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Implantation with simultaneous vestibular alveolar ridge augmentation

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Implantation with simultaneous vestibular alveolar ridge augmentation

Alveolar ridge augmentations are increasingly being performed with allogenic bone substitute materials before or simultaneously with implantation. The author uses a fully synthetic hydroxyapatite with slow resorption kinetics for this purpose. The indications for and limits to its clinical use are demonstrated using case examples and naming the products concerned.

Modern techniques of dental preservation in endodontic and periodontal treatment mean that increasingly often teeth are only removed at a very late stage, often with the consequences of a considerable alveolar ridge defect. Full denture wearers are very often also observed to have severe alveolar ridge atrophy. In many cases, therefore, pre-implantological alveolar ridge augmentation is required.

Bone transplants versus substitute materials | For severe horizontal atrophies, augmentation with a bone graft is usually unavoidable. For moderate horizontal atrophy, restoration with bone substitute materials may be considered providing that the implant can be stably anchored in the residual bone. The currently used materials, such as hydroxyapatite and tricalcium phosphate, are available in the form of granules and are unsuitable for stabilising implants in patients with severe atrophy. In cases with minor bone deficits, augmentation with bone replacement materials can often be performed simultaneously with the implantation.

The use of tricalcium phosphate for this purpose is limited. This material frequently resorbs completely in vestibular superstructures. Hydroxyapatite is better suited for this purpose, as this material is degraded only slightly and over a long period.

Among the hydroxyapatites commonly used today, the synthetically manufactured materials such as IngeNiOs™HA (Zimmer Dental Inc.) are to be preferred to biological materials since possible complications of the kind observed when using substitute materials of biological origin can be avoided. Because of its high porosity, IngeNiOs™HA undergoes rapid vascularisation with high stability. IngeNiOs™HA has been used in my practice for about one year for vestibular augmentation of Grade I and II alveolar ridge defects before or simultaneously with implantation. I now present three clinical examples illustrating the use of this material in my practice.

Clinical case examples | Backfilling and contouring of a graft: For a severe alveolar ridge defect in region 22, a preimplantation bone block transplant had to be taken from vestibular region 38, placed vestibularly on 22 and fixed with bone screws (Medicon). IngeNiOs™HA was used for backfilling and contouring the transplant. Three months later, with good ossification, the implantation was performed. At the same time, the fixation screws were removed (Fig. 1-3). In this case, augmentation simultaneously with the implantation using only granular bone replacement material would not have resulted in primary stability of the implant.



Fig. 1: Due to a severe alveolar process defect in region 22 a pre-implantation bone block transplantation was taken from vestibular region 38, placed vestibularly on 22 and fixed with bone screws (Medicon).



Fig. 2 and 3: Three months later, with good ossification, implantation was performed. At the same time, the fixation screws were removed.

Filling of a buccal defect: In a 52-year-old female patient, teeth 22 and 23 treated elsewhere with a crown block had to be extracted due to high-grade periodontal bone destruction (Fig. 4).

Additionally, tooth 23 was apically infected. Eight weeks postoperatively the extraction sockets had healed (Fig. 5). Clinically, however, 23 exhibited buccal bone loss. This was not so severe, however, as to represent an

indication for bone transplantation. In the radiographic measurement with a drilling template (sleeves, Steco), the vertical bone dimension was well preserved with ring markings with a spacing of 2 mm (Fig. 6). During preparation of the implant bed for two Straumann implants (Straumann) with a diameter of 4.1 mm, on placing the measuring cylinder on tooth 23 a vestibular bone deficit of approx. 6 mm implant length was ob-

served, but did not impair the primary stability of the implant (Fig. 7).

After mixing the IngeNiOs™HA hydroxyapatite granules with autologous blood from the implant region (Fig. 8), this buccal defect was filled. At the same time, the narrow buccal cortical lamella at 22 and 23 was reinforced with IngeNiOs™HA (Fig. 9). The material was pressed in place and adapted to the bone with a collagen membrane (Resorba). Perioperative antibiotic prophylaxis was unnecessary in this case.

