

A Comparison of Demineralized Bone Matrix, Calcium Sulfate(OSTEOSET®) and Calcium Metaphosphate in a Critical Sized Femoral Unicortical Defect Canine Model

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The purpose of this experiment was to study the effects of demineralized bone matrix, calcium sulfate, and calcium metaphosphate on osteogenesis of unicortical 5 -mm-diameter defect in canine femurs.

Seventy-two femoral unicortical defects in nine adult beagles (18 femurs, 4 unicortical femoral defects in each femur) which have a normal orthopedic conditions were made for the study. Demineralized bone matrix (DBM), calcium sulfate (OSTEOSET®) and calcium metaphosphate (CMP) were implanted into 3 defects, respectively, and one remained untreated (control). Each of the three bone graft substitutional materials and the empty controls were compared. The specimens were harvested at 4 weeks, 8 weeks, 6 months postimplantation for radiographic, biochemistic and histomorphologic evaluation.

In the radiologic study, in calcium sulfate group, cortical bone was partially seen around the fourth week. In DBM group, it was a little observed at 8 weeks. In CMP group, it was observed, and the projection of the marrow cavity became distinctive, so bone consolidation was considered so be much progressed at 8 weeks. However, in control group, cortical bone was not formed even 8 weeks. At 6 months postoperatively, radiographic results for all beagles showed the 96 % of bone graft substitutes had been resorbed and 87 % of the defect was filled with cortical bone. In the histomorphologic study, the CMP, calcium sulfate and DBM group was contained significantly more new bone than the defects untreated group. No adverse inflammatory reactions were associated with any of the three graft materials.

We concluded that DBM, CMP and calcium sulfate pellets are effective delivery means of bone graft materials for the successful restoration of cortical bone defect.

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