Published in final edited form as:

J Hand Surg Eur Vol. 2016 January ; 41(1): 110–111. doi:10.1177/1753193414535349.

The Use of Interference Screw Fixation in the Modified Brunelli Technique for Scapholunate Dissociation

DJ Lee¹, A Zingman¹, and JC Elfar¹

¹Department of Orthopaedic Surgery, University of Rochester Medical Center, Rochester, NY, USA

Keywords

Scapholunate dissociation; scapholunate reconstruction; modified Brunelli technique; interference screw fixation

Dear Sir

The modified Brunelli technique for scapholunate interosseus ligament (SLIL) reconstruction is used commonly. While cadaveric and short-term clinical studies report favorable radiographic and clinical outcomes using the modified Brunelli tenodesis (Links et al., 2008), published literature suggests that it does not maintain the normal carpal relationships over time (Chabas et al., 2008).

Theoretically, the use of interference screws to secure the tendon reconstruction to bone may offer a more anatomic reconstruction over time as it creates a theoretically better environment for tendon-to-bone healing at the original sites of attachment of the native SL ligament. This has been shown in reconstruction of ligaments in the knee and elsewhere (Kraeutler et al., 2013).

The aim of this study was to assess the strength of a method of interference screw fixation of the flexor carpi radialis (FCR) tendon autograft to both the scaphoid and lunate in comparison to the modified Brunelli technique, in a cadaveric model of SL dissociation.

Ten fresh-frozen cadaveric forearms without radiographic evidence of scapholunate instability were obtained. Each forearm was secured to an external fixator apparatus and a force was applied to the forearm tendons to move the wrist from neutral into flexion, extension, ulnar deviation, a clenched fist view, and a clenched pencil view (modified clenched fist view with forearm in pronation, hand gripping a pencil, and index fingers closely apposed). Individual 2.5 or 5 lb weights (for a total of 20 lb or 89 N) were applied to the tendons to achieve the desired positions. Pilot testing determined that the sum force of 89 N was more than sufficient to allow maximum wrist excursion in each of the positions.

Corresponding author: John Elfar, Department of Orthopaedic Surgery, University of Rochester Medical Center, 601 Elmwood Avenue, Box 665, Rochester, NY 14642. Phone number: (585) 273-3157, Fax number: (585) 276-1134, john_elfar@urmc.rochester.edu.

Declaration of conflicting interests: Materials were supplied by Arthrex Inc., Naples, Florida.

The wrists were assessed in four conditions: the native pre-injury wrist; the wrist with the SL interval sectioned; following the modified Brunelli tenodesis; and following the modified Brunelli tenodesis with interference screw fixation. Posteroanterior and lateral radiographs were obtained to measure the SL intervals and the SL angles.

To simulate SL instability, the SLIL was completely divided through a small dorsal incision over the SL interval, and the dissection continued around the scaphoid to release the dorsal radiocarpal, dorsal intercarpal, radioscaphocapitate, and scaphotrapezial ligaments.

The modified Brunelli tenodesis was performed as described by Garcia-Elias et al. (Garcia-Elias et al., 2006). Briefly, the FCR tendon slip was passed through the scaphoid tunnel from volar to dorsal, passed over the lunate, looped around the dorsal radiotriquetral ligament, and sutured onto the lunate using a 2.4-mm suture anchor (Arthrex Inc., Naples, FL).

The modified Brunelli repair was undone and a second reconstruction was performed fixing the FCR tendon graft to both the scaphoid and lunate using tenodesis screws. The previously drilled scaphoid tunnel served as the site of scaphoid interference screw fixation, while a 3.5-mm drill was passed over the lunate suture anchor hole to create a trough for lunate interference screw fixation. The tendon was secured down to the scaphoid trough using a 3×8 mm PEEK tenodesis screw (Arthrex Inc., Naples, FL). The tendon graft was looped around the dorsal radiotriquetral ligament and secured down to the lunate trough using another 3×8 mm tenodesis screw.

Our results demonstrated that the modified Brunelli tenodesis and the interference screw fixation technique provided similar restoration of the normal SL interval and angle (Figure 1). There were no significant differences in the SL intervals and angles between the preoperative specimens in any wrist position and either reconstruction or between the reconstructions.

Our data indicate that the tenodesis screw reconstruction performs comparably to the modified Brunelli technique in restoration of the SL interval and angle. This technique creates the possibility of tendon-to-bone healing at the dorsal SL ligament native attachment points. Interference screw fixation forces the tendon into the bone at the attachment site, which may promote osteo-integration as in reconstructions at other joints. Over time, this technique may be superior to previously described techniques owing to this difference.

Acknowledgments

Funding statement: This work was supported by the National Institute Of Arthritis And Musculoskeletal And Skin Diseases of the National Institutes of Health [Grant Number K08AR060164].

References

- Chabas JF, Gay A, Valenti D, Guinard D, Legre R. Results of the modified Brunelli tenodesis for treatment of scapholunate instability: a retrospective study of 19 patients. *J Hand Surg Am.* 2008; 33:1469–77. [PubMed: 18984325]
- Garcia-Elias M, Lluch AL, Stanley JK. Three-ligament tenodesis for the treatment of scapholunate dissociation: indications and surgical technique. *J Hand Surg Am.* 2006; 31:125–34. [PubMed: 16443117]

- Kraeutler MJ, Bravman JT, McCarty EC. Bone-patellar tendon-bone autograft versus allograft in outcomes of anterior cruciate ligament reconstruction: a meta-analysis of 5182 patients. *Am J Sports Med.* 2013; 41:2439–48. [PubMed: 23585484]
- Links AC, Chin SH, Waitayawinyu T, Trumble TE. Scapholunate interosseus ligament reconstruction: results with a modified Brunelli technique versus four-bone weave. *J Hand Surg Am.* 2008; 33:850–56. [PubMed: 18656754]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Figure 1. (A) Mean SL interval (mm). (B) Mean SL angle (°). MBT = Modified Brunelli Tenodesis. MBT with ISF = Modified Brunelli Tenodesis with Interference Screw Fixation.