Pre-clinical \textit{(in vitro \& in vivo)} studies

1. Osseointegration of Superhydrophilic Implants Placed in Defect Grafted Bones. 


The goal of this study was the analysis and comparison of bone formation around implants with a superhydrophilic modSLA (SLActive) or hydrophobic SLA (SLA) surface.
Methods: Straumann® Roxolid, Ø 3.3 mm, length 8 mm, either SLA or SLActive, were implanted in circumferential defects in minipig mandibles. Following implant placement, the 2-mm circumferential defects around the implants were filled with maxgraft® or cerabone®. Distance from implant shoulder to first bone-to-implant contact (f-BIC), percentage of bone-to-implant contact (BIC), and bone aggregate percentage (amount of new bone and remaining graft) within the defect area were evaluated after 8 weeks of healing.
Results: In the cerabone® group, lingual fBIC and buccal BIC were significantly lower for SLA (mean -0.404 ± 0.579 mm for modSLA versus -1.191 ± 0.814 mm for SLA, $P = .021$ and mean 62.61% ± 9.49% for modSLA versus 34.67% ± 24.41% for SLA, $P = .047$, respectively). Bone aggregate percentage was significantly higher for modSLA versus SLA implants in cerabone® (77.84% ± 6.93% versus 64.49% ± 13.12%; $P = .045$). The differences between implant surfaces in maxgraft® showed a similar trend but were less pronounced than in the cerabone® group and did not reach a statistically significant level.
Conclusions: The authors concluded that the results suggest that implants with a superhydrophilic modSLA surface are more conducive to faster osseointegration even in conjunction with simultaneous bone grafting procedures.


The goal of this study was to compare the effects of cerabone® and a synthetic bone graft (hemihydrate calcium sulfate) on socket preservation histologically using a dog model.
Methods: The premolars on both sides of the lower jaw were extracted (dogs n = 6), and the sockets were grafted either with cerabone® or the synthetic bone graft. Four and eight weeks following the surgery, bone cores were harvested and a histological evaluation was performed to determine the amount of newly formed bone and connective tissue. In addition, the presence of inflammatory cells was determined.

Results:
- Mean values of bone proportion were 11% and 8% for cerabone® and calcium sulfate, respectively (P=0.58)
- Mean values for connective tissue proportion were 29% and 33% for cerabone® and calcium sulfate, respectively (P=0.72)
- No inflammatory cells were observed in the cerabone® group, while 50% of the samples in the calcium sulfate group showed inflammation (P=0.50)

Conclusions: The authors concluded that the effects of cerabone® and calcium sulfate on socket preservation in the used dog model were comparable. The found differences concerning bone formation, fibrous connective tissue amounts and inflammation levels were not significantly different at four and eight-week post-operative intervals.


Investigation of the dimensional changes and molecular mobility by Dynamic Mechanical Analysis (DMA) of xenograft (cerabone®), synthetic (maxresorb®), and allograft (maxgraft®, Puros®) blocks in a wet and dry state. While no significant differences could be seen in dry state, cerabone® and maxresorb® blocks showed a slight height decrease in wet state, whereas both maxgraft® and Puros® had an almost identical height increase. In addition, cerabone® and maxresorb® blocks remained highly rigid and their damping behaviour was not influenced by the water. On the other hand, both maxgraft® and Puros® had a strong increase in their molecular mobility with different damping behaviour profiles during the wet state. A high-speed microscopical imaging system was used to analyze the hydrophilicity in several naturally derived (cerabone®, Bio-Oss®, NuOss®, SIC® nature graft) and synthetic DBGS granules (maxresorb®, BoneCeramic®, NanoBone®, Ceros®). The highest level of hydrophilicity was detected in cerabone® and maxresorb®, while Bio-Oss® and BoneCeramic® had the lowest level of hydrophilicity among both naturally derived and synthetic DBGS groups. Deviations among the DBGS were also addressed via physicochemical differences recorded by Micro Computed Tomography, Scanning Electron Microscopy, Fourier Transform Infrared Spectroscopy, X-ray powder Diffractometry, and Thermogravimetric Analysis. Such DBGS variations could influence the volume stability at the
Relevant Publications - cerabone®

grafting site, handling as well as the speed of vascularization and bone regeneration. Therefore, this study initiates a new insight into the DBGs differences and their importance for successful clinical result

