SCIENTIFIC ARTICLE

Suture Anchor Fixation for Scaphoid Nonunions With Small Proximal Fragments: Report of 11 Cases

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Purpose To describe the use of 2 suture anchors as the fixation devices in the management of 11 patients with scaphoid proximal pole nonunions with small proximal fragments.

Methods In a prospective study, 11 patients with proximal pole scaphoid nonunions (10 with small proximal fragments and 1 with an oblique nonunion line) were evaluated before surgery by standard wrist x-rays and functional wrist scores including a visual analog scale (VAS), Mayo wrist score, and Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH). The nonunion site was fixed with 2 suture anchors supplemented with autologous cancellous bone graft. Postoperative evaluations consisting of functional wrist scores and evaluation of radiological union were performed 9 months after surgery.

Results At the end of the study, we observed union in 10 of the 11 patients. The QuickDASH and VAS scores showed significant improvement, and 10 patients had satisfactory Mayo scores.

Conclusions We propose the technique of suture anchor fixation for cases of proximal scaphoid nonunion in which secure internal fixation with common techniques is challenging because of the small size of the proximal fragment and the obliquity of the nonunion site. *(J Hand Surg Am. 2014;39(8):1494–1499. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic IV.

Key words Mayo wrist score, proximal pole nonunion, QuickDASH score, scaphoid nonunion, suture anchor.

The proximity of a fracture line to the proximal pole is one of the major risk factors for developing scaphoid nonunion and increases the risk of treatment failure.[1–6] Osteonecrosis and an inability to achieve secure fixation are explanations for scaphoid proximal pole nonunions.[2,7]

Treatment options for proximal scaphoid nonunion are vascularized or nonvascularized bone graft with internal fixation.[8] Headless screw fixation is the preferred method for fixation in most scaphoid nonunions.[7,8] In the case of a proximal scaphoid nonunion, it is challenging to fix the small osteochondral fragment using standard internal fixation techniques.[9] Persistent nonunion, even with a small proximal fragment, leads to late degenerative changes and persistent pain.[10]

The purpose of this study was to present a fixation technique for scaphoid nonunion with a small proximal pole fragment using 2 suture anchors. We report our results for 11 patients treated with this method.

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METHODS

Patient selection and evaluation

We designed a prospective study to assess suture anchor fixation for proximal pole scaphoid nonunions unsuitable for a headless compression screw. All proximal pole scaphoid nonunion cases with a proximal fragment length 20% or less of overall bone length and without radiological signs of wrist degeneration changes were included in the study (Fig. 1). We also included cases with small proximal fragments in which the direction of the nonunion line was close to the long axis of the scaphoid so that fixation with a headless screw would not produce secure fixation across the nonunion site owing to inadequate bone stock (Fig. 1). There were no selection limitations for age, sex, etiology, smoking, the time from injury to presentation, or proximal fragment vascularity. All of the operations were performed by the senior author (R.S.K). The medical ethics committee of the orthopedics department of our hospital approved the study, and informed consent from the patients was obtained after explanation of the available treatment options prior to surgery.

Preoperative evaluation

On the preoperative evaluation, the passive wrist flexion and extension were measured by a goniometer, and the grip strength was measured in kilograms by a grip dynamometer (Jamar device, Patterson Medical, Warrenville, IL) with the forearm in a neutral position and the elbow in 90° flexion. The maximal value of 3 trials was documented. All of the patients were assessed with a visual analog scale (VAS) for scoring pain,[11] the Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) score, and the Mayo wrist score[12] to document the baseline functional status.

Posteroanterior (PA), lateral, and ulnar-deviated PA x-ray images were obtained. We evaluated the presence of dorsal intercalary segment instability (DISI) deformity in lateral radiographs by measuring the radiolunate angle.

The proximal fragment ratio was measured from the ulnar-deviated PA view according to the method of Slutsky and Slade.[5] The distances between the midpoint of the nonunion site and the distal and proximal poles were measured, and the ratio of the length of the proximal fragment to the sum of the proximal and distal fragments was expressed as the fragment ratio (Fig. 2).

Surgical technique

The scaphoid was exposed dorsally through a 2.5- to 3-cm transverse incision over the third and fourth extensor compartments just distal to the Lister tubercle. Both extensor compartments were identified and opened longitudinally, and the joint capsule was opened transversely, resulting in the exposure of the nonunion site. If there was fibrous tissue stabilizing the nonunion site, a hole was made with a 3-mm bur, and the nonunion surfaces on the distal and proximal fragments were gently freshened through the hole. If the nonunion was unstable, the opposing surfaces of

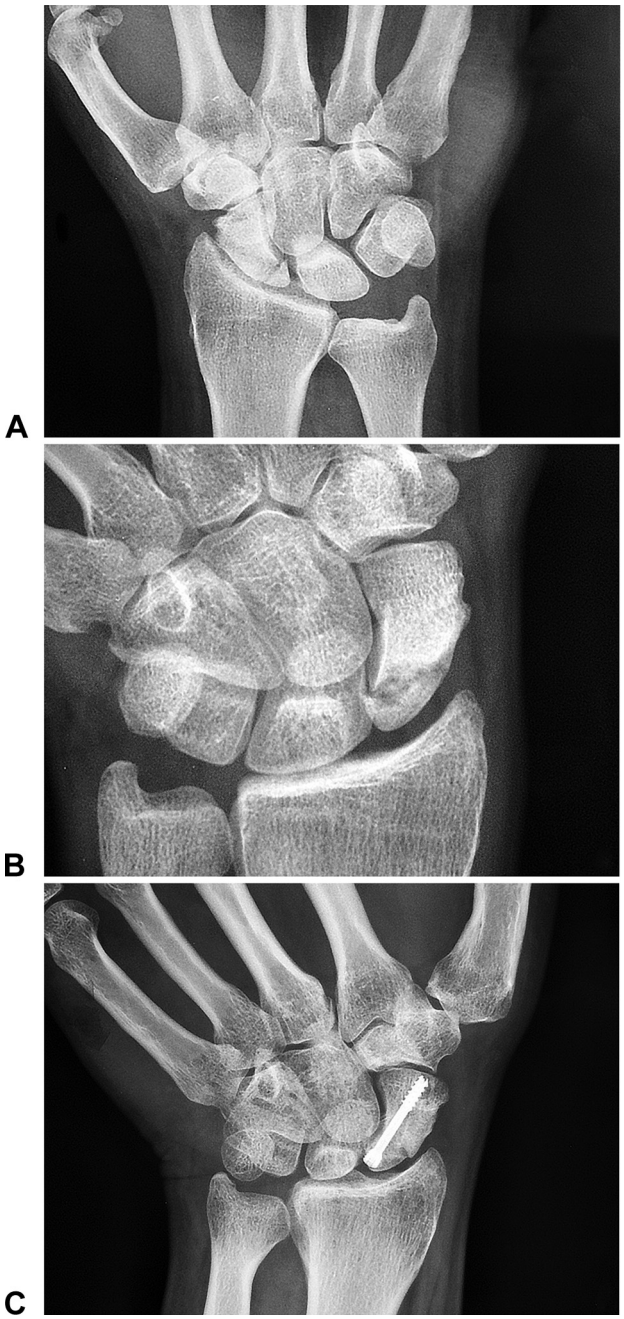

FIGURE 1: Indications of suture anchor fixation. **A** Case no. 2, small proximal fragment. **B** Case no. 3, small proximal fragment with oblique fracture line. **C** Case no. 9, previous percutaneous headless screw fixation failure with a small proximal fragment.