UNIKLINIK KÖLN
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Clinical Performance of a New Biphasic ß-TCP/Hydroxyapatite Ceramic. A Consecutive Case Report Study.

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Background

Beside autogenic bone, different bone substitute materials are well established for augmentation procedures in oral implantology. Whereas tricalciumphosphate ceramics have shown fast osseous organisation but low volume stability, complete osseous organization of native and synthetic hydroxyapatite ceramics (HA) may last much longer resulting in prolonged healing times. The combination of both ceramics as biphasic HA/ß-TCP could hypothetically combine the fast regeneration of ß-TCP and volume stability of HA due to its specific chemical composition. The aim of this case report study was to investigate a new biphasic ß-TCP/HA ceramic (maxresorb® [MR], 60% HA/40% ß-TCP, botiss dental GmbH, Berlin) for lateral augmentations in GBR technique and single-stage and two-stage sinus floor elevations.


Fig. 1: Clinical situation 3 months following extraction of the second premolar

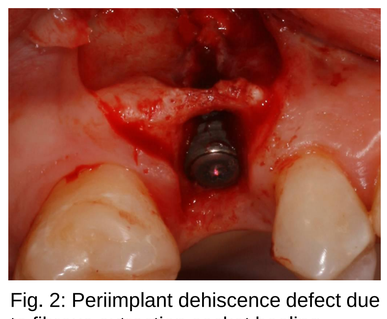
Fig. 2: Periimplant dehiscence defect due to fibrous extraction socket healing

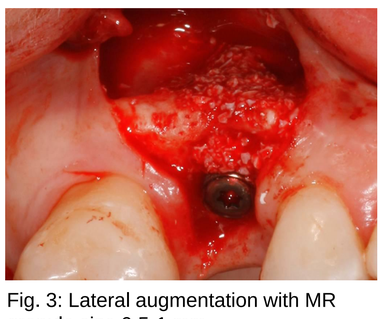
Fig. 3: Lateral augmentation with MR granule size 0,5-1 mm


Fig. 4: Augmented area is covered with a native pericardium membrane (JM)


Fig. 5: Soft tissue situation after 4 months healing period

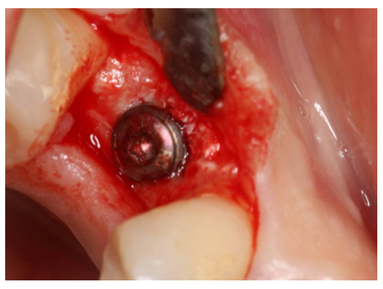
Fig. 6: After 4 months, grafted area shows osseous organisation and volume stability

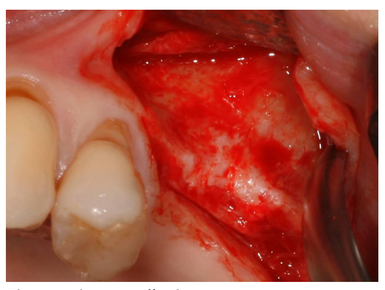
Fig. 7: Sinus wall after mucoperiosteal flap preparation

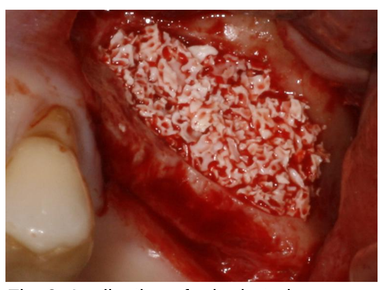
Fig. 8: Application of rehydrated maxresorb (MR) (0,8-1,5 mm)


Fig. 9: Further lateral augmentation for width improvement

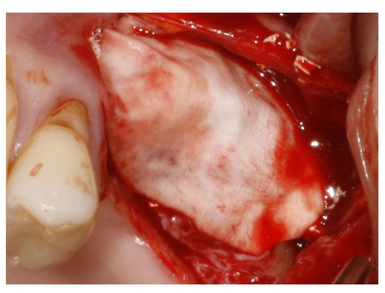
Fig. 10: Covering of the lateral augmentation using JM

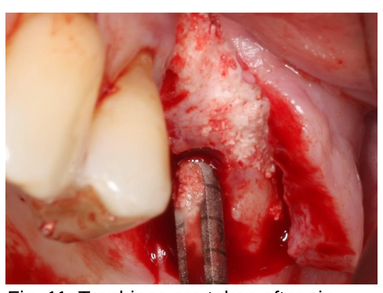
Fig. 11: Trephines are taken after six months during of implant bed preparation

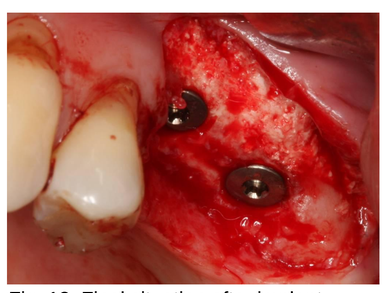
Fig. 12: Final situation after implant installation

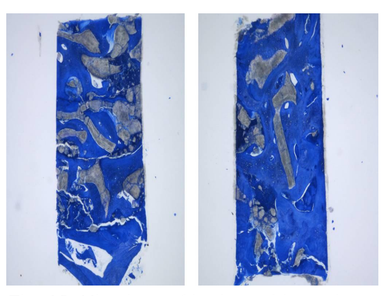
Fig. 13: Histology of both trephines show complete bone regeneration (12,5x)

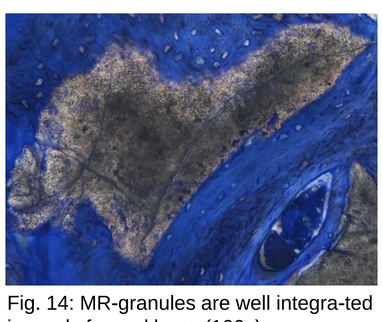
Fig. 14: MR-granules are well integra-ted in newly formed bone (100x)