4. Resol based chitosan/nano-hydroxyapatite nanoensemble for effective bone tissue engineering.

It is the first report where different amounts of resol resin (RS) were incorporated with chitosan-hydroxyapatite (CHA) to develop a triconstituent nanoensemble CHA-RS(0.5,1,2), via simple co-precipitation method. The results of SEM, TEM, TGA and mechanical analysis revealed irregular interconnected rough morphology with homogenous distribution of needle shaped particles having average size ranging between 12 and 19nm, possessing higher thermal stability and mechanical strength, respectively relative to CHA (binary) nanocomposite. The CHA-1RS nanocomposite showed enhanced protein adsorption and ALP activity with excellent apatite formation ability compared to CHA-RS(0.5,2) and CHA nanocomposites. Thus, CHA-1RS nanocomposite was selectively tested as bare implant in the repair of critical-size calvarium defect (8mm) in albino rat. The histopathological and radiological investigations indicated that CHA-1RS prompted the bone regeneration ability as early as 2 weeks postimplantation demonstrating remarkably faster healing of calvarial defect relative to cerabone. These findings have placed CHA-1RS on the pedestal to be employed as a potential alternative biomaterial for bone tissue engineering.

5. Comparison of three different types of scaffolds preseeded with human bone marrow mononuclear cells on the bone healing in a femoral critical size defect model of the athymic rat.

Comparison of three different scaffolds serving as carrier for BMC in a rat femoral critical size defect with regard to the osteogenic activity in the defect zone. Human demineralized bone matrix (DBM), bovine cancellous bone hydroxyapatite ceramic (BS), or β-TCP were seeded with human BMC and hereafter implanted into critically sized bone defects of male athymic nude rats. Autologous bone served as control. Gene activity was measured after one week, bone formation was analysed
histologically and radiologically after 8 weeks. Generally, regenerative gene expression (BMP2, RUNX2, VEGF, SDF-1, RANKL) as well as bony bridging and callus formation was observed to be most pronounced in defects filled with autologous bone, followed in descending order by DBM, β-TCP and BS. Although DBM was superior in most aspects of bone regeneration analysed in comparison to β-TCP and BS, the level of autologous bone could not be attained.

6. Polymeric vs hydroxyapatite-based scaffolds on dental pulp stem cell proliferation and differentiation.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4663374/

The aim was to evaluate adhesion, proliferation and differentiation of human dental pulp stem cells (hDPSCs) on four commercially available scaffold biomaterials.

Methods: hDPSCs were isolated from human dental pulp tissues of extracted wisdom teeth and established in stem cell growth medium. hDPSCs at passage 3-5 were seeded on four commercially available scaffold biomaterials, SureOss (Allograft), cerabone (Xenograft), PLLA (Synthetic), and OSTEON II Collagen (Composite), for 7 and 14 d in osteogenic medium. Cell adhesion and morphology to the scaffolds were evaluated by scanning electron microscopy (SEM). Cell proliferation and differentiation into osteogenic lineage were evaluated using DNA counting and alkaline phosphatase (ALP) activity assay, respectively.

Results: All scaffold biomaterials except SureOss (Allograft) supported hDPSC adhesion, proliferation and differentiation. hDPSCs seeded on PLLA (Synthetic) scaffold showed the highest cell proliferation and attachment as indicated with both SEM and DNA counting assay. Evaluating the osteogenic differentiation capability of hDPSCs on different scaffold biomaterials with ALP activity assay showed high level of ALP activity on cells cultured on PLLA (Synthetic) and OSTEON II Collagen (Composite) scaffolds. SEM micrographs also showed that in the presence of Cerabone (Xenograft) and OSTEON II Collagen (Composite) scaffolds, the hDPSCs demonstrated the fibroblastic phenotype with several cytoplasmic extension, while the cells on PLLA scaffold showed the osteoblastic-like morphology, round-like shape.

Conclusion: PLLA scaffold supports adhesion, proliferation and osteogenic differentiation of hDPSCs. Hence, it may be useful in combination with hDPSCs for cell-based reconstructive therapy.
7. Characterization of Bone Marrow Mononuclear Cells on Biomaterials for Bone Tissue Engineering In Vitro.


