Autologous cartilage chip implantation improves cartilage repair tissue quality in osteochondral defects

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Background: Osteochondral injuries in the knee have a poor endogenous healing potential and no gold standard treatment has been established. Recently, the use of cartilage chips has been emerging in the literature with promising short-term clinical results.

Purpose / Aim of Study: The aim of this study was to investigate the repair response of cartilage chips in a Göttingen minipig (GMP) osteochondral defect model. The hypothesis was that the presence of cartilage chips would improve the quality of the cartilage repair tissue in osteochondral defects.

Materials and Methods: Twelve GMP's received two 6 mm deep osteochondral defects in each knee. The defects were randomized to autologous bone graft combined with autologous cartilage chips (Autologous dual-tissue transplantation, ADTT) or autologous bone graft alone (ABG). Six GMP's were euthanized at six months and six GMP's at 12 months. Evaluation of repair was performed by histomorphometry.

Findings / Results: The presence of cartilage chips in the defects resulted in significantly more hyaline cartilage in the ADTT group compared with the ABG group at both six months (25.8% vs. 12.8%) and at 12 months (20.1% vs. 4.8%). There was significantly more fibrocartilage in the ADTT group compared with ABG alone at both time-points (44% vs. 27.5% and 60.8% vs. 41%, respectively) and there was significantly less fibrous tissue in the ADTT group compared with the ABG group at both time-points (27.6% vs. 57.7% and 16% vs. 48.3% respectively).

Conclusions: The presence of cartilage chips in an osteochondral defect facilitated the formation of fibrocartilage as opposed to fibrous tissue at both six- and 12- months follow-up. This study confirms the chondrogenic effect of cartilage chips on cartilage repair tissue in osteochondral defects.