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## Sinus lift with Straumann® BoneCeramic: clinical treatment and histological results

Today, oral implant rehabilitation has been proven to be a reliable and predictable therapy option to meet the needs of edentulous patients. Aimed to be a complete restitution ad integrum, the implant therapy should follow not only functional requirements, but also esthetic expectations. The lack of adequate bone height of the alveolar crest of the posterior maxilla results from involuntal absorption caused by the absence of the trophic stimulus created by natural dentition and from the concomitant pneumatization of the maxillary sinus. Solving this atrophic situation by creating new hard tissue, the sinus lift procedure is a widely accepted technique to enable reliable implant placement in the posterior segments of the maxilla.

### Initial situation

A 58-year old male with unremarkable medical history presented for implant treatment with a distal edentulous saddle situation in the left side of the maxilla. Tooth loss of 23–26 happened 2 years ago. The preoperative X-ray demonstrated residual bone of less than 2 mm in the left molar region (Fig. 1).

### Treatment plan

To meet the patient's request for a fixed restoration in this area, it was necessary to perform an unilateral sinus lift in region 26 using the lateral window technique with combined



Fig. 1

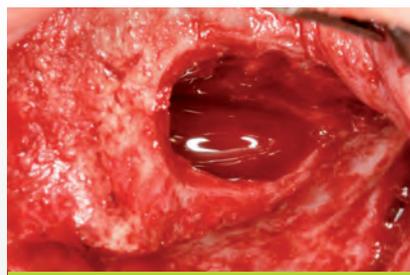


Fig. 2

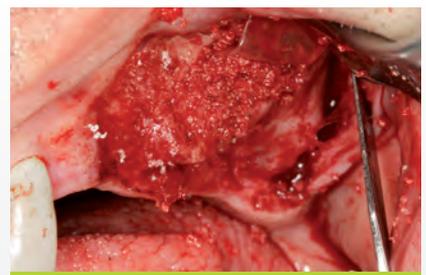


Fig. 3

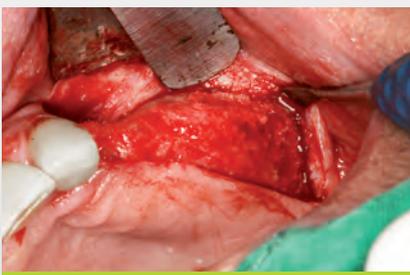


Fig. 4



Fig. 5



Fig. 6

lateral augmentation using Straumann® BoneCeramic. A delayed implant placement after 6 months was planned to solve the initial deficient patient situation with limited bony structures (Fig. 2). From prosthodontics point of view it was planned to place three Straumann® Soft Tissue Level implants in a second surgical stage after 6 months healing time. The bone core from trephine drilling of the augmented site in region 26 was preserved for histological processing.

**Surgical procedure**

An incision was made slightly palatal of the crest with one mesial extension. The window preparation of the bone to ac-

cess the sinus was made with a piezoelectric device in order to keep the patient’s bone fragments in situ. After detaching the Schneiderian membrane, the Straumann® BoneCeramic, previously mixed with the patient’s blood, harvested from the operation site, and autologous bone chips sourced from the lateral window, was inserted starting from the inner wall of the palate (Fig. 3). An absorbable membrane to protect and stabilize the previously inserted Straumann® BoneCeramic is placed on the outer part of the window. Lateral augmentation in region 23–24 was performed concurrently prior to closing the access flap (Fig. 4). Finally, sutures were placed (Fig. 5), maintaining the integrity of the margins. Following the initial

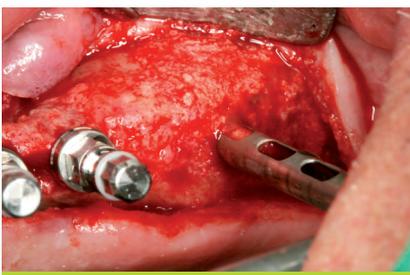


Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11

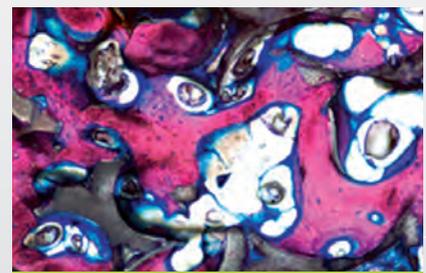


Fig. 12



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phase of surgery, the patient was prescribed anti-inflammatory treatment together with chlorhexidine solution to be used in the area of the procedure. Six months later, the patient had a follow up OPT (**Fig. 6**) demonstrating the presence of an adequate amount of regenerated bone. In the first molar region a bone core was removed for histological analysis using a specific trephine drill (**Figs. 7, 8**).

Straumann® Soft Tissue Level implants were placed in positions 23, 24 and 26 respectively (**Figs. 9, 10**). While in region 23 and 24 a non-submerged healing was preferred, the implant in 26 was placed subgingival to allow smooth healing. The control OPG shows the position of the implants in the maxilla (**Fig. 11**).

### Histological analysis

**Figures 12, 13** show the interface between Straumann® BoneCeramic and newly formed bone (10x and 20x magnification). The following parameters were measured:

Straumann® BoneCeramic	14.0%
Mineralized new bone	30.3%
Bone marrow and non-mineralized tissue	31.6%
Soft tissue	24.2%



**Fig. 13**



**Fig. 14**



**Fig. 15**

### Prosthetic procedure

After a healing period of 6 months the patient presented inconspicuous soft tissue conditions (Fig. 14). Exposure of Implant 26 was performed and gingiva formers were placed on all implants (Fig. 15). Insertion of the final restoration performed by the referring prosthodontist showed satisfactory results (Fig. 17).

### Conclusion

This clinical case yielded satisfactory results. In 12 months, the patient obtained complete restoration of the left posterior hemiarch. At the control visit after 2 years the radiograph demonstrates an absence of pathological peri-implant changes (Fig. 16).

No bone resorptive patterns of the peri-implant bone sites can be seen when compared to the situation at time of implant placement. The preservation of the generated bone volume in the sinus cavity could be confirmed 5 years post-op by a DVT at a follow-up visit (Fig. 18).

The employment of Straumann® BoneCeramic for sinus grafting, as well as lateral recontouring for the deficient bony site, has been demonstrated to be very useful; this article confirms the data on the osteoconductive properties of Straumann® BoneCeramic.



**Dr. Jonathan Fleiner**

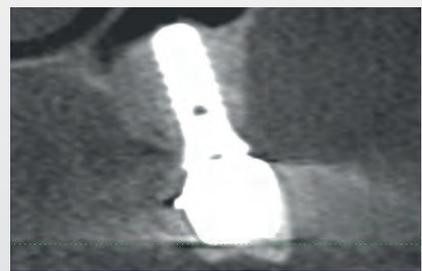
2007–2009 University Clinic for dental, oral and orthodontic medicine and maxillofacial surgery, X-ray department, Freiburg im Breisgau. 2007/2008 Postgraduate education “Curriculum Implantology” of the German Society for Implantology for dental, oral and orthodontic medicine (DGI) and Academy Practice and Science (APW). 2008 Dental Diagnostic Center Weil am Rhein (DDZ) with focus on “Dental Digital Volume Tomography (DVT)”. Since 2008 regular speaker at national and international events as well as reviewer of international scientific journals in the fields of dental radiological diagnostics, DVT and 3D-based template-guided implant treatment (Guided Surgery). 2010 Center for Implantology, Periodontology and 3-D diagnostics, practice Dr. Dr. Stricker (Constance).



**Fig. 16**



**Fig. 17**



**Fig. 18**