SCIENTIFIC ARTICLE

Effectiveness of an Arthroscopic Technique to Correct Supination Losses of 90° or More

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Purpose To present a new arthroscopic method for treating supination losses.

Methods Six patients (15–71 y) were eligible for this study. All had a history of trauma to the wrist more than 6 months previously. Five of them had sustained a distal radius fracture: 3 had been treated with a volar plate (1 of them for an extra-articular malunion), 1 with an external fixator and K-wires, and 1 had been treated in a cast. One of these patients underwent a further operation for correcting an intra-articular malunion. The last patient underwent an open reduction of a trans-scaphoid perilunate dislocation. During a standard radiocarpal arthroscopy, a curved periosteal elevator was inserted through the 6R portal into the volar-radial corner of the triangular fibrocartilage complex and advanced proximally gliding on the anterior ulnar head surface. The volar capsule was then distended with the periosteal elevator and by means of gentle sweeping motion adherences between them, the volar capsule and the ulnar head were freed. Finally, the arthroscopic release was combined with a gentle passive supination force applied by the surgeon. Full supination was maintained in an orthosis for 2 to 3 days. Afterward, regular physical therapy was instituted. Concomitant surgery, arthroscopic or open, was performed in all to treat associated conditions.

Results Full supination (90°) was achieved in all intraoperatively. At a mean follow-up of 3.3 years, mean supination was 76° in the latest follow-up (range, 50° to 90°). Mean improvement in supination was 80° (range, 50° to 100°). No distal radioulnar instability or other complications were noted.

Conclusions The method presented proved effective in severe forms of supination deficits. *(J Hand Surg Am. 2018;■(■):1.e1-e6. Copyright © 2018 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic V.

Key words Supination loss, pronosupination stiffness, wrist arthroscopy, distal radius fractures.

Online Exclusive

Loss of supination is frequently seen after a distal radius fracture. Although often painless, lack of supination leaves patients unable to place their hand in space effectively. Adherence and retraction of the volar distal radioulnar joint capsule,[1] due to immobilization in pronation, and retraction of the pronator quadratus by compartment syndrome[2] have been proposed to be responsible for

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the condition. If, after extensive physical therapy, lack of supination persists, open excision of the volar capsule is recommended. For cases where this is insufficient, Garcia-Elias[3] recommends excising the distal edge of the pronator quadratus. In both instances, an open approach, ulnar or radial, to the flexor carpi ulnaris is recommended to progressively excise the volar distal radioulnar capsule and release the pronator quadratus from the ulna.

Arthroscopic arthrolysis of the distal radioulnar joint (DRUJ) has also been proposed for cases of rotational stiffness.[4–6] The procedure is performed from the DRUJ portals.[4–6]

The purpose of this study was to present a new method for arthroscopic release, through the radiocarpal joint, of adherences and contractures in the volar radioulnar capsule that may cause supination losses. To evaluate the true value of the method, its effectiveness was assessed in a selected group of patients with a severe lack of supination (90° minimum).

METHODS

Six patients lacking at least 90° supination were included in this series. All had sustained trauma to their wrist and had been initially treated at other centers. Five had a distal radius fracture and 1 an ununited scaphoid fracture with midcarpal degeneration, in the setting of a transscaphoid perilunate dislocation that was kept immobilized in a cast for 3 months after open reduction.

There were 4 females and 2 males with ages ranging from 15 to 71 years. Several patients had pain (Table 1). Four patients also had losses of pronation of 30°, 10°, 50°, 50° (cases 2, 3, 4, and 6, respectively). All patients had undergone extensive physical therapy before the procedure.

For the purpose of this study, they were recalled and the range of motion was recorded with a handheld goniometer by the surgeon. To avoid any contribution by the shoulder, the arm was adducted to the side and the elbow flexed. All patients were aware of the treatment aims and understood the risks and benefits of the procedure.

Informed consent was obtained for each patient for the arthroscopic as well as the possible conversion to open procedure if the need arose.

Surgical technique

Arthroscopy was performed in all cases as the first part of the procedure to assess the joint and identify possibilities for reconstruction. The hand was set in traction to an overhead bow. Even traction of 12 to 15 kg was distributed to all fingers. Typically, only 3-4 and 6R portals were needed—no DRUJ portals were used. Arthroscopy was performed dry in all cases, flushing the joint with saline as needed to remove debris, as recommended by del Piñal et al.[7,8] The midcarpal joint was not entered as the scarred tissue rarely involves this joint. The exception was one case in which an arthroscopic 4-corner arthrodesis was carried out.[9]

In most cases, there was abundant scar tissue and time was required to triangulate in the radiocarpal space. First, a working space was created, and this was done by recreating the dorsal sulcus by releasing adhesions between the carpal bones and the dorsal capsule with a 2.9-mm shaver. Then, if any pathology was treatable under arthroscopy (ulnar styloid impingement: cases 1 and 6), it was carried out.[10] At this point, correction of the supination deficit was undertaken. While the scope was in the 3-4 portal, a slightly curved rib periosteal elevator (Fig. 1) was introduced through the 6R portal. The tip of the instrument perforated the volar radial corner of the triangular fibrocartilage (TFC) (if the TFC was intact) and gently twisted until the capsule yielded. Then, the instrument was swept ulnarly, gliding over the head of the ulna and pushed volarly to distract the capsule and free the ulnar head from adhesions. At the same time, the surgeon brought the hand into supination to permit release of the volar adhesions. At this point, full, or nearly full, supination had been achieved. Gentle passive forearm supination and volar pressure on the ulna completed the correction (Figs. 2, 3; Videos 1, 2, available on the *Journal's* Web site at www.jhandsurg.org).

Any required concomitant procedure was carried out after this release. No open surgery was performed in case 1 or 2. In case 2, an arthroscopic 4- corner arthrodesis was performed in the same operation.[9] As regards the rest, in 2, a volar plate was removed, whereas in another 2, a volar plate was installed for fixation after an arthroscopic guided intra-articular osteotomy.[11] Finally, 1 patient who also had stiffness of the fingers had intrinsic muscle releases and a carpal tunnel release. Details are presented in Table 2.

Patients were immobilized with an above-elbow orthosis in full supination for the first 2 to 3 days. Self-directed exercises, which consisted of assisted supination (and pronation) to the point of slight pain and maintaining that position for 5 seconds, were instituted afterward. This exercise was repeated 10 times every hour during daytime. After the fourth to sixth week, this was implemented by the therapist in every case. The passive force exerted was commensurate with the concomitant surgery. Unrestricted active and passive