the end of alveolar distraction osteogenesis, length of consolidation was 3 months, and distractors were removed. Bone height was measured on digital orthopantomographic radiographs, after distraction and before implant placement.

Results: Mean alveolar distraction was 11.5 mm. The mean relapse was 21% (13% to 27%)after the end of consolidation. 1 month after distractor removal, 10 patients were performed implant placement (Group A). The mean relapse was 5% (1–7%) at implant placement. On the other hand, 15 patients were performed distractor removal and implant placement at the same time (Group B).

Conclusion: The vertical alveolar distraction osteogenesis before dental implant placement is very useful but a considerable relapse must be confronted. This study indicated that implant placement performed at the same time of distractor removal if possible, and the need for overcorrection was more than 27%. In Group A, the need for overcorrection was more than Group B, more than 34%.

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Preclinical animal model for de novo bone formation in human maxillary sinus

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Background and aim: Up to now the effect of bone substitute materials on *de novo* bone formation has been tested in a variety of preclinical animal models to demonstrate their regenerative capacity before clinical use. In order to define the comparability of the experimental pig model, the following study compared the outcome of bone regeneration after application of autogenous bone and bone substitutes in a porcine model with the clinical outcome in humans.

Materials and methods: In the animal experiment β-tricalcium phosphate (βTCP), hydroxyapatite (HA) and autogenous bone (AB) were each placed in three monocortical bone defects (10 mm diameter) on the forehead of six adult pigs ($N = 54$). In a randomized prospective clinical trial, 44 sinus floor elevations were performed with βTCP, HA and AB in 41 patients. The bone regeneration rate was quantified microradiographically, after a defined observation period of 24 weeks in both experimental models.

Results: No statistically significant differences in bone regeneration after application of autogenous bone (AB) and bone substitute materials (HA and βTCP) in a porcine calvarial monocortical defect model and in human maxillary sinus augmentation could be found after 24 weeks of observation. [AB ($P = .98$), βTCP ($P = .31$) and HA ($P = .68$)]. Wilcoxon rank-sum test was used for statistical analysis.

Conclusion: The chosen porcine model ensures an important evidence of biocompatibility before clinical use of bone substitute materials. Showing no statistically significant differences in bone regeneration compared to human maxillary sinus it has to be considered as a valuable model for preclinical testing of bone substitute materials in maxillofacial surgery.

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Dimensional study of the bone reparation achieved after the sinus lift procedure with a composite graft of autogenous bone and deproteinized mineral bovine bone, assessed by cone-beam tomography

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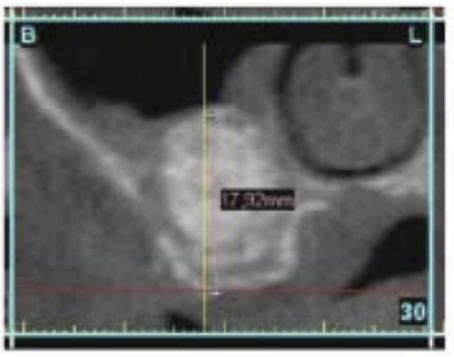
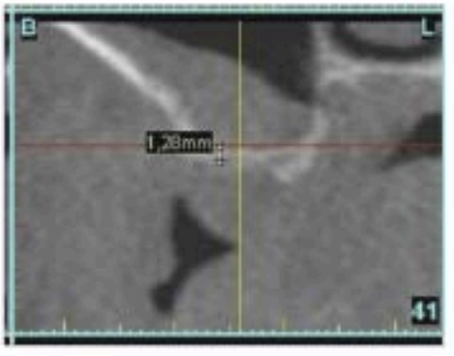
Background and aim: The sinus floor elevation is a well-documented technique for the grafting of atrophic posterior maxillas with reduced crestal bone height. Several grafting materials have been described for this proposal. In type III and IV sinuses this procedure becomes especially necessary and often a delayed implant approach is required, making it vital to analyze patients' characteristics and to minimize complications which could threaten the graft viability. The aim of this study was to calculate the bone gain after maxillary sinus grafting in potential maxillary sites receiving dental implants evaluated by means of cone-beam tomography. Secondly, prevalence of complications and its influence on bone reparation was evaluated.

