Minced Cartilage compared to Autologous Chondrocyte Implantation for medium to large knee chondral defects: a two-year outcome study

Armin Runer[1], Louis Leuthard[2], Vincent A Stadelmann[2], Stefan Preiss[3], Gian Max Salzmann, Jakob Hax
[1]Department of Sports Orthopaedics, Technical University of Munich, [2]Department of Research and Development, [3]Schulthess Klinik

INTRODUCTION:
The minced cartilage (MC) procedure emerges as a viable alternative to Matrix-induced Autologous Chondrocyte Implantation (MACI) in addressing medium to large knee chondral defects. With its single-stage application, ease of implementation, cost-effectiveness, and promising short- and midterm outcomes, MC challenges the established gold standard set by MACI. Despite its potential advantages, a direct comparison between MC and MACI has not yet been performed in the current literature.
The aim of this study was to evaluate and compare clinical and functional outcomes between MC and MACI in the management of knee cartilage lesions.
METHODS:
For this retrospective propensity score matching study, patients treated with either MC or MACI were identified from the hospital registry database. Subsequently patients were split into two matching groups according to age at the time of surgery, body mass index (BMI), ASA classification, and preoperative value of the Core Outcome Measures Index (COMI). The COMI score (0=best, 10=worst), comprising six items evaluating pain, function, quality of life, and disability in knee surgery patients, was assessed before surgery and at 6, 12, and 24 months postoperatively. Preoperative MRIs were graded according to the AMADEUS Score (Area Measurement and Depth and Underlying Structure, 0=worst score, 100=healthy cartilage). Postoperative MRIs were graded according to the MOCART (Magnetic Resonance Observation of Cartilage Repair Tissue, 0=worst, 100=best) score.
RESULTS:
In this study, 96 patients (40% females), with an average age, BMI and symptom duration of respectively 33±11 years, 24.5±4.6 and 25±29.5 months were included. On average, MACI and MC patients had a varus malalignment of 0.7±2.7° and 0.4±3.0°, respectively. There were no statistically significant differences in any preoperative patient characteristics between both cohorts. The average defect size was 4.2±2.0mm^2 in the MACI- and 3.6±1.8mm^2 in the MC group (p=0.3). Regarding defect localization, tibiofemoral, patellofemoral, and combined lesions were present in 22.5%, 60.0%, and 17.5% of MACI cases, and 43%, 53%, and 5% of MC cases, respectively. All defects were graded as grade 3 or 4 according to the International Cartilage Repair Society (ICRS). The baseline COMI score was 5.1±1.6 for MACI and 5.3±1.6 for MC (p=0.4). The average AMADEUS score was 55±16 for MACI and 49±19 for MC (p=0.2).
One year postoperative, both groups exhibited improvement in the COMI score (MACI: 3.0±1.9, MC: 2.1±1.5, p=0.07). After two years, patients treated with MC reported a significantly better COMI score (1.7±1.5) compared to those treated with MACI (3.3±2.4, p=0.003).
DISCUSSION AND CONCLUSION: Patients treated with single-staged MC and two-staged MACI report postoperative PROMs improvements after one and two years. However, those treated with MC exhibit a significantly higher COMI score compared to patients treated with MACI. MC should be considered a viable treatment alternative in patients where a two-staged approach is not desired. Nonetheless, further high-quality studies are warranted to confirm these findings and better inform treatment decisions.