

Bicolumnar Intercarpal Arthrodesis: Minimum 2-Year Follow-Up

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Purpose To determine greater than 2-year outcomes for combined lunate-capitate and triquetrum-hamate arthrodeses.

Methods We identified 16 patients who underwent scaphoid excision and combined arthrodeses of the lunate-capitate and triquetrum-hamate joints (bicolumnar arthrodesis) from 2007 to 2010. Eleven patients returned for follow-up evaluation, which included measurement of operative and contralateral control wrist flexion, extension, and grip strength, and completion of a patient-reported outcomes questionnaire, visual analog scale pain assessment, and Disabilities of the Arm, Shoulder, and Hand questionnaire. Radiographs of each patient were reviewed for evidence of union. Complications including nonunion and hardware migration were recorded.

Results Wrist flexion-extension in the operative wrist was 68% of the contralateral control wrist. Grip strength of the operative wrist was 97% of the contralateral wrist. All 11 patients had radiographic bicolumnar union; 8 patients had spontaneous radiographic fusion of the capitolunate joint. One patient required capitoulunate screw removal for migration despite having evidence of union.

Conclusions Results from scaphoid excision and bicolumnar intercarpal arthrodesis are comparable to those reported for traditional scaphoid excision and 4-corner arthrodesis, with a similar loss of wrist range of motion and with possible preservation of better grip strength in the operative wrist. Advantages of this modification include preservation of the normal lunate-triquetrum and capitate-hamate anatomic relationships and simplification of operative technique. (*J Hand Surg Am.* 2014;39(5):888–894. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words Arthrodesis, 4-corner arthrodesis, midcarpal arthrodesis, scaphoid nonunion advanced collapse, scapholunate advanced collapse.

LONGSTANDING SCAPHOID NONUNION and scapholunate dissociation lead to predictable forms of wrist arthritis, scaphoid nonunion advanced collapse (SNAC) wrist, and scapholunate advanced

collapse (SLAC) wrist.^{1,2} Treatments for these entities involve transference of load normally borne through the arthritic radioscaphoid joint to the radiolunate and ulnotriquetral joints, which are characteristically spared of arthrosis. Common treatments for these entities are either proximal row carpectomy or scaphoid excision and 4-corner arthrodesis between the lunate, capitate, hamate, and triquetrum.²

Alternative intercarpal arthrodeses have been proposed in the treatment of SLAC wrist and SNAC wrist, including capitoulunate arthrodesis (with scaphoid excision and possibly triquetrum excision),^{3–5} 3-corner arthrodesis,⁶ and bicolumnar arthrodesis.^{7,8} Advocates of limited intercarpal arthrodesis for treatment of SLAC wrist and SNAC wrist believe that through limited

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FIGURE 1: Representative radiograph of a wrist treated with a bicolumnar intercarpal arthrodesis for scapholunate advanced collapse. Bony fusion is present at the capitate-lunate and triquetrum-hamate joints. A possible incidental fusion is noted at the capitate-hamate joint, although this joint is not denuded of cartilage. The lunotriquetrum joint is not disturbed by the procedure and no change is present there.

fusion, similar surgical and clinical goals can be accomplished with the preservation of normal anatomy between some of the carpals.⁷

The senior author (D.K.B.) has been performing a bicolumnar intercarpal arthrodesis technique for a number of years. This technique involves scaphoid excision and arthrodesis of the capitate-lunate and triquetrum-hamate joints, but sparing of the lunotriquetrum and capitate-hamate joints. Fixation is accomplished through placement of 2 headless compression screws (lunate-capitate and triquetrum-hamate-capitate) in a V-shaped orientation. This technical modification requires less exposure of the carpus than is necessary for traditional 4-corner arthrodesis and greatly simplifies the operative technique. [Figure 1](#) shows a representative radiograph illustrating the bicolumnar arthrodesis technique.

The purpose of this study was to evaluate the results of this bicolumnar intercarpal arthrodesis technique at a minimum of 2-year follow-up. We hypothesized that the bicolumnar fusion for SNAC wrist and SLAC wrist would yield results similar to those previously reported for scaphoid excision with 4-corner arthrodesis.

MATERIALS AND METHODS

We obtained institutional review board approval for this study.

Sixteen patients who underwent bicolumnar intercarpal arthrodesis by the senior author for SLAC wrist or SNAC wrist were identified retrospectively at our institution. We attempted to contact these patients by phone and asked them to return to the clinic for a research follow-up visit. Of these 16 patients, 1 was incarcerated at the time of the study; 3 had disconnected phone numbers, and despite an exhaustive search we were unable to locate and contact them; and 1 did not respond to multiple attempts at contact. The remaining 11 patients returned for a follow-up visit. After obtaining informed consent and Health Insurance Portability and Accountability Act consent, each patient completed the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire and a questionnaire specific to the study, including current pain on a visual analog scale (VAS), patient satisfaction with surgery, and employment status before and after surgery. Flexion and extension of both the operative and nonsurgical wrist were measured with a goniometer. Flexion and extension measurements from each wrist were summed to yield a measurement of arc of flexion-extension for each wrist. Grip strength was measured using a JAMAR dynamometer (Sammons Preston Roylean, Bolingbrook, IL). For all motion and grip strength determinations, the average of 3 measurements was used for data analysis. The same senior orthopedic trainee made all measurements and supervised all research study visits.

Surgical technique

The bicolumnar intercarpal arthrodesis was performed according to the following technique. Under tourniquet control, a dorsal longitudinal incision is made just ulnar to the Lister tubercle. The extensor retinaculum overlying the third dorsal compartment is incised longitudinally on the ulnar border of the extensor pollicis longus tendon, which along with the radial wrist extensors is retracted radially. The septum between the third and fourth dorsal compartments is released from the radius, and the plane of exposure is continued distally, elevating the fourth compartment tendons off the dorsal wrist capsule without actually exposing the tendons, in an attempt to minimize postoperative adhesions. The contents of the fourth dorsal compartment are retracted ulnarly in their fibroosseous sheath, exposing the dorsal wrist capsule. Because the fourth dorsal compartment is

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