Materials and methods: Twenty-four consecutive patients from January 2007 to December 2007 receiving 29 sinus floor elevations (type III and IV sinuses) were evaluated retrospectively. An initial cone-beam tomography assessed insufficient residual crestal bone height. Subsequently, the sinus lift procedure was performed (lateral window approach) and any perforation of the schneiderian membrane was covered (collagen membrane), if noted. A composite graft was then placed. When it was possible, implants were placed simultaneously. Patients were monitored and any adverse event was recorded. After a maturation period of 6–8 months, a second cone-beam tomography was carried out, leading to the placement of 65 rough-surface implants. An immediate provisional prosthesis was developed when primary stability requirements were achieved. Short-term (average 9.82 months) implant survival rate was calculated. The average bone height gain and the influence of complications were analyzed statistically.

Results: Six perforations of the sinus membrane were observed during the healing period. Ninety-seven percent of the implants were placed in a delayed approach, after a healing period of 6–8 months; whereas 3% were placed simultaneously. An overall survival rate of 100% was observed after a follow-up of 10 months. To consider an implant successful, the criteria of Albrektsson et al were evaluated. No complications were observed in the immediate provisional restorations. An average 12.7 mm of bone height gain was observed after the maturation of the maxillary sinus graft.





Conclusion: Within the limitations of this study, delayed implant placement after sinus grafting seems to be a reliable alternative for severely atrophic maxillary sites receiving implant rehabilitations. Complications, such as membrane perforations, seem to decrease significantly the amount of bone reparation, without preventing programmed implant placement or compromising graft viability.

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A comparison of two techniques to augment maxillary sinuses with the lateral approach: no grafting procedure vs. anorganic bone placement. Preliminary histological and clinical outcomes of a randomized controlled clinical trial

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Background and aim: To compare the histological/histomorphometricand implant results up to 4 months follow-up of two different maxillary sinus lift techniques via a lateral approach: the use of synthetic resorbable barriers (Inion) (test group) without grafting material in one side vs. anorganic bovine bone (Bio-Oss) placement in the contra-lateral site (control group).

Materials and methods: Ten patients with a residual bone height of 1–4 mm in posterior edentulous maxillas underwent sinus lift procedures performed bilaterally with lateral approach: after the elevation of a mucoperiosteal flap, a lateral bony window was performed and internally displaced; the maxillary membrane was carefully elevated and its integrity was assessed visually and with a blunt instrument. The site randomly assigned to test group was treated with the application of a resorbable barrier (Inion®) with no grafting material. The Inion barrier stiffens in contact with water holding up the sinus membrane and maintaining the space beneath. Contra-laterally 100% particulated inorganic bovine bone (Bio-Oss®) was applied beneath the sinus membrane (control procedure). After 6 months, a total number of 60 Way® (Geass, Italy) implants were placed and a bone specimen has been taken for histological evaluation on both sides. Implants were loaded after 4 months.

Results: Test procedure: Atrabecular bone with large medullary space were observed. Many osteoblasts were observed in the process of apposing bone. No acute inflammatory cell infiltrate was present around the particles or at the interface with bone. Histomorphometry showed that the mean amount of new bone was 37.0 ± 3.28, of marrow spaces was 62.2% ± 4.4, of osteoblast activity was 25%.

Control procedure: A new woven bone and a remarkable percentage of residual Bio-Oss biomaterial was found. Residual ABB particles, in most cases, were surrounded by marrow spaces. In other areas, lamellar bone was found in tight contact with the particles surface. Histomorphometry showed that the mean amount of new bone was 39.0 ± 2.28, of ABB was 47.1 ± 3.18%, of marrow spaces was 22.2 ± 5.4%, of osteoblast activity was 5%.

Conclusion: Histological outcomes demonstrated that the use of a stiff barrier is able (a) to maintain lifted up the Schneiderian membrane, (b) to preserve the space underneath, (c) to obtain the formation of a good quality bone just from the bone clot, with no necessity of grafting materials.

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Evaluation of a new three-dimensional measurement technique to define bone volume after sinus augmentation

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Background and aim: Volume determination of internal maxillary sinus augmentations and evaluation of time dependend dimensional changes are very time-consuming. The intention of this investigation was to assess a newly developed software to calculate the grafted volumes automatically using computed tomography (CT) data sets.

Materials and methods: In this study augmentations and dimensional changes were simulated with radiation impermeable