Bone marrow mononuclear cells (BMCs) are suitable for bone tissue engineering. Comparative data regarding the needs of BMC for the adhesion on biomaterials and biocompatibility to various biomaterials are lacking to a large extent. Therefore, we evaluated whether a surface coating would enhance BMC adhesion and analyze the biocompatibility of three different kinds of biomaterials. BMCs were purified from human bone marrow aspirate samples. Beta tricalcium phosphate (β-TCP, without coating or coated with fibronectin or human plasma), demineralized bone matrix (DBM), and bovine cancellous bone (BS) were assessed. Seeding efficacy on β-TCP was 95% regardless of the surface coating. BMC demonstrated a significantly increased initial adhesion on DBM and β-TCP compared to BS. On day 14, metabolic activity was significantly increased in BMC seeded on DBM in comparison to BMC seeded on BS. Likewise increased VEGF-synthesis was observed on day 2 in BMC seeded on DBM when compared to BMC seeded on BS. The seeding efficacy of BMC on uncoated biomaterials is generally high although there are differences between these biomaterials. Beta-TCP and DBM were similar and both superior to BS, suggesting either as suitable materials for spatial restriction of BMC used for regenerative medicine purposes in vivo.

8. High-temperature sintering of xenogeneic bone substitutes leads to increased multinucleated giant cell formation: In vivo and preliminary clinical results.*


The present preclinical and clinical study assessed the inflammatory response to a high temperature-treated xenogeneic material (Bego-Oss®) and the effects of this material on the occurrence of multinucleated giant cells, implantation bed vascularization and regenerative potential. After evaluation of the material characteristics via scanning electron microscopy, subcutaneous implantation in CD-1 mice was used to assess the inflammatory response to the material for up to 60 days. The clinical aspects of this study involved the use of human bone specimens six months after sinus augmentation. Established histological and histomorphometric analysis methods were applied. After implantation, the material was well integrated into both species without any adverse reactions. Multinucleated giant cells were observed in both species and were associated with enhanced
vascularization. These results revealed that the high heat treatment led to an increase in the inflammatory tissue response to the biomaterial and a combined increase in multinucleated giant cell formation. Further clarification of the differentiation of the multinucleated giant cells toward so-called osteoclast-like cells or foreign body giant cells is needed to relate these cells to the physicochemical composition of the material.

*Study refers to BEGO OSS, which is a former private label of cerabone®.

9. Bone substitute material composition and morphology differentially modulate calcium and phosphate release through osteoclast-like cells. 


The aim of this study was to determine the material composition and cell-mediated remodelling of different calcium phosphate-based bone substitutes. Osteoclasts were cultivated on bone substitutes (cerabone®, maxresorb®, and NanoBone) for up to 5 days. Bafilomycin A1 addition served as the control. To determine cellular activity, the supernatant content of calcium and phosphate was measured by inductively coupled plasma optical emission spectrometry. Cells were visualized on the materials by scanning electron microscopy. Material composition and surface characteristics were assessed by energy-dispersive X-ray spectroscopy. Osteoclast-induced calcium and phosphate release was material-specific. maxresorb® exhibited the highest ion release to the medium (P = 0.034; calcium 40.25mg/l day 5, phosphate 102.08 mg/l day 5) and NanoBone the lowest (P = 0.021; calcium 8.43 mg/l day 5, phosphate 15.15 mg/l day 5); cerabone® was intermediate (P = 0.034; calcium 16.34 mg/l day 5, phosphate 30.6 mg/l day 5). All investigated materials showed unique resorption behaviours. The presented methodology provides a new perspective on the investigation of bone substitute biodegradation, maintaining the material-specific micro- and macrostructure.
10. Comparison of six bone-graft substitutes regarding to cell seeding efficiency, metabolism and growth behaviour of human mesenchymal stem cells (MSC) in vitro.


