Matrix-Associated Stem Cell Transplantation (MAST) in Chondral Defects of the Ankle is Safe and Effective - 2-Year-Followup in 120 Patients

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Introduction/Purpose: For treatment of chondral defects, matrix-associated stem cell transplantation (MAST) is a modification of autologous matrix-induced chondrogenesis (AMIC) with a potential higher concentration of stem cells due to harvesting fluid at the bone marrow and in-vitro processing. The aim of the study was to assess the 2-year-followup of MAST in chondral defects of the ankle.

Methods: In a prospective consecutive non-controlled clinical follow-up study, all patients with chondral defect that were treated with MAST from April 1st 2009 to March 31st, 2013 were analyzed. Patients with bilateral treatment or with MAST at more than one joint surface were excluded from the study. The size and location of the chondral defects, method-associated problems and the Visual-Analogue-Scale Foot and Ankle (VAS FA) before treatment and at followup were registered and analyzed.

MAST was performed as a single open procedure including debridement and microfracturing of the chondral defects. Stem cell-rich blood was harvested during the procedure from the ipsilateral pelvic bone marrow and centrifuged (10 minutes, 1,500 RPM). The supernatant was used to impregnate a collagen I/III matrix (Chondro-Guide®, Geistlich, Baden-Baden, Germany) that was cut to the size of the defect before. The matrix with stem cells was fixed into the chondral defect with fibrin glue (Tissucoll, Deerfield, USA).

Results: One hundred and fifty chondral defects in 144 patients were included in the study. The age of the patients was 35 years on average (range, 10-68 years), 85 (59%) were male. The VAS FA before surgery was 58.5 on average (range, 16.5-78.8). The defects were located as follows, medial talar shoulder, n=62; lateral talar shoulder, n=66 (medial and lateral talar shoulder, n=6), distal tibia, n=22. The defect size was 1.6cm2 on average (range, .6 - 6cm2). Additional autologous bone
transplantation (harvested from the proximal tibia) was performed in 19 cases (medial/lateral talar shoulder, n=8/8; distal tibia, n=3). 130 patients (90%) completed 2-year-follow-up. No method related complications or consecutive surgery were registered. The VAS FA improved to an average of 87.5 (range, 62.1-100; t-test (comparison with preoperative scores), p=.01).

**Conclusion:** MAST led to good clinical scores. No complications were registered. Even though a control group is missing, we conclude that MAST is a safe and effective method for the treatment of chondral defects of the ankle. The main advantage of MAST in comparison with ACI and MACI is the single procedure methodology. The advantage in comparison with AMIC is the potential higher concentration of stem cells. It remains unclear if this method is superior to AMIC, and what kind of tissue is created.