

Role of allogeneic mesenchymal stem cells in the reconstruction of bone defect in rabbits

H.D Ismail Phedi, author

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Abstrak

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Despite the advancement of bone reconstruction in the past decade, large bone defect remains a challenge for orthopedic surgery. As mesenchymal stem cells (MSCs) emerges as one of the possible treatment of these defects, we evaluate the effect of its transplantation, particularly in combination with hydroxyapatite-calcium sulphate pellets. Methods: Twenty eight rabbits were randomly assigned into four different treatment groups. Each group received a different type of grafts (Autograft, hydroxyapatite-calcium sulphate [HA-CaSO₄], HA-CaSO₄ combined with marrow aspirate, or HA-CaSO₄ combined with 2x10⁶ MSCs). One centimeter long bone defects were created then immediately fixated with mini plate-screw and two cerclage wires. It was followed by the graft transplantation. Callus thickness was measured from the x-rays taken at 4, 8, 12 week after transplantation by two authors working independently. At the end of the study, histological staining along with osteocyte index were obtained by sacrificing the rabbits. These data were analyzed by one-way ANOVA test. Results: At the fourth week, callus thickness showed significant difference ($p = 0.018$). Although statistically insignificant, callus in MSCs group at the eighth week seemed to be thicker than any other groups of intervention ($p = 0.546$). The MSCs group also tend to have a higher osteocyte index at the follow-up weeks. Conclusion: MSC transplantation on bone defect results in faster callus formation and tends to generate a thicker callus.