This in vitro study investigates cell seeding efficiency, metabolism, gene expression and growth behaviour of MSC sown on six commercially clinical available bone-graft substitutes in order to define their biological properties: synthetic silicate-substituted porous hydroxyapatite (Actifuse ABX), synthetic alpha-TCP (Biobase), synthetic beta-TCP (Vitoss), synthetic beta-TCP (Chronos), processed human cancellous allograft (Tutoplast) and processed bovines hydroxyapatite ceramic (cerabone®). 250,000 MSC derived from human bone marrow (n=4) were seeded onto the scaffolds, respectively. On days 2, 6 and 10 the adherence of MSC (fluorescence microscopy) and cellular activity (MTT assay) were analysed. Osteogenic gene expression (cbfa-1) was analysed by RT-PCR and scanning electron microscopy was performed.

The highest number of adhering cells was found on Tutoplast (e.g. day 6: 110.0+-24.0 cells/microscopic field; p<0.05) followed by Chronos (47.5+-19.5, p<0.05), Actifuse ABX (19.1+-4.4), Biobase (15.7+-9.9), Vitoss (8.8+-8.7) and cerabone® (8.1+-2.2). MSC seeded onto Tutoplast showed highest metabolic activity and gene expression of cbfa-1. These data are confirmed by scanning electron microscopy. The cell shapes varied from round-shaped cells to wide spread cells and cell clusters, depending on the bone-graft substitutes. Processed human cancellous allograft is a well-structured and biocompatible scaffold for ingrowing MSC in vitro. Of all other synthetical scaffolds, beta-tricalcium phosphate (Chronos) have shown the best growth behaviour for MSC.

Discussion: Our results indicate that various bone-graft substitutes influence cell seeding efficiency, metabolic activity and growth behaviour of MSC in different manners. We detected a high variety of cellular integration of MSC in vitro, which may be important for bony integration in the clinical setting.


The objective of this pilot study was to examine, in vitro and in vivo, a novel native collagen membrane extracted from porcine pericardium.
Materials and Methods: The morphologic structure of two different native collagen membranes (Remotis, Thommen Medical; Bio-Gide, Geistlich Biomaterials) was examined using a scanning electron microscope. For biocompatibility testing, membranes were incubated with SaOs-2 osteoblastlike cells. After 2 hours, 3 days, and 7 days, proliferation of the cells on the membranes was determined. Evaluation of the biodegradation pattern was performed in a dog model with simultaneous bone augmentation with Bio-Oss (Geistlich Biomaterials) or cerabone® (Botiss Biomaterials) in the lateral anterior maxilla in eight animals with histologic examination after 4, 8, 12, and 24 weeks. Results: An interconnective pore system was identifiable for Remotis, while Bio-Gide displayed a more fibrous structure. In vitro, Remotis showed considerable cell proliferation, which was significantly superior to that observed with Bio-Gide, especially after 7 days (2,910 ± 1,273 and 707 ± 706, respectively). In vivo, both membranes integrated into the surrounding tissue without any inflammatory reaction. Both membranes allowed early vascularization. However, considerable biodegradation was noted within 4 to 8 weeks with Bio-Gide, while Remotis resorbed generally within the first 8 to 12 week. Both membranes supported underlying bone formation. Conclusion: Both examined membranes indicate a high level of biocompatibility. Both are resorbed without inflammation within 8 weeks (Bio-Gide) or 12 weeks (Remotis). The compact interconnective pericardium collagen of Remotis may have stabilized the resorption process.


The purpose of this study was to evaluate the influence of anorganic bovine bone as a grafted biomaterial on newly formed bone and cementum in periapical regions after surgical endodontic treatment in cats.

Methods: After inducing apical periodontitis in 9 cats, root canal and surgical endodontic treatment were performed on 72 roots of first and second maxillary premolars. Bone defects were treated with biomaterial particles + a membrane, biomaterial only, a membrane only, or left unfilled (control). Histomorphometry on nondecalcified sections were performed at 3 and 6 months after surgery. Analysis of variance with repeated measures was used within 2 and 3 subject factors to analyze newly formed bone, cementum, biomaterial conduction, and resorption.

Results: At each time period, bone formation was greater at the grafted membrane-protected sites than in the grafted unprotected sites. At 6 months, the bone area fraction at membrane nongrafted sites was greater than in the grafted-protected sites. The new cementum was significantly greater at 6 months than at 3 months and greater at the grafted membrane-protected sites over the unprotected ones at 6 months. Statistically, the grafted biomaterial, the membrane, and the time contributed
significantly to the amount of new bone (P < .05) with no significant interaction. Biomaterial osteoconduction was significantly affected by the time. All 3 variables showed a significant interaction on new cementum.