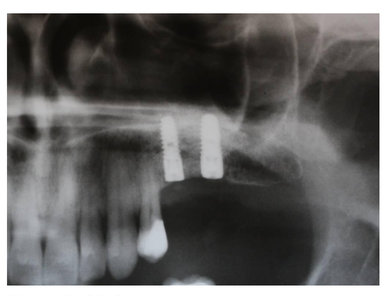
Fig. 15: OPG following implant installation

Patients and Methods

32 Patients (14 male, 18 female) were included in the study. 17 patients received a one-stage, 12 patients a two-stage sinus floor elevation. In 14 cases, a lateral augmentation was performed solitarily (Fig. 1-6) or in combination with sinus grafts (Fig. 7-27). Augmented areas were covered with a porcine pericardium membrane (Jason® Membrane [JM], , botiss dental GmbH, Berlin). In the staged approach, implants were placed after a healing period of five to six month. Implant uncovering was performed between three and four months following implant installation. Prosthetic treatment was performed after a soft-tissue healing of six to twelve days. After each surgical intervention a radiograph was taken. Data evaluation was performed clinically, radiologically and – for staged approaches – histologically by taking a bone trephine in progress of implant bed preparation. Altogether, 23 bone cores were harvested and prepared for histological evaluation.

Results

Healing was uneventful for all patients. All implants showed stable hard and soft tissue conditions after a total observation period of up to 18 months. Radiologically, the vertical loss of graft dimension in the sinuses until implant placement was negligible. Histological analysis revealed complete osseous organisation of the MR granules in 18 of the 23 cases. Porous particles of the bone substitute were embedded in newly formed bone, showing very low superficial resorption of the material. In 5 cases, a more initial bone formation was found on the particles, particularly in the apical regions of large sinus grafts and in cases of lateral augmentations with a light vertical component (Fig. 26).

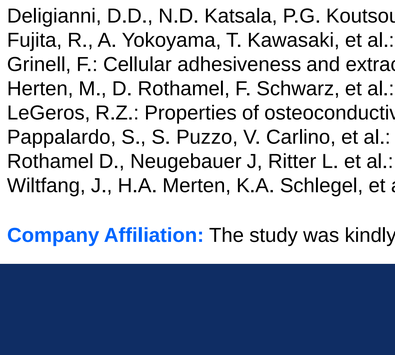
Fig. 16: Vertical atrophy of the posterior maxilla and a root remnant in the front

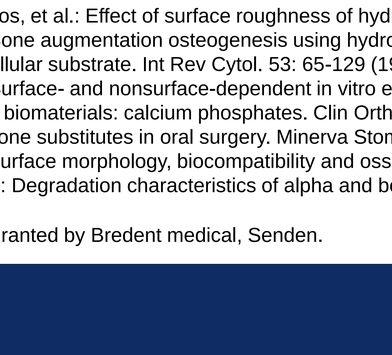
Fig. 17: Clinical Situation in the atrophic lateral maxilla

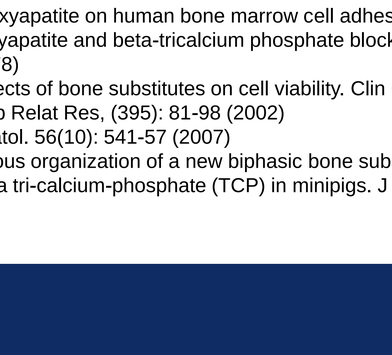
Fig. 18: Sinus floor elevation and application of MR (size 0,8 - 1,5 mm)

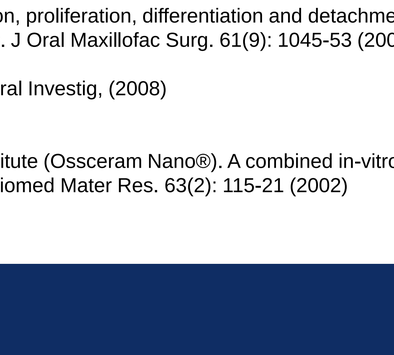
Fig. 19: Clinical situation in the front

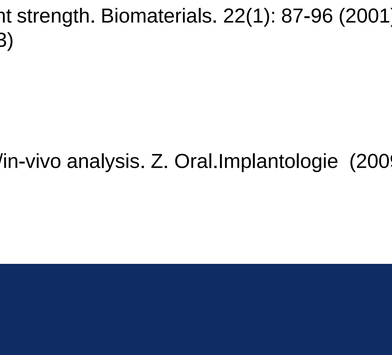
Fig. 20: Root remnant is removed using a buccal approach

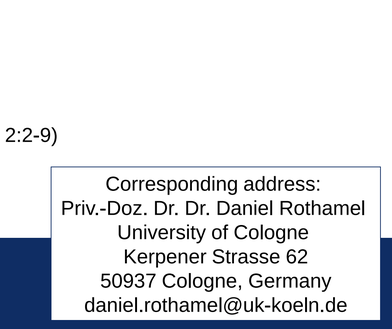
Fig. 21: After application of a collagen membrane (JM), MR is inserted

Fig. 22: Trephine harvesting and implant installation after 6 months healing period

Fig. 23: Histology convinces complete osseous organisation of the graft (100x)

Fig. 24: Uneventful healing also in the anterior region

Fig. 25: Also in the front, graft reveals osseous organisation

Fig. 26: Newly formed bone matrix on MR surface in the anterior trephine

Fig. 27: Postoperative x-ray

Conclusion

It was concluded that clinical use of MR reveals good volume maintenance, fast osseous organisation and slow resorption. The comparison with other materials requires further investigation.

References

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