

PR-II-3. The effects of deproteinized bovine bone graft material combined with synthetic peptide derived from rhBMP-2 on bone formation in rabbit calvarial defects

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Background

The roles of BMPs have been extensively studied for clinical treatment in recent years. But, there are several limits to use for treatment. In addition, long term effects and releasing pattern of BMPs was unknown yet well. We synthesized a synthetic peptide which corresponds to residues 73-92 of the knuckle epitope of BMP-2 and attached to anorganic bovine bone material(Osteograft[®]/N-300) which is widely used for treatment of defects. And then we evaluated the effects of deproteinized bovine bone graft material combined with synthetic peptide derived from rhBMP-2 to find new regeneration material in rabbit calvarial defect.

Material & methods

Two defects in rabbit skull were made in parietal bones with a 8-mm trephine bur. The defects were filled with different graft materials in each group as follows and then histologic observation and histomorphometric analysis were carried out.

- Control group: defects were not filled at all
- ABM only group: defects were filled with OsteoGraf[®]/ N-300
- ABM/residues 73-92 of rhBMP-2 group: defects were filled with ABM/ residues 73-92 of rhBMP-2 graft
- ABM/rhBMP-2 group: defects were filled with ABM/rhBMP-2

Results

In histologic findings at 4 weeks of healing, defects of control group were mainly replaced by dense connective tissue. The new bone formation was observed at the margins and a small amount of isolated bony island was found. A little amount of newly formed bone surrounding ABM particles was seen in the ABM only group. The new bone formation of ABM/residues 73-92 of rhBMP-2 group showed not more

than the new bone formation of ABM/rhBMP-2 group. However, compared to ABM only group, the defects grafted with ABM/residues 73-92 of rhBMP-2 group showed more active bone formation in the middle areas of defect as well as in the margin of defect. At 8 weeks of healing, the volume and density of new bone in all groups was much more than specimens at 4 weeks. Almost complete bony bridges were seen in the defects of ABM/rhBMP-2 group.

In histomorphometric analysis, At 4 weeks of healing, the percentage of new bone formation(mean±SD) in ABM/rhBMP-2 group, ABM/residues 73-92 of rhBMP-2 group, ABM only group, control group were $17.76\pm0.89\%$, $14.25\pm1.0\%$, $11.42\pm2.97\%$ and $8.32\pm1.28\%$, respectively. At 8 weeks of healing, the corresponding percentage of new bone formation were $25.47\pm3.2\%$, $20.41\pm4.2\%$, $17.64\pm3.0\%$ and $17.84\pm3.6\%$, respectively.

Conclusion

The results suggested that deproteinized bovine bone graft material combined with synthetic peptide derived from rhBMP-2 may be served as an effective tissue-engineered bone graft material to treat periodontal defect or bony defect for implant.