Conclusions: There was significantly more bone formation after surgical endodontic treatment when membrane and bone grafts were used as compared with bone grafts only or unfilled control sites. However, it appears that the key factor to the enhanced tissue regeneration is the membrane and not the grafted biomaterial.

13. Impact of Citric Acid Etching on Biocompatibility and Osseous Organisation of a Natural Bovine Bone Mineral: Preliminary Results of an In-Vitro/In-Vivo Study.

http://link.springer.com/chapter/10.1007/978-3-642-03891-4_69

The aim of the present study was to evaluate the influence of superficial etching of a xenogenous bone mineral on cell proliferation and bone regeneration. A granular bone substitute material [BSM] (cerabone® [CB], botiss medical, Berlin, Germany) was superficially etched using citric acid (Acid [CBA]). CB and CBA were allocated into 96 non-binding well plates and incubated with 1×104 human osteoblast-like cells (SaOs-2) per well under standardized conditions. After 2 hours, 3 and 7 days a LDH-Assay was used for photometric evaluation of cell proliferation (n=8). LDH values were transferred into cell amounts using a standard curve and analyzed for statistical difference. Additionally, cell morphology was investigated using scanning electron microscopy (SEM) (n=3). In the in-vivo part, CB and CBA granules were used for lateral augmentation of the maxillae of four beagle dogs and covered with a collagen membrane (Jason® Membrane, botiss medical). Healing periods were set at 3 and 8 weeks (n=2, respectively). In-vitro evaluation revealed statistically significant higher cell proliferation after 3 and 7 days on CBA compared to CB (p<0.05, Wilcoxon test). SEM observation presented flat and star-shaped SaOs-2- osteoblasts displaying high numbers of lamellopodia on both CB and CBA surfaces. In vivo, both BSM showed osteoconductive properties and osseous organisation after 8 weeks. However, the number of the in-vivo applications did not allow further statistical analysis. Within the limits of the present study it was concluded that superficial etching of natural bone minerals using citric acid may support osteoblast-like cell proliferation. Further studies are necessary to specify the impact on bone regeneration.


The purpose of our study was to test the effectiveness of Ostim nanocrystalline hydroxyapatite paste and cerabone ceramic by treating a critical size bone defect (CSD) on the right foreleg of a white New Zealand rabbit. Evaluation was carried out by comparing four groups each with a different CSD filling: an only Ostim bone filling, an only cerabone filling, an Ostim-cerabone combination, and a control group with no filling of the CSD. The results of this study display a rapid and uniform bone ingrowth following the CSD filling with Ostim. The histological and histomorphometrical data have shown similarly excellent results for both the Ostim and cerabone-Ostim groups. The control group fared poorly in comparison, as three cases of non-union were observed and none of the defects were totally refilled with fresh bone within 60 days. The successful bone healing with osseous consolidation verifies the importance of the nanocrystalline hydroxyapatite in the treatment of metaphyseal osseous volume defects in the metaphyseal spongiosa.

15. Comparison of different methods for the preparation of porous bone substitution materials and structural investigations by synchrotron μ-computer tomography.


The preparation of porous biomaterials for bone substitution is an important clinical issue in current biomedical technology because the ingrowth of bone can only occur if a suitable number of sufficiently large pores is available. Different procedures are compared here: The combined chemical-thermal treatment of bovine and human cancellous bone, the calcination of bovine cancellous bone, mechanical hole-drilling, and the extraction of porogens (in this case: salt crystals). The inner structure and the porosity of all samples were studied using high-resolution synchrotron μ-computer tomography.


Fourteen different synthetic or biological bone substitution materials were characterised by high-resolution X-ray diffractometry, infrared spectroscopy, thermogravimetry, and scanning electron microscopy. Thus, the main parameters chemical composition, crystallinity, and morphology were determined. The results are compared with natural bone samples. The materials fall into different classes: Chemically treated bone, calcined bovine bone, algae-derived hydroxyapatite, synthetic hydroxyapatite, peptide-loaded hydroxyapatite, and synthetic beta-TCP ceramics.

