Background

The modified Brunelli technique for scapholunate interosseus ligament 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 better environment for tendon-to-bone healing at the original sites of attachment of the native scapholunate interosseous ligament (SLIL). 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 tendon autograft to both the scaphoid and lunate, in comparison with the modified Brunelli technique, in a cadaveric model of SL dissociation.

Ten fresh-frozen cadaveric forearms (8 male, 2 female; mean age 62 years; range 58-69) without radiographic evidence of scapholunate instability or degenerative changes were obtained.

Methods

Surgical Reconstruction of SLIL

- 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:
  - Neutral, wrist flexion, wrist extension, clenched pencil view, clenched fist, ulnar deviation.

Results

Figure 3. The MBT and ISF provide similar restoration of the normal SL interval

- Wrist flexion demonstrated the greatest increase from a preoperative SL interval of 2.4 ± 0.6 mm (mean ± SD) to 5.0 ± 1.1 mm after surgical dissociation.
- Neither reconstruction showed significant differences in the SL interval when compared to the preoperative specimens in any wrist position (p>0.05).
- Direct comparisons of the two techniques showed no significant differences in the SL interval in any wrist position (p>0.05).

Figure 4. The MBT and ISF provide similar restoration of the normal SL angle

- The clenched fist position exhibited the greatest increase from a preoperative SL angle of 49.7° ± 6.6° to 65.5° ± 7.4° after ligament sectioning.
- Neither reconstruction showed significant differences in the SL angle when compared to the preoperative specimens in any wrist position (p>0.05).
- Direct comparisons of the two techniques showed no significant differences in the SL angle in any wrist position (p>0.05).

Summary

1. The addition of interference screw fixation to the modified Brunelli procedure provides a comparable degree of radiographic correction as the modified Brunelli tenodesis alone for SL dissociation.
2. The interference screw technique creates the possibility of tendon-to-bone healing at the dorsal SL ligament native attachment points.
3. Over time, this technique may be superior to previously described techniques owing to this difference.

References


Acknowledgments

Elfar Lab: Theron Fussell, John Elfar. Year-out Committee: Mike Zucol, Mark Noble
Clinical Translational Science Institute at the University of Rochester Medical Center Academic Research Track 1L3 Year-out Fellowship