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Assessment of Calcium Sulfate Hemihydrate–Tricalcium Silicate Composite for Bone Healing in a Rabbit Femoral Condyle Model

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Abstract

Calcium sulfate or plaster of Paris (POP) is considered as a bone cement with a fast degradation rate, which frequently makes it resorb before the bone defect area is completely filled by new bone. The incorporation of tricalcium silicate (C3S) into POP cement has been proven as a feasible approach to reduce the in vitro degradation rate and improve the in vitro bioactivity of the material. However, the in vivo performance of the POP/C3S composite cement is still unclear. Therefore, the aim of the present study is to assess the biodegradability and osteogenesis of POP/C3S composite cement in comparison with those of POP bone cement. To carry out the in vivo evaluation, POP and POP/C3S cements were implanted into a femoral condyle defect model in rabbits (5 mm diameter × 10 mm length) for 4, 8, and 12 weeks duration. The area of the remaining cement and new bone regeneration in bone defect were investigated and quantitatively measured using radiography, micro-computed

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