Matrix Associated Autologous Chondrocyte Transplantation of Patellar Cartilage Defects

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INTRODUCTION

The matrix associated autologous chondrocyte transplantation (MACT) represents a further improvement of the autologous chondrocyte implantation (ACT), which has been clinically used for the first time 10 years ago. Since then, several studies have proven its clinical efficacy. However, ACT inherits a number of limitations which are basically associated with its surgical complexity. Especially in the challenging region of the patella, ACT seems less effective, which is probably due to difficulties keeping the cells evenly distributed within the defect. We therefore used a matrix associated chondrocyte transplantation system (i.e. chondro-systems, Wels, Austria).

PATIENTS AND METHODS

Autologous chondrocyte cell cultures were established from small cartilage biopsies and were grown until sufficient cell numbers could be obtained. Cultivation took place in an accredited cell culture laboratory. Shortly before operation, the cultures were harvested and transferred to the operation theatre. After preparation of the defect, cells were mixed with a stabilized fibrin solution which was then allowed to polymerize on a collagen mesh. Before that, the fascia was trimmed to the shape of the defect. This fibrin-collagen construct could then easily be put into the defects where they tightly adhered to the surrounding tissue. The success of the transplantations was examined by using the knee evaluation score of the International Cartilage Repair Society (ICRS), by clinical and MRI examinations before operation and postoperatively at 6, 12 and 24 months.

RESULTS

13 patients with large patellar cartilage defects (mean defect size 7.8 ± 3.3 cm²) were treated by MACT based on scaffolded chondrocyte-fibrin-collagen constructs. The mean age of the patients was 37.4 ± 5.3 years and the median observation period was 9 months ranging from 2 to 24 months. During the observation period no transplant was lost and no secondary intervention was necessary. MRI data demonstrated a progressive transformation of the chondrocyte-fibrin-collagen constructs into a mature tissue, producing a typical cartilage signal within one year. The subjective knee evaluation score (IKDC) increased continously after the operation (Fig 3). Also the Activity index increased significantly over time and reached preaccidental values (Fig 4), representing a high level of patients satisfaction with their reconstructed knee.

DISCUSSION

Autologous chondrocyte transplantation (ACT) has proven its clinical feasibility, especially for defects of the condyles. Defects of the patella showed less favorable results 4. Indeed, ACT inherits a number of limitations which are especially critical for applications on the patella. We therefore looked for a method which facilitates the filling of the patellar defects with chondrocytes. The variant of the matrix associated autologous chondrocyte transplantation (MACT) we used has several advantages as compared to ACT and other MACT applications. Firstly, it does not need a membrane filling of the patellar defects with chondrocytes. The variant of the matrix associated autologous chondrocyte transplantation (MACT) we used has several advantages as compared to ACT and other MACT applications. Firstly, it does not need a membrane