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Change in Cartilage Volume after Meniscal Allograft Transplantation: A One-Year MRI Study Based on Semi-Automated Graph-Cut Algorithm Method

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Summary:

After MAT, cartilage volume displayed immediate postoperative decrease and gradual recovery approximately equal to preoperative value

Abstract:

Meniscal allograft transplantation (MAT) has been accepted as an effective treatment to the patients with meniscal deficiency. However, further studies are needed to evaluate the chondroprotective effect of MAT. Advances in MR imaging enabled us to obtain quantitative metrics of cartilage morphology.

The purpose of this study is to investigate the one-year change of cartilage volume following meniscal allograft transplantation.

Between January 2008 and March 2013, 315 patients underwent MAT. Among these patients, 24 patients were enrolled in the study and followed up using a 3.0 T MR scanner at baseline (preoperative day), 3 months, 6 months and 1 year after MAT. Cartilage segmentation and volumetric measurement was performed by using a semi-automated graph-cut algorithm. Cartilage volume of femur and tibia was quantified. We divided cartilage volume into medial and lateral compartment to compare the difference. Additionally, we measured cartilage volume of femur and tibia in defined regions of interest (ROIs) in order to get rid of segmentation errors. Cartilage volume in ROIs was divided into the meniscus covering zone and the cartilage to cartilage zone.

Cartilage volume in ROIs showed no significant difference between before and 1-year after MAT. Cartilage volume of femur and tibia in ROIs decreased until 3 months after MAT and recovered to an approximate figure of preoperative value by 1-year after MAT.

After MAT, cartilage volume displayed immediate postoperative decrease and gradual recovery approximately equal to preoperative value. Long term follow-up is needed for investigation of further change of cartilage volume.