Clinical Performance of a New Biphasic Bone Substitute Material for Sinus Grafting

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Introduction

For about three decades sinus grafting is a proven augmentation procedure in dental implantology utilizing a wide range of grafting materials. Osteoconductive materials with fast resorption kinetics e.g. β-tricalciumphosphates (β-TCP) allow for early osseous organisation of the graft, resulting in rapid bone formation. However, various information is given about the resorption stability and volume maintenance of the grafts. Particularly for two-stage approaches, unpredictable volume loss may compromise the following implant placement. Materials with slow resorption kinetics e.g. hydroxyapatite (HA) need more time for complete osseous organisation. Nevertheless, application of HA provides better volume stability of the grafted area.

Materials and Methods

A new synthetic, nanoporous biphasic bone substitute (maxresorb [MAX], botiss dental GmbH, Berlin) consisting of 60% HA and 40% β-TCP, was used for sinus grafting in fifteen patients treating 21 sinuses with a total of 50 implants. In 6 out of 21 sinuses, implants were placed after a five to six months healing period as a staged approach. Implant uncovering was performed between three and four months following implant installation. Prosthetic treatment was performed by comparison of references or anatomical structures.

Results

All implants showed stable hard and soft tissue conditions after a total observation period of up to 18 months. Radiologically, mean loss of vertical graft dimension until implant placement was 0.9 mm for the staged approach. For the non-staged approach, the vertical height loss was 0.4 mm until implant uncovering. The following radiographs revealed no further alterations of the vertical graft dimensions. Eight trephines of grafted areas could be harvested in the staged group during implant site preparation. Histological analysis revealed complete osseous organisation of the grafts. Porous particles of the bone substitute were embedded in newly formed bone, showing very low superficial resorption of the granules.

Conclusion

Within the limits of the present study it was concluded that the use of MAX for one-stage or two-stage sinus floor elevations shows fast osseous organisation, good volume maintenance and slow resorption. Particularly the good volume maintenance may increase the predictability of two-stage implant treatments in the atrophic posterior maxilla.