

Injectable cultured Bone Marrow derived Mesenchymal Stem Cells in Varus knees with cartilage defects undergoing High Tibial Osteotomy: A prospective, randomized controlled clinical trial with 2 years follow up

Keng Lin WONG, Kevin Boon Leng LEE, Bee Choo TAI, Ping LAW, James Hoi Po HUI

National University Hospital System, Singapore, Department of Orthopaedic Surgery, University Orthopaedic, Hand and Reconstructive Microsurgery Cluster, National University Hospital 1E Kent Ridge Road, NUHS Singapore

Objectives

To analyze the results of the use of intra-articular cultured autologous bone marrow-derived mesenchymal stem cells (MSC) injections in conjunction with microfracture and medial opening-wedge High Tibial Osteotomy (HTO).

Materials and Method

Fifty-six knees of 56 patients with uni-compartmental osteoarthritic knees and genu varum were randomly allocated to the cell recipient group (n=28), or control group (n=28). Patients who have joint line congruity angle of more than 2°, mal-alignment of knee secondary to femoral causes, fixed flexion deformity and age >55 years were excluded. All patients underwent HTO and microfracture. The cell recipient group received intra-articular injection of cultured MSC with hyaluronic acid (HA) 3 weeks after surgery, whereas the control group only received HA. The primary outcome measure was International Knee Documentation Committee (IKDC) scoring at intervals of 6 months, 1-year and 2-years post-operatively. Secondary outcome measures were Tegner and Lysholm clinical scores and 1-year post-operative Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) scores.

Results

Both treatment arms achieved improvements in Tegner, Lysholm and IKDC scores. After adjusting for age, baseline scores and time of evaluation, the cell recipient group demonstrated significantly better scores. Effect of treatment shows an added improvement of 7.65(95% CI:3.04-12.26,p=0.001) for IKDC scores, 7.61(95% CI:1.44-13.79,p=0.016) for Lysholm scores, and 0.64(95% CI:0.10-1.19,p=0.021) for Tegner scores. MRI scans performed 1-year after surgical intervention shows significantly better MOCART scores for the cell recipient group. The-adjusted mean difference in MOCART score was 19.6(95% CI:10.5-28.6,p <0.001).

Conclusion

Intra-articular injection of cultured MSCs provide short-term clinical and better MOCART scores in varus knees with cartilage defects undergoing HTO and microfracture.