Kruse A, Jung RE, Nicholls F, Zwahlen RA, Hämmerle CHF, Weber FE
Bone regeneration in the presence of a synthetic hydroxyapatite/silica oxide -based and a xenogenic hydroxyapatite -based bone substitute material.
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A comparison of synthetic hydroxyapatite/silica oxide, xenogenic hydroxyapatite-based bone substitute materials with empty control sites in terms of bone regeneration enhancement in a rabbit calvarial four non-critical-sized defect model.
Methods: In each of six rabbits, four bicortical calvarial bone defects were generated. The following four treatment modalities were randomly allocated: (1) empty control site, (2) synthetic hydroxyapatite/silica oxide-based (HA/SiO) test granules, (3) xenogenic hydroxyapatite -based granules, (4) synthetic hydroxyapatite/silica oxide -based (HA/SiO) test two granules. The results of the latter granules have not been reported due to their size being three times bigger than the other two granule types. After 4 weeks, the animals were sacrificed and un-decalcified sections were obtained for histological analyses. For statistical analysis, the Kruskal–Wallis test was applied (Po0.05).
Results: Histomorphometric analysis showed an average area fraction of newly formed bone of 12.32 _ 10.36% for the empty control, 17.47 _ 6.42% for the xenogenic hydroxyapatite -based granules group, and 21.2 _ 5.32% for the group treated with synthetic hydroxyapatite/silica oxide -based granules. Based on the middle section, newly formed bone bridged the defect to 38.33 _ 37.55% in the empty control group, 54.33 _ 22.12% in the xenogenic hydroxyapatite -based granules group, and to 79 _ 13.31% in the synthetic hydroxyapatite/silica oxide -based granules group. The bone-to-bone substitute contact was 46.38 _ 18.98% for the xenogenic and 59.86 _ 14.92% for the synthetic hydroxyapatite/silica oxide-based granules group.
No significant difference in terms of bone formation and defect bridging could be detected between the two bone substitute materials or the empty defect.
Conclusion: There is evidence that the synthetic hydroxyapatite/silica oxide granules provide comparable results with a standard xenogenic bovine mineral in terms of bone formation and defect bridging in non-critical size defects.