Lawrence D. Dorr Award

Core Decompression with Autogenous Bone Marrow Stem Cells for the Treatment of the Femoral Head Osteonecrosis

Reza Mostafavi Tabatabaee, MD, Sadegh Saberi, MD, Javad Parvizi, MD, FRCS, Mahmoud Frazan, MD

Introduction: Using stem cells has been shown to reduce pain and delay the development of early-stage osteonecrosis of the femoral head (ONFH). The aim of the present study was to evaluate the effects of core decompression and autologous bone marrow containing mononuclear cell (MNC) implantation on ONFH.

Methods: This was a randomized controlled clinical trial evaluating 28 femoral heads with non-traumatic osteonecrosis in stages I, II, or III according to Association Research Circulation Osseous classification. Patients were randomly assigned into two groups to be treated with core decompression combined with autologous bone marrow MNC implantation as the treatment group (group A) or decompression solely as the control group (group B). Patients were evaluated for two years using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire, Visual Analogue Scale (VAS) index, and magnetic resonance imaging (MRI) of the femoral head.

Results: In both groups, the mean WOMAC and VAS scores reduced after 24 months. The changing trends of WOMAC and VAS were significant in group A ($p < 0.001$) and group B ($p < 0.001$) during 24 months; however, the trends in each group were significantly different ($p < 0.001$) showing more score reduction in group A. MRI findings showed improvement in the grafted group ($p=0.046$) and showed worsening in the control group ($p < 0.001$). 3 hips (21%) in the group A improved after implantation of stem cells (1 patient from stage III to II and 2 patients from stage II to I) and 3 hips (21%) in group B underwent hip arthroplasty later during follow-up.

Conclusion: Injection of concentrated bone marrow into the necrotic femoral head could be effective in the early stages of ONFH and result in reduced pain and joint discomfort, delayed deterioration, and even improvement of the disease.