A Scapholunate Ligament–Sparing Technique Utilizing the Medial Femoral Condyle Corticocancellous Free Flap to Reconstruct Scaphoid Nonunions With Proximal Pole Avascular Necrosis

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This article demonstrates a technique for the treatment of scaphoid fracture waist and proximal pole nonunions with avascular necrosis using a free vascularized medial femoral condyle flap. We present our surgical technique and representative case examples in which the scapholunate ligament, a key structure required to preserve carpal kinematics, is spared. *(J Hand Surg Am. 2016;41(9):e309–e315. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words Avascular necrosis, medial genicular/geniculate femoral condyle flap, reconstruction, scaphoid nonunion.

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BACKGROUND AND INTRODUCTION

Scaphoid nonunion with avascular necrosis of the proximal fragment represents a challenge, especially in the presence of humpback or dorsal intercalated segmental instability (DISI) deformity. Surgical options include nonunion repair using pedicled vascularized bone grafts or free vascularized bone grafts including the medial femoral condyle (MFC) flap.[1–4] Excision and replacement of the proximal pole with an osteocartilaginous MFC flap containing trochlear cartilage has been described; however, this technique may compromise or even require excision of the scapholunate ligament.[5] Herein, we describe a surgical technique with potential advantages over those described in the literature. This technique reliably preserves the scapholunate ligament for both scaphoid waist and proximal pole nonunions and is based upon the MFC corticocancellous free flap, which is less technically demanding to harvest than its osteocartilaginous counterpart. The motivation to derive this technique was based upon evidence suggesting that superior healing rates are achieved with free MFC flaps over pedicled bone grafts[1,3,6] and the desire to apply a single surgical technique to the treatment of both scaphoid waist and proximal pole nonunions while preserving the scapholunate ligament, an important linkage with respect to carpal kinematics, stability, and development of arthritis.[7]

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INDICATIONS AND CONTRAINDICATIONS

This technique is considered for scaphoid waist or proximal pole nonunions with avascular necrosis of the proximal fragment in symptomatic patients (Figs. 1–3; Video 1; available on the *Journal*'s Web site at www.jhandsurg.org) or for those with humpback or DISI

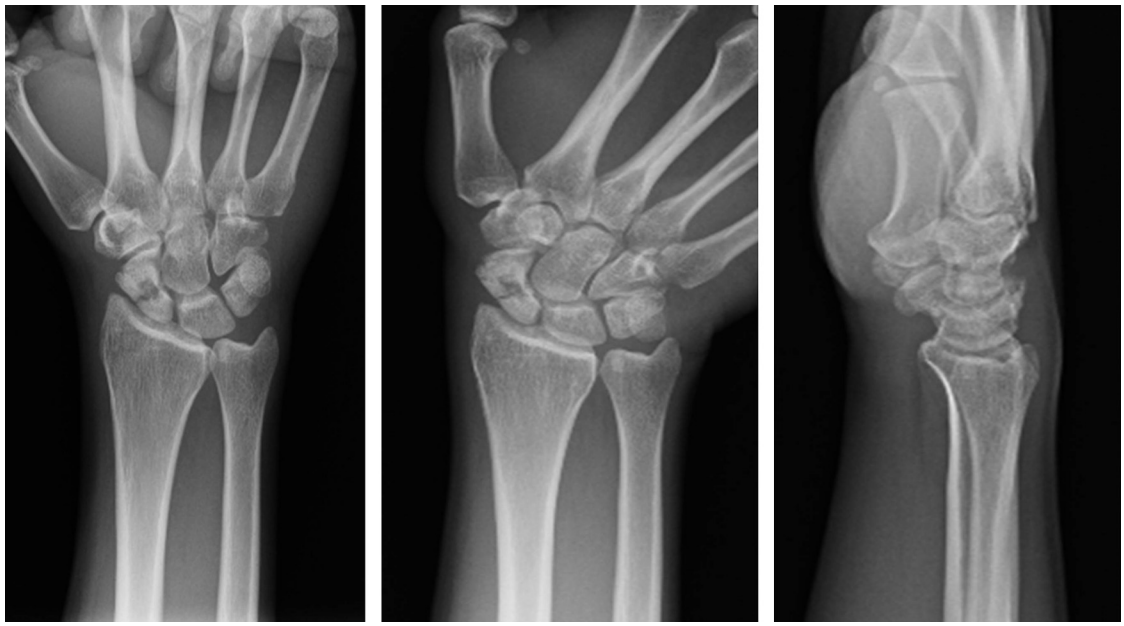

FIGURE 1: Preoperative radiographs demonstrate a scaphoid waist nonunion with proximal pole sclerosis consistent with avascular necrosis. Distal fragment cystic changes and a humpback deformity are evident. The radiolunate angle remains normal, and arthritic changes are absent.

FIGURE 2: Preoperative computed tomography imaging. Coronal and sagittal images of the scaphoid further elucidate the nonunion, humpback deformity, and cystic changes in the distal fragment.

deformity regardless of symptoms.[7] Alternate treatment strategies are pursued in the setting of preexisting scaphoid nonunion advanced collapse arthritis, severe peripheral vascular disease, or patients with significant medical comorbidities.

RELEVANT ANATOMY

The MFC flap is based upon the descending branch of the medial genicular artery, which originates from the superficial femoral artery 14 cm proximal to the joint line.[8] Its pedicle, located lateral to the adductor magnus