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Comparative histological results of different biomaterials used in sinus augmentation procedures: a human study at 6 months

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ABSTRACT

As demonstrated by several studies, sinus augmentation is a predictable treatment for atrophy of the posterior maxilla and different bone substitutes have been used in sinus floor augmentation. However, only few studies compared the performances of the different kinds of grafts and so a current issue is the definition of the best filling material for the sinus cavity. Therefore, the aim of this study was to perform a histological and histomorphometric evaluation, in humans, of specimens retrieved from sinuses augmented with phycogene HA (Algipore®, DENTSPLY-Friadent, Mannheim, Germany), macroporous biphasic calcium phosphate (MBCP®) (Leone, Firenze, Italy), calcium carbonate (Biocoral®, Leader-Novaxa, Milan, Italy), collagenized porcine cortico-cancellous bone (OsteoBiol® *Apatos Cortical*, Tecnoss®, Giaveno, Italy) ABB (Bio-Oss®, Geistlich, Wohlhusen, Switzerland). A total of 30 sinus augmentation procedures were performed and in every case, 100% biomaterial was used. 15 patients were scheduled for bone reconstruction procedures including sinus augmentation and implant insertion. For the examination, a total of 60 bone cores, 2 for each augmented sinus, 12 for every biomaterial, were retrieved. At low power magnification, it was possible to observe that many grafted particles were bridged by newly formed bone and in some portions of the specimens, graft particles appeared to be lined by newly formed bone, without gaps at the bone-particle interface and with no sign of inflammatory cells and multinucleated giant cells. In the porcine bone group, few peripheral osteocytic lacunae, present in the biomaterial, appeared to be filled with osteocytes; around some particles, osteoblasts could be seen, while actively depositing unmineralized osteoid matrix.

CONCLUSIONS

Based on the findings, the Authors concluded that "*the results of the present study have shown that all these biomaterials can be used with success in maxillary sinus augmentation procedures showing good biocompatibility and osteoconductive properties, with osteoblastic seams forming bone directly on the biomaterial surface and with no histological signs of adverse reactions*".

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