Three months post implantation, the partially subgingivally healed implants were exposed and fitted with prosthetic restorations. The abutments used are surrounded by a thick buccal bone lamella and sufficiently thick gingiva (Fig. 10). The master model demonstrates that the contact zones of the full metal-ceramic crowns are only approx. 1 to 2 mm above the gingival border to promote ingrowth of the gingiva into the interdental space (Fig. 11).



Fig. 4: The X-ray shows teeth 22 and 23 with severe periodontal bone destruction and apical infection on 23



Fig. 5: Situation in region 22 and 23 eight weeks post extraction



Fig. 6: Radiographic presentation of the vertical bone dimension.



Fig. 7: Implants in region 22 and 23 in situ.



Fig. 8: The hydroxyapatite IngeNiOs™HA mixed with autologous blood ...



Fig. 9: ... is applied to fill the buccal defect.



Fig. 10: Three months post implantation, a sufficiently thick buccal bone lamella and gingiva are observed.



Fig. 11: Master model: the contact zone of the full metal-ceramic crowns is only about 1 to 2 mm above the gingival border.

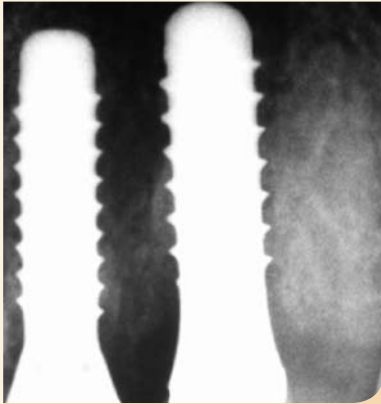


Fig. 12: Final X-ray – preservation of the inter-implant bone.

The concluding radiograph shows preservation of the inter-implant bone after prosthetic treatment (Fig. 12).

Reinforcement of a bone lamella: In a 64-year-old female patient, due to poorly fitting dentures the edentulous upper jaw was to be provided with four implants in regions 13, 15, 23 and 25 for stabilisation of a telescopic full denture (Fig. 13). Inspection of the denture border (Fig. 14) already revealed a vestibular bone defect in region 13. This was also diagnosed on checking with the drilling template (Fig. 15). The extent of the buccal bone deficit in 13 was recognisable both in the model and clinically

with optimal implant positioning (Fig. 16). After palatine incision the narrow alveolar ridge was stretched with expansion screws (Komet Dental/Brasseler) to accommodate two implants of diameter 4.3 mm (Camlog) (Fig. 17.) After inserting the implants, the thin remaining bone lamella in region 13 was readily identifiable (Fig. 18). To reinforce the bone lamella, IngeniOs™HA was again coagulated with blood and buccally adapted. The augmentation material was then covered with collagen membrane (Resorba) and the wound was sutured tension-free (Fig. 19 and 20).

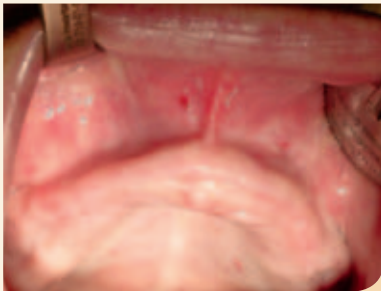


Fig. 13: Initial situation: the edentulous upper jaw shows vestibular atrophy at 13.

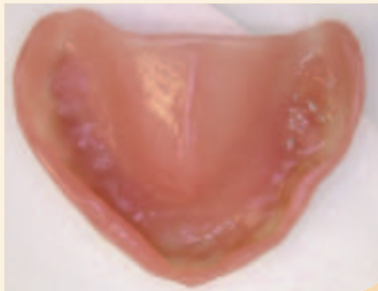


Fig. 14: Checking of the denture border.

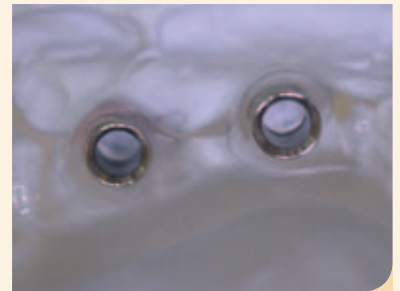


Fig. 15: Checking of the drilling template. The vestibular bone defect is visible.



Fig. 16: With optimal implant positioning, the extent of the buccal bone deficit at 13 is also clinically apparent.

