R-25. Fibrin-Fibronectin Sealing System in Combination with β-Tricalcium Phosphate as a Carrier for Recombinant Human Bone Morphogenetic Protein-2: Effects on Bone Formation in Rat Calvarial Defects

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Background

Bone morphogenetic proteins(BMPs) are being evaluated as potential candidates for periodontal and bone regenerative therapy. In spite of good prospects for BMP applications, an ideal carrier system for BMPs has not yet been identified. The purpose of this study was to evaluate the osteogenic effect of a fibrin-fibronectin sealing system (FFSS) combined with β-tricalcium phosphate(β-TCP) as a carrier system for rhBMP-2 in the rat calvarial defect model.

Methods

Eight-mm critical-size calvarial defects were created in 100 male Sprague-Dawley rats. The animals were divided into 5 groups of 20 animals each. The defects were treated with rhBMP-2/FFSS, rhBMP-2/FFSS/ β-TCP, FFSS and β-TCP carrier control or were left untreated as a sham-surgery control. Defects were evaluated by histologic and histometric parameters following a 2- and 8-week healing interval (10 animals/group/healing intervals).

Results

The FFSS/β-TCP carrier group was significantly greater in new bone area at 2 weeks($p < 0.05$) and augmented area at 2 and 8 weeks($p < 0.01$) relative to the FFSS carrier group. New bone area and augmented area in the rhBMP-2/FFSS/β-TCP group were significantly greater than in the rhBMP-2/FFSS group at 8 weeks($p < 0.01$).

On histologic observation, FFSS remnants were observed at 2 weeks, but by 8 weeks, the FFSS appeared to be completely resorbed. rhBMP-2 combined with FFSS/β-TCP produced significantly more new bone formation and augmentation in this calvarial defect model.

Conclusion

FFSS/β-TCP may be considered as an available carrier for rhBMP-2.

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