

High-resolution MR imaging of the proximal zone of the lunotriquetral ligament with a microscopy coil

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INTRODUCTION

The intercarpal ligaments of the wrist are complex structure, and play an important role in wrist stability. However, accurate diagnosis of lunotriquetral ligament (LTL) injury with MRI is often difficult because of low resolution and low contrast. A previous study has reported that the proximal zone of the LTL showed a variety of variants in shape and signal intensity (1). Therefore, it is important to know normal MR appearance of the LTL proximal zone with high-resolution technique to improve diagnosis of the LTL injury. The purpose of this study was to evaluate high-resolution MRI of the proximal zone of the LTL using a microscopy surface coil with a 1.5 T scanner.

MATERIALS AND METHODS

The proximal zone of the LTL was examined in 90 subjects (23 asymptomatic normal volunteers and 67 patients with wrist pain) with high-resolution MRI using a 47-mm microscopy surface coil. All MR images were obtained with a 1.5 T (Gyrosan NT Intera, Philips Medical Systems, Best, The Netherlands). High-resolution MR images were obtained with fast spin echo (FSE) proton density-weighted imaging (PDWI) ((TR) ms / echo time (TE) ms = 1076-2235/15), gradient recalled echo (GRE) T2*-weighted sequence (T2*WI) (TR/TE/ flip angle = 270-608/13-18/40), and short tau inversion recovery (STIR) imaging (TR/TE/ inversion time (TI) = 3007-5492/90/150), with a 1- to 1.5-mm slice thickness, a 50-mm field of view, an imaging matrix of 140-224 x 512 using zero fill interpolation, and 3-4 excitations.

As a qualitative analysis, we evaluated the shape and signal intensity of the proximal zone, and high signal intensity direction inside the proximal zone. The shape of the LTL proximal zone was classified into 5 types (type 1: regular triangle, type 2: broad-based triangle, type 3: narrow-based triangle, type 4: asymmetrical triangle and type 5: bar shape) (Fig. 1). The signal intensity of the LTL proximal zone was classified into 3 types (type 1: homogeneously low intensity, type 2: linear high signal intensity traversing the distal surface, and type 3: linear high intensity traversing both proximal and distal surfaces) (Fig. 2). The high signal intensity direction inside the proximal zone was classified into 5 types (type 1: radius-radius (RR) pattern, type 2: radius-ulna (RU) pattern, type 3: ulna-radius (UR) pattern, type 4: ulna-ulna (UU) pattern, and type 5: center (c) pattern). RR pattern indicates high signal intensity traversing from the "radial" side of the distal surface to "radial" side of the proximal surface, and RU pattern indicates high signal intensity traversing from the "radial" side of the distal surface to "ulnar" side of the proximal surface. The center pattern shows high signal intensity traversing center of the proximal zone.

RESULTS

The triangle-shaped low signal intensity LTL was identified in 77 of 90 subjects (85.6%). The regular triangle was most frequently observed (41.1%). Broad-based triangle (20.0%) and asymmetrical triangle (17.8%) followed next. The bar-shaped ligament was seen in one patient and unclassified ligaments were seen in 12 patients. All volunteers showed triangle-shaped LTL. The percentage of each signal intensity type of the proximal zone on PDWI and T2*WI was shown as follows, 33.3% in type 1, 44.9% in type 2, and 21.8% in type 3. In seven subjects of type 2 and 3 (13.5%), linear high signal intensity was also seen on STIR images. Regarding high signal intensity pattern inside the proximal zone, both RR pattern and RU pattern showed 28.8%, which were most frequently seen.

Figure 1. High-resolution MRI of shape of LTL proximal zone

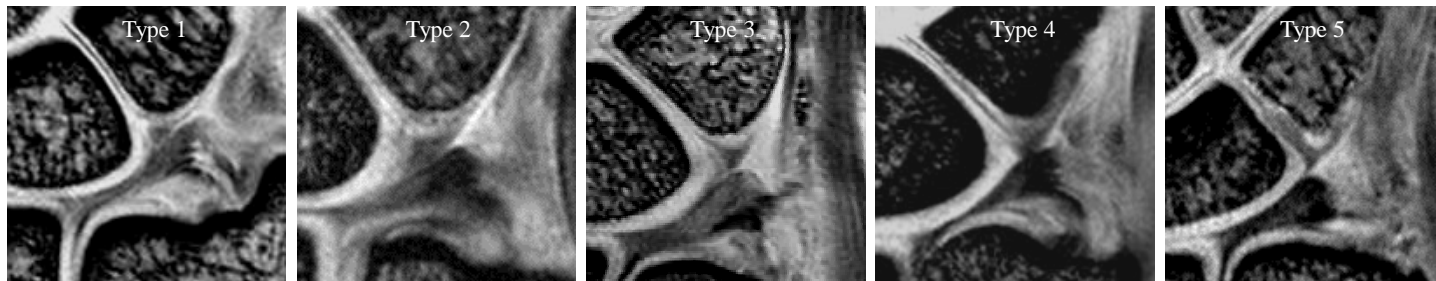
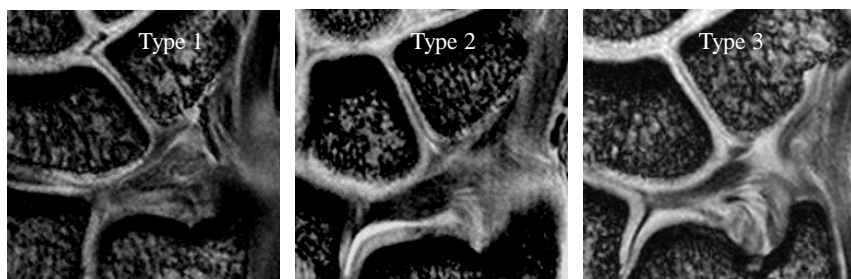


Figure 2. High-resolution MRI of signal intensity of LTL proximal zone



CONCLUSION

The proximal zone of the LTL showed a wide variety of normal variants in shape, signal intensity, and high intensity direction on high-resolution MR images with a microscopy coil. High-resolution MRI with a microscopy coil was promising to depict detailed LTL anatomy. It would be useful to know these variations for accurate diagnosis of LTL injury.

REFERENCES

1. Smith DK, Snearly WN. Lunotriquetral interosseous ligament of the wrist: MR appearances in asymptomatic volunteers and arthrographically normal wrists. *Radiology* 1994; 191:199-202.