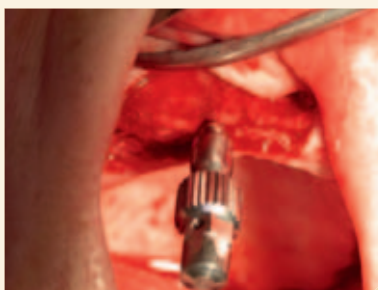


Fig. 17: The narrow alveolar ridge was stretched with an expansion screw to receive the implant.

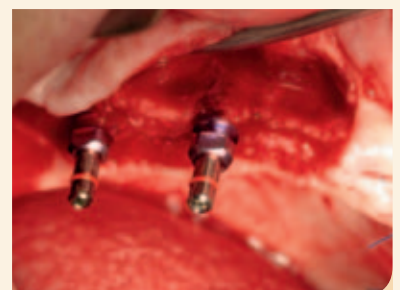


Fig. 18: After insertion of the implants, the thin remaining bone lamella in region 13 was clearly identifiable.

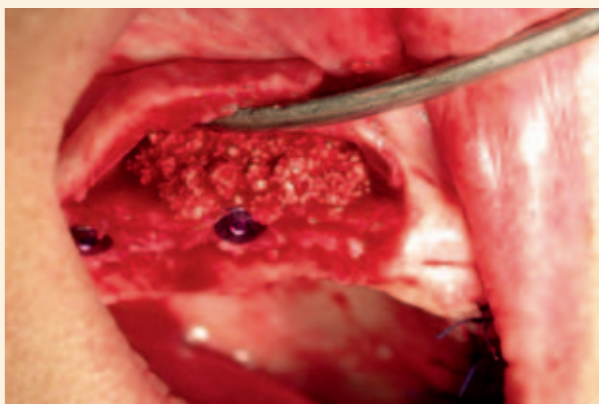


Fig. 19: To reinforce the bone lamella, IngeniOs™HA was coagulated with blood and buccally adapted.

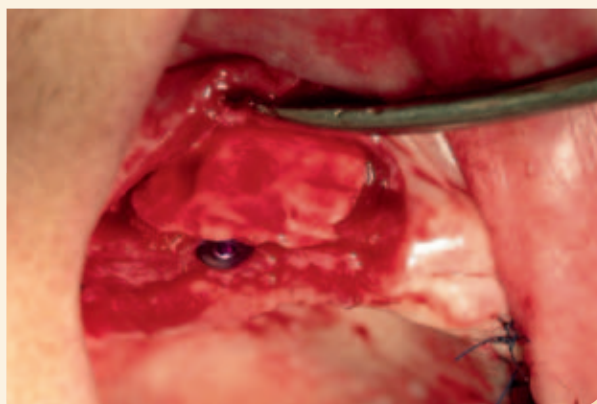


Fig. 20: The augmentation material was covered with a collagen membrane and the wound was sutured tension-free.

Summary | Vestibular simultaneous augmentation with hydroxyapatite for Grade I and II jaw atrophies has proved successful because the material is not rapidly resorbed in the buccal region like, for example, tricalcium phosphate. For larger alveolar process defects, a pre-implantation bone graft should be used as before, because no primary stability of implants can be achieved with the simultaneous use of hydroxyapatite granules. To what extent pre-implantation augmentation with IngeniOs™HA provides long-term implant stability will have to be investigated in further scientific studies. Similarly, longer follow-up periods will show how well IngeniOs™HA is osseointegrated and remains stable in terms of resorption. IngeniOs™HA is to be preferred to other particulate hydroxyapatite materials because of its synthetic manufacture.

Literature

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Address for correspondence:

Prof. Dr. Ulrich Keller
 Fachzahnarzt für Oralchirurgie
 Implantologie zertifiziert
 Schillerstraße 1/15, 89077 Ulm
 Germany
 E-Mail: ulrichkeller1@aol.com



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Zimmer Dental | 1900 Aston Avenue | Carlsbad, CA 92008-7308 | USA
Phone: 1 (800) 854-7019 (In the U.S.) | +1 (760) 929-4300 (Outside the U.S.)
www.zimmerdental.com