17. Bone ingrowth in bFGF-coated hydroxyapatite ceramic implants.


This experimental study was performed to evaluate angiogenesis, bone formation, and bone ingrowth in response to osteoinductive implants of bovine-derived hydroxyapatite (HA) ceramics either uncoated or coated with basic fibroblast growth factor (bFGF) in miniature pigs. A cylindrical bone defect was created in both femur condyles of 24 miniature pigs using a saline coated trephine. Sixteen of the 48 defects were filled with HA cylinders coated with 50 microg rhbFG, uncoated HA cylinders, and with autogenous transplants, respectively. Fluorochrome labelled histological analysis, histomorphometry, and scanning electron microscopy were performed to study angiogenesis, bone formation and bone ingrowth. Complete bone ingrowth into bFGF-coated HA implants and autografts was seen after 34 days compared to 80 days in the uncoated HA group. Active ring-shaped areas of fluorochrome labelled bone deposition with dynamic bone remodelling were found in all cylinders. New vessels could be found in all cylinders. Histomorphometric analysis showed no difference in bone ingrowth over time between autogenous transplants and bFGF-coated HA implants. The current experimental study revealed comparable results of bFGF-coated HA implants and autogenous grafts regarding angiogenesis, bone synthesis and bone ingrowth.
18. Immediate placement and restoration of a new innovative fully-tapered implant replacing central and lateral incisors: A clinical case report.


This case report describes the use and performance of a newly developed implant in immediate implant placement.

Methods: Teeth 11 and 12 of a 52-year old patient were diagnosed hopeless and extracted consecutively. First, tooth 11 was extracted and an immediate implant placement procedure was performed using a Straumann® BLX Implant. Following implant insertion, a temporary abutment for the crown was installed and the gap between the implant and the buccal bone wall was augmented with cerabone® granulate. Finally, a screw-retained temporary crown was installed. Three months later tooth 12 was extracted and a socket preservation was performed using cerabone® and an autologous soft tissue punch. Two months following healing the final prosthetic restoration was done using a zirconia cantilevered implant supported bridge.

Results and Conclusion: The gingival contours were well preserved ten months post-surgery. The authors appreciated the advantages of an immediate implant placement procedure, which are a reduced treatment time and less surgical interventions. The use of a volume stable bone graft were considered favorable in preserving the ridge dimensions. Installation of an implant supported provisional crown in the described procedure helped maintaining the gingival contours and allowed the patient to have fixed provisional at the day of the surgery. The authors highlighted the importance of an intact socket and a sufficient primary stability of the implant for the described surgical procedure.

19. Digitalized CAD/CAM protocol for the fabrication of customized sealing socket healing abutments in immediate implants in molar sites.*


This case series aimed to evaluate the performance and efficacy of a digitally fabricated sealing socket abutment in implant immediacy.
Methods: Molars in the mandible or maxilla were extracted atraumatically (patients n=29) and implants (n=30) were placed in the irrigated and cleaned sockets. Small cerabone® granules were placed around the implants to augment the gaps. A digital impression was taken and based on that a customized healing abutment was milled chairside. Then, the abutment was placed onto the implants. After three to four months, the abutment was removed and a digital impression was taken for preparation of the final prosthesis. The clinical outcomes were evaluated at one and two years post-surgery.

Results:
- Uneventful healing for all patients one week after abutment placement
- Maintenance of the buccal contours over the 2-year follow up period
- All implants remained successfully in situ over the 2-year follow up period

Conclusion: The authors summarized that the use of a CAD/CAM-fabricated healing abutment in immediate implant placement is a viable treatment option for the management of molar extraction sites.

*Publication in English and German.


This study aims to evaluate the efficacy of buccal fat pad-derived stem cells (BFPSCs) mixed with cerabone® in comparison to autologous bone for vertical and horizontal augmentation of the posterior mandible.

Methods: 14 patients with horizontal and vertical alveolar ridge deficiencies of less than 4 and 8 mm respectively were treated with cerabone® either preloaded with BFPSCs (group 1) or mixed with autologous bone chips (group 2). A titanium mesh was used to cover the grafts and to stabilize the augmented sites. The surface areas of newly formed bone were determined by quantitative CBCT analysis. Images were taken pre-operative and six months post-surgery.

