Midterm Outcome of Bone-Ligament-Bone Graft and Dorsal Capsulodesis for Chronic Scapholunate Instability

Anne Gray, MD,* Philippe Cuénod, MD,† Michaël Y. Papaloïzos, MD†

Purpose To assess midterm outcomes of our bone-ligament-bone (BLB) grafts for chronic scapholunate (SL) instability and better define criteria for their use.

Methods We conducted a retrospective review of 26 patients treated with BLB grafts and dorsal capsulodesis between 1997 and 2009. Twenty-four patients were reviewed. Mean follow-up was 8.2 years. Two patients had dynamic lesions, 7 had SL dissociation, 14 had a dorsal intercalated segment instability lesion, and 1 had SL advanced collapse stage 1. Mean age at surgery was 46 years. All patients presented with pain and 14 had lack of strength. Results were reviewed clinically and radiologically. Images were assessed by 4 surgeons and 1 radiologist for radial styloid, radioscaphoid, radiolunate, midcarpal, and scaphotrapeziotrapezoid degenerative changes.

Results Five patients needed subsequent 4-corner arthrodesis. Of the remaining 19 patients at follow-up, both extension and flexion decreased to 73% of the contralateral side. Postoperative grip strength improved from 78% to 90% of the nonsurgical wrist. Quick Disabilities of the Arm, Shoulder, and Hand score was 10 of 100 and the Patient-Rated Wrist Evaluation score was 10 of 100. Radiologically, the SL gap was improved and maintained at follow-up. The SL angle (mean before surgery, 79°) was initially corrected to 69° but returned to preoperative values at follow-up. Eleven of the 19 cases had signs of midcarpal arthritis.

Conclusions Bone-ligament-bone grafts with SL dorsal capsulodesis were able to restore and maintain an improved SL interval in all patients. The technique achieved good clinical results and high patient satisfaction, but it did not stop the progression of arthritis, particularly at the midcarpal level. This technique is an option for isolated unrepairable lesion of the dorsal SL ligament with an easily correctable lunate and especially when restoration of grip strength is important. *(J Hand Surg Am. 2015;40(8):1540–1546. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic IV.

Key words Wrist instability, scapholunate ligament, bone-ligament-bone, capsulodesis.

*From the *Centre Hospitalier du Valais Romand (CHVR), Sierre; and the †Center for Hand Surgery and Therapy, Geneva, Switzerland.*

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Corresponding author: Philippe Cuénod, MD, CH8-Center for Hand Surgery and Therapy, Charles-Humbert 8, 1205 Geneva, Switzerland; e-mail: pcuenod@ch8.ch.

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Chronic injury to the scapholunate interosseous ligament (SLIL) remains a difficult lesion to treat. Either acute trauma or repetitive excessive loading can be the cause of the injury.[1,2] Chronic dissociation causes a painful wrist disability and, if left untreated, will often lead to progressive changes of the wrist, from abnormal rotation of the scaphoid to radioscaphoid arthritis, and then eventually, scapholunate advanced collapse (SLAC).[3]

Treatment is controversial and no technique has been generally accepted as the treatment of choice for chronic scapholunate (SL) dissociation. To date, the options include different forms of capsulodesis,[4,5] tenodesis,[6,7] bone-ligament-bone (BLB) procedures,[8–10] Reduction and Association of the Scaphoid and Lunate using the Herbert screw,[11] and partial wrist arthrodesis.[12] Newer techniques including the scapholunate axis method have been recently introduced, and a recent biomechanical cadaver study by Lee et al[13] shows this might be a useful alternative for SL ligament reconstruction.

Clinicians faced with chronically disrupted SLIL ligaments ideally need an anatomically based and biomechanically sound surgical treatment. The dorsal part of the SLIL is the most important structure in providing stability of the SL joint.[14,15] Bone-ligament-bone reconstruction of the SL ligament has the potential to improve the anatomy and kinematics of the wrist. Several different autografts have been proposed both experimentally and clinically to replace an insufficient SLIL. Hofstede et al[16] analyzed foot tarsal autografts and found that the third dorsal tarsometatarsal ligament and the dorsal calcaneocuboid ligament were comparable with the dorsal part of the SL ligament. The disadvantage of this technique is the use of a second surgical site and the potential effects of ligament removal on foot stability. Weiss[8] described a bone-retinaculum-bone (BRB) autograft from the Lister tubercle. Soong et al[17] showed in their long-term study that the BRB maintained the SL gap to less than 3 mm in 56% of the cases and had no radiographic arthritis in 44% of cases. However, they did note a failure that may have been related to the stiffness of the graft.[17] This is in line with biomechanical studies that have shown that this type of graft is noticeably weaker than the dorsal part of the SLIL.[18] Cuénod et al[19] believed that a more appropriate substitute should be hand-based and intercarpal. A mechanical comparison of BLB autografts from the wrist found the trapezoid—to—second metacarpal ligament and the capitate-to-trapezoid are appropriate substitutes for the dorsal SLIL.[19] The advantages proposed for these grafts were an easy harvest by the same surgical approach; the size, type, load to failure, and stiffness matches those of the dorsal part of the SLIL; and functionally minimal donor site morbidity. Since 1997, we have treated a series of patients with these BLB grafts reinforced with a distally based dorsal capsulodesis. Our purpose was to assess the midterm results of this procedure for chronic SL dissociation and to better define its indications.

MATERIALS AND METHODS

Patients

Twenty-six patients underwent BLB grafts from 1997 to 2008 in our center. All patients were fully informed about the procedure and its possible risks and benefits before surgery, and written consent was obtained from each of them, Institutional review board approval was not required at our institution. We were able to contact 24 of the 26 patients and explained to them the purpose and extent of this study. Twenty-four patients gave their consent to participate in the review. One patient who lives abroad only filled out the questionnaires, and 1 patient accepted a home visit so no x-rays could be obtained. SL lesions were classified according to Wolfe[20]: there were 2 dynamic lesions, 7 SL dissociations, 14 dorsal intercalated segment instability (DISI) deformities, and 1 SLAC stage 1. Twelve patients had plain x-ray diagnosis; the remaining 13 had DISI deformities and abnormal SL and radiolunate angles that required additional testing to confirm the extent of the lesion and/or to look for other intracarpal lesions: 8 had a supplementary computed tomography scan, 3 had a magnetic resonance imaging study, and 2 had a diagnostic arthroscopy. Twenty-two were men and 2 were women. Average age at the time of surgery was 46 years (range, 22—69 y). Three patients had no recollection of trauma. Of the other 21, the average time from injury to surgery was 8 months (6 wk—24 mo). All patients presented with pain and 14 complained of lack of strength. Eleven patients had nonmanual occupations; 3 had semimanual, and 10 had manual employment.

Surgical procedure

The technique used was previously described by Cuénod.[9] It is a combination of methods in an attempt to provide a robust repair. Similarly to the BRB graft described by Weiss,[8] this technique replaces the dorsal SLIL by a BLB graft that has closer structural and mechanical properties,[19] reinforced by a distally based dorsal intercarpal ligament capsulodesis modified from Blatt[21] and Slater et al.[22] This was inspired by Slater's poster in 1997. The article[22] was later published concurrently with Cuénod's 1999 article.[9] The capsulodesis attachment to the distal pole of the scaphoid was left intact and its proximal part anchored under tension on the lunate or, in a late modification, on both the scaphoid proximal pole and the lunate with 2 anchors.

The dorsal approach was centered over the Lister tubercle with a capsular incision according to Berger and Bishop,[23] reduction of the scaphoid and the