

Treatment of Scaphoid Nonunion Utilizing Capsular Based Vascularized Bone Graft from Second Dorsal Compartment

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INTRODUCTION:

Scaphoid fractures are challenging injuries to treat due to their tenuous blood supply and significant risk for nonunion and avascular necrosis. Utilizing vascularized bone grafts may increase union rates, lessen time to union, and offer better conditions for healing. However, harvesting them requires increased technical demands, delicate small vessel dissection, and special care to preserve graft viability. We propose a technique utilizing a capsular based vascularized bone graft harvested through a second dorsal extensor compartment approach to the distal radius to promote consolidation in scaphoid nonunions. This harvest site is in good relative location to both proximal pole and scaphoid waist fractures and uniquely avoids encountering any true vascular leash; but instead receives vascularity from small branches of both the 1,2 and 2,3 intercompartmental supraretinacular arteries.

METHODS:

A retrospective review of all patients treated for scaphoid nonunions treated with second dorsal extensor compartment grafting was completed. One proximal pole and 7 scaphoid waist nonunions were identified. Capsular based vascularized bone grafts were harvested through a second dorsal extensor compartment release, preserving the capsular attachment to the distal dorsal lip of the radius. All nonunions were stabilized or fixed with cannulated headless compression screws prior to graft impaction. Patients were followed clinically and radiographically for union.

RESULTS: Tourniquet time averaged 45.9 minutes (38-65) during the procedure. Six patients achieved radiographic union after 21.7 weeks (13.0-44.1). Of the remaining two, one patient was lost to follow up, and one discontinued in person visits prior to achievement of radiographic union. Four patients had documented employment status and returned to work after an average of 99.25 days out from surgery (49-151). One patient experienced persistent wrist stiffness and decreased range of motion. One patient reported persistent paresthesia in a radial sensory distribution. One patient had subjective stiffness and was found to have radiographic migration of supplemental Kirschner wire, which resolved with subsequent removal.

DISCUSSION AND CONCLUSION: Capsular based vascularized bone graft harvest from the base of the second dorsal extensor compartment provides an effective option for both scaphoid proximal pole and waist nonunion repair. The regional graft capsule itself uniquely receives vascularity from small branches of established extraosseous vessels while avoiding a true vascular leash. This novel technique is technically simple, time efficient, and has demonstrated promising union and time to union rates when compared to previously described vascularized bone grafts.



Figure 1: Initial plain films obtained 6 weeks out from injury demonstrating scaphoid waist nonunion.

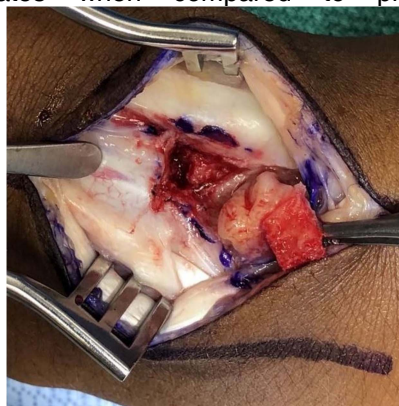


Figure 2: Intra-operative photo from 2nd dorsal extensor compartment release with pedicled vascularized bone graft reflected distally. Underlying capsular attachment remains preserved.



Figure 5: Plain films 1 year postoperatively demonstrating solid bony union.