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MR Imaging of Cartilage Regeneration following Periosteal Autograft in Dogs: Correlation with Histologic Findings

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Purpose: Autogenous periosteal graft is a promising treatment for cartilage defects of the knee. The purpose of this study was to assess the sequential change of the grafted periosteum and MR predictability for success of the graft, and to correlate the MR characteristics of transplantation area with histologic findings.

Materials and Methods: A cartilage repair with autogenous periosteal grafts was studied with MR imaging and histology in both femoral articular cartilage of six adolescent dogs. The grafts were taken from the tibia and transplanted to artificial defects. MR imaging was performed with 4.7T using 2.2-3.0 diameter coil. Pulse sequences included spin echo sequence.

Results: The defects were begun to appearance of fibrous tissue, fibrocartilage after two weeks. The defects were repaired with hyaline cartilages after eight weeks. A mixture of immature cartilage and hyaline cartilage revealed isointense on T1-weighted image and iso to high signal intensity on T2-weighted image. Periosteal proliferation showed intermediate signal intensity on all sequences. Ossification of the graft coincided with the signal void of the graft and correlated with the depth of the defect.

Conclusion: The serial MR features of the grafted area nicely matched with those of pathologic findings. MR imaging can predict the success of the graft and determine the sequential change of the transplantation. Our findings are of potential clinical importance with regard to MR imaging of postoperative articular cartilage.