

# TREATMENT OF OSTEONECROSIS OF THE FEMORAL HEAD WITH IMPLANTATION OF AUTOLOGOUS BONE-MARROW CELLS

## A PILOT STUDY

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**Background:** Aseptic nontraumatic osteonecrosis of the femoral head is a disorder that can lead to femoral head collapse and the need for total hip replacement. Since osteonecrosis may be a disease of mesenchymal cells or bone cells, the possibility has been raised that bone marrow containing osteogenic precursors implanted into a necrotic lesion of the femoral head may be of benefit in the treatment of this condition. For this reason, we studied the implantation of autologous bone-marrow mononuclear cells in a necrotic lesion of the femoral head to determine the effect on the clinical symptoms and the stage and volume of osteonecrosis.

**Methods:** We studied thirteen patients (eighteen hips) with stage-I or II osteonecrosis of the femoral head, according to the system of the Association Research Circulation Osseous. The hips were allocated to a program of either core decompression (the control group) or core decompression and implantation of autologous bone-marrow mononuclear cells (the bone-marrow-graft group). Both patients and assessors were blind with respect to treatment-group assignment. The primary outcomes studied were safety, clinical symptoms, and disease progression.

**Results:** After twenty-four months, there was a significant reduction in pain ( $p = 0.021$ ) and in joint symptoms measured with the Lequesne index ( $p = 0.001$ ) and the WOMAC index ( $p = 0.013$ ) within the bone-marrow-graft group. At twenty-four months, five of the eight hips in the control group had deteriorated to stage III, whereas only one of the ten hips in the bone-marrow-graft group had progressed to this stage. Survival analysis showed a significant difference in the time to collapse between the two groups ( $p = 0.016$ ). Implantation of bone-marrow mononuclear cells was associated with only minor side effects.

**Conclusions:** Implantation of autologous bone-marrow mononuclear cells appears to be a safe and effective treatment for early stages of osteonecrosis of the femoral head. Although the findings of this study are promising, their interpretation is limited because of the small number of patients and the short duration of follow-up. Further study is needed to confirm the results.

**Level of Evidence:** Therapeutic study, Level II-1 (prospective cohort study). See Instructions to Authors for a complete description of levels of evidence.