SCIENTIFIC ARTICLE

The Effect of Debridement of Coexisting Partial Ligament Injuries on Outcomes Following Arthroscopic Osteosynthesis for Minimally Displaced Scaphoid Nonunions

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Purpose Partial intercarpal ligament injuries can coexist with scaphoid nonunions. However, whether these injuries should be debrided simultaneously when scaphoid nonunions are treated is unclear. The purpose of this study was to compare union rates and clinical outcomes after arthroscopic management of scaphoid nonunions, in which coexisting partial ligament injuries were, or were not, simultaneously debrided.

Methods This retrospective study included 46 patients with scaphoid nonunions and coexisting partial intercarpal ligament injuries who underwent arthroscopy-guided bone grafting and fixation (K-wires or headless screws) between March 2008 and May 2014 with a minimum follow-up of 1 year. None of the cases had necrosis of the proximal fragment (determined by contrast-enhanced magnetic resonance imaging), severe deformities, or advanced arthritis. The partial intercarpal ligament injuries were either simultaneously debrided (25 patients; group D) or not debrided (21 patients; group ND). Visual analog scale pain scores, grip strength, flexion-extension arc of the wrist, Mayo Wrist Scores, and Disabilities of Arm, Shoulder, and Hand scores were used to compare clinical outcomes between the 2 groups.

Results The nonunions united in 93% (43 of 46) of the patients. There were no differences between the 2 groups with regard to patient demographics, preoperative outcome measures, location of scaphoid nonunion, and degree of ligament injury. The overall union rate was similar between group D (92%; 23 of 25) and group ND (95%; 20 of 21). At a median follow-up of 24 months for group D and group ND, the visual analog scale pain score, grip strength, Mayo Wrist Scores, and Disabilities of the Arm, Shoulder, and Hand scores were significantly improved in both groups, compared with preoperative scores. Flexion-extension arc showed no change in both groups compared with preoperative angles. All of the follow-up measurements were similar in the 2 groups.

Conclusions In patients who underwent arthroscopic bone grafting and fixation of scaphoid nonunions, simultaneous debridement of incidentally found partial intercarpal ligament injuries did not result in a better union rate or clinical outcomes than not debriding the partial ligament injuries. *(J Hand Surg Am. 2016;41(6):e135–e142.*

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Received for publication July 17, 2015; accepted in revised form April 6, 2016.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

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0363-5023/16/4106-0014$36.00/0
http://dx.doi.org/10.1016/j.jhsa.2016.04.007

Type of study/level of evidence Therapeutic III.

Key words Scaphoid nonunion, arthroscopic management, coexisting partial intercarpal ligament injuries.

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APPROXIMATELY 5% TO 15% OF SCAPHOID fractures do not unite,[1–3] particularly when ligament injuries are present.[4–6] Nonunion debridement, reduction, bone grafting, and stable internal fixation while maintaining blood supply are critical requirements of treatment.[7,8] All of these procedures can be performed under arthroscopic guidance in patients with minimally displaced scaphoid nonunions and minimal sclerosis.[9–13]

Since arthroscopic techniques have been used to treat scaphoid fractures and nonunions, the incidence of coexisting ligament injuries has been found to be higher than originally thought.[9,10,14–17] Several studies have reported coexisting ligament injury rates of 41% to 83% in patients with acute scaphoid fractures and 60% in patients with scaphoid nonunions.[9,14,17,18] In 2005, Wong et al[18] reported that the clinical outcomes of patients with partial and complete intercarpal ligament injuries were inferior to those of patients without ligament injuries even after simultaneous debridement and pinning. In contrast, in 2008, Caloia et al[17] reported good or excellent clinical outcomes in 95.7% of their scaphoid fracture patients after arthroscopically assisted reduction and fixation, although 62.5% of their patients had coexisting soft tissue and/or osteochondral injuries. In 2011, Chu and Shih[9] reported good or excellent clinical outcomes in 93.3% of their series of patients with scaphoid nonunions, 66.7% of whom had coexisting partial intercarpal ligament injuries. The differences among these studies may be related to the degree of coexisting intercarpal ligament injury. However, the clinical relevance of partial intercarpal ligament injuries and their debridement in relation to union rates and clinical outcomes upon treating scaphoid nonunions is unclear.

We hypothesized that debridement of coexisting partial ligament injuries is not necessary when treating scaphoid nonunions by arthroscopic osteosynthesis. The purpose of this retrospective study was to compare scaphoid union rates and clinical outcomes after debridement of coexisting partial intercarpal ligament injuries to outcomes associated with no debridement when bone grafting and stable fixation of scaphoid nonunions is performed.

MATERIALS AND METHODS

Data collection

We retrospectively reviewed the records of a sample of convenience consisting of 78 patients who underwent arthroscopic nonunion debridement, internal fixation, and bone grafting between March 2008 and May 2014. The preoperative imaging evaluation comprised plain radiographs, including true wrist posteroanterior, lateral, posteroanterior with ulnar deviation, and obliques with 45° pronation views. Computed tomography (CT) scans of the scaphoid were routinely obtained before surgery but magnetic resonance imaging (MRI) was performed only in cases with suspected avascular necrosis, such as those with increased radiodensity (sclerosis) of the proximal fragment on plain radiographs or CT scans.[19] Nonunion was defined as a persistent fracture gap at least 6 months after the index injury, with bone resorption and sclerotic and/or cystic changes at the fracture site, seen on plain radiographs (Fig. 1).

Patients were excluded for the following reasons: (1) scaphoid nonunion without coexisting ligament injuries based on arthroscopic findings, (2) history of another fracture around the wrist, (3) advanced wrist arthritis (stage II or more scaphoid nonunion advanced collapse (SNAC) wrist), (4) humpback deformity or dorsal intercalated segmental instability, defined as a lateral intrascaphoid angle greater than 45° or a radiolunate angle greater than 10°,[8] (5) triangular fibrocartilage complex (TFCC) injury with ulnar wrist pain or instability of distal radioulnar joint, and (6) inadequate follow-up (<12 months). Based on these criteria, 19 patients without any coexisting ligament injuries, 1 patient with a previous ulnar styloid fracture, 3 patients with a SNAC II wrist, 4 patients with humpback nonunions, and 2 patients with combined symptomatic TFCC injury were excluded. Three of the 78 patients had inadequate follow-up. In total, 32 patients were excluded, leaving a final study sample of 46 patients who underwent arthroscopic management of scaphoid nonunion with coexisting ligament injuries (Fig. 2).

During the study period, our treatment strategy of coexisting ligament injuries has evolved. During the earlier part of the study, we debrided coexisting partial intercarpal ligament injuries and debrided or repaired coexisting TFCC injury during the same surgery for