3D-FSE-Cube of the foot at 3TMRI: Comparison with 2D-FSE images.

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PURPOSE

Three-dimensional (3D)-fast spin echo (FSE)-Cube is a new 3D FSE sequence that enables to obtain multiplanar 3D T2-weighted or intermediate-weighted images with isotropic resolution. 3D-FSE-Cube with parallel imaging at 3.0T magnetic resonance (MR) imaging enables to reduce examination time preserving image quality. Images acquired with 3D-FSE-Cube can be reformatted in arbitrary planes, which improve depiction of complex anatomy such as tendons and ligaments around the ankle. The purpose of our study was to compare a 3D-FSE-Cube with a conventional two dimensional (2D) FSE sequence for MR imaging of the ankle.

MATERIALS AND METHODS

MR imaging was performed in the ankles of 8 healthy volunteers (three men, five women; age range, 24–33 years) with a 3.0T MR system (Signa HDxt GE healthcare) by using an eight-channel knee coil. Imaging with 3D-FSE-Cube was performed with the following parameters: repetition time msec/echo time msec,2000/34; matrix, 320*320; field of view, 15 cm; section thickness, 0.6 mm; number of acquisitions, zero point five; echo train length, 22; receiver bandwidth, 31.25 kHz; and acceleration factor, 3.8. Imaging with 2D FSE were acquired in the axial, sagittal and coronal planes and performed with the following parameters: 2000/34; matrix, 320*224; field of view, 16cm; section thickness, 2 mm; number of acquisitions, one; echo train length, four; and bandwidth, 31.25 kHz. Total imaging time was 6 minutes 50 seconds for 3D-FSE-Cube and 11 minutes 24 seconds for 2D FSE sequences. For quantitative assessments, signal to-noise ratio (SNR) for bone, cartilage, synovial fluid, fat, muscle, and tendon and contrast-to-noise ratio (CNR) for cartilage-fluid, muscle-tendon, bone-tendon, fat-tendon, and bone-cartilage with 3D-FSE-Cube were compared with those of 2D FSE sequence. For qualitative assessments, MR imaging qualities of bone, cartilage, tendon, and ligament on 2D FSE images and 3D-FSE-Cube images including reformatted images of same planes as 2D FSE were reviewed independently by two radiologists with a four-point scale (a score of 1 indicated poor image quality and a score of 4, excellent image quality).

RESULTS

Bone, cartilage, fluid, and tendon SNRs and bone-tendon CNR were significantly higher with the 3D-FSE-Cube sequence (P <0.05 for all, **Fig 1**). Each anatomy tended to be depicted clearer with the 2D FSE, but no significant difference was demonstrated between the 2D FSE and 3D-FSE-Cube sequence (**Fig 2**).

CONCLUSION

The 3D-FSE-Cube sequence with parallel imaging at 3.0T MR enables to reduce examination time preserving image quality and evaluate complex anatomy of the ankle on multiple arbitrary planes.

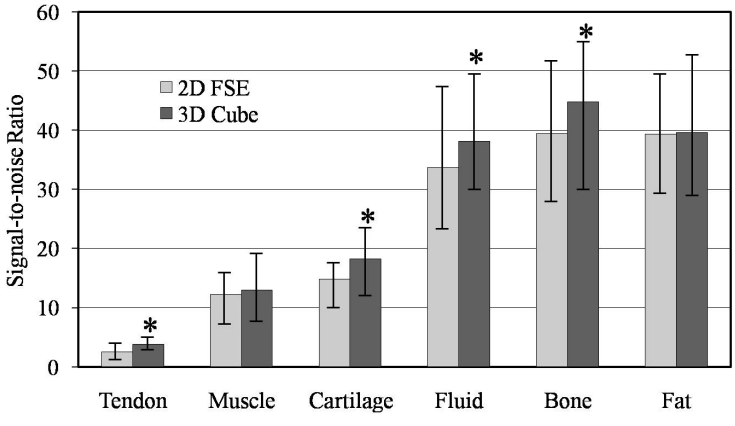

Fig. 1. Bar graph shows comparison of SNRs in tendon, muscle, cartilage, fluid, bone, and fat between 2D FSE and 3D-FSE Cube. 3D-FSE-Cube had significantly higher SNR in tendon, cartilage, fluid, and bone (*=P<0.05).

Fig.2 (a) Sagittal 2D FSE image and (b) reformatted 3D-FSE-Cube images of same planes as 2D FSE.