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Osteoinduction regeneration using tooth bone graft with BMP-2

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Despite the fact that improved biomaterials are needed to match the effectivity of autogenous bone grafts, as this is still superior to that of synthetic bone grafts, osteoinductive materials such as BMP-2 would be perfect candidates for combination with biomaterials to achieve this task. However, different sizes of biomaterials have shown insufficient consideration for important prerequisite for its development. This study aimed to investigate the estimated increase in osteoinductive activity of different shapes of tooth bone grafts (TBGs) with BMP-2 in rabbit calvarial defects compared with synthetic bone grafts based on histomorphometric and histological analysis. We randomly divided a total of 40 calvarial defects in10 male New-Zealand rabbits into four experimental groups: group 1: powder-type graft + BMP; group 2: block-type graft + BMP; group 3: block-type graft only; and control group: synthetic bone + BMP. In each rabbit calvarium, we formed four circular bi-cortical defects with a diameter of 8 mm and filled them with bone graft materials. After four weeks (n = 5) and eight weeks (n=5), we conducted histomorphometric and histological analyses to determine the changes in bone area in the different groups. We assessed the tissue volume, bone volume, and percent bone volume in each group; the BMP-2/tooth powder-type graft and the TBG alone stimulated mesenchymal cells to create endochondral ossification and direct bone formation and showed significant differences between groups ($p<0.05$). The changes in bone volume ranged from 12 to 23% with powder type tooth biomaterial and tissue volume ranged from 113 to 123mm3 in the different groups. We concluded that powder-type TBG was effective as a carrier of BMP-2, which significantly accelerated bone formation in the acid-insoluble TBG carrier system.

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