Results:
- Total areas of newly formed bone were 169.5 ± 5.90 (group 1) and 166.75 ± 10.05 mm² (group 2)
- Areas of new bone formation for vertical defects were 164.91 ± 3.74 (group 1) and 169.36 ± 12.09 mm² (group 1)
- The area of new bone formation for horizontal deficiencies were 170.51 ± 4.54 mm² (group 1) and 166.98 ± 9.36 mm² (group 2)
Differences between the two groups were not statistically significant

Conclusion: The authors concluded that BFPSCs may be an alternative to autologous bone in alveolar ridge reconstruction as no differences in bone volume formation between the groups were found.

21. Can placement of an immediate bone level tapered implant and subperiosteal xenograft help maintain bone architecture in esthetic areas?


The goal of the study was to evaluate if the buccal plate preservation (BBP) technique in implant immediacy in conjunction with cerabone® prevents alveolar ridge resorption.

Methods: 20 patients were subjected to single tooth extraction in the aesthetic zone. In four-wall intact sockets implants were placed immediately following curettage. Spaces between the buccal plate and implant were augmented with cerabone® according to the BBP technique. Sites were stabilized by sutures, but no primary wound closure was achieved. CBCTs were taken immediately after implant placement (T1) and six months post-surgery (T2) to evaluate buccal plate resorption. Measurements were performed at two sites of the socket, at 1mm and at 4mm below the cementoenamel junction of the adjacent teeth.

Results:
- Mean bone thickness was 2.86mm (range 1.4–5.3) at T1 at the 1mm point, and 3.09mm (range 1.8–5.3) at the 4mm point
- At T2, the thicknesses were 2.49mm (range 1.2–4.9) at M1, and 2.83mm (range 1.5–5) at M2
- The mean of the difference between T1 and T2 was −0.19±0.85mm at the 1mm point and −0.05±0.99mm at the 4mm point
- The difference between the means at T1 and T2 was not statistically significant
- No implants were lost, all remained successfully in function over the whole observation period

Conclusion: The results showed excellent stability of the buccal plate contour six months post-operative. The authors concluded that the BBP technique can be successfully used in combination with immediate implant placement.


The goal of this retrospective study was to evaluate, if a collagen barrier membrane placed over the lateral bone window affects the stability of the bone graft and the displacement of bone graft particles following sinus floor augmentation.

Methods: 41 patients did undergo lateral sinus floor augmentation using cerabone®. The bone windows were either covered with collprotect® membrane (control group, n=17) or left uncovered (test group, n=24). All sites were closed by the flap. CBCTs were taken immediately after the surgery, and seven days as well as six months post-operative in order to evaluate bone graft stability and bone graft particle displacement. Post-surgical morbidity was analyzed using a visual analog scale (VAS) seven days after the surgical intervention.

Results: The mean displacement of the bone graft particles six months post-operative was significantly greater in the test group (3.8±3.1 mm) than in the control group (0.5±0.4 mm). The post-operative morbidity was significantly more pronounced in the test group (pain 3.3±1.4/swelling 4.3±4.5) than in the control group (2.1±0.9/2.7±0.9).

Conclusion: The authors concluded that a barrier membrane placed over the lateral bone window helped preventing bone graft particles displacement thus reducing post-operative morbidity.


This case series aims to clinically evaluate a new surgical approach to treat periodontal intrabony defects in conjunction with cerabone® and Emdogain®. Surgically, the defects are accessed via the alveolar mucosa preserving the interdental tissues (Nonincised Papillae Surgical Approach, NIPSA).

Methods: Ten patients diagnosed with periodontal intrabony defects with a mean probing pocket depth (PPD) of 9.6 ± 2.3 mm were treated with NIPSA in conjunction with cerabone® and Emdogain®. PPD reduction, clinical attachment level gain (CAL), keratinized tissue width and recessions were recorded six to 18 months post-surgery.
Results: Healing was uneventful in all cases. PPD decreased to 2.3 ± 0.5 mm and a CAL gain of 7.3 ± 2.4 mm was found. Gingival papilla height, keratinized tissue width and buccal gingival margin remained stable over time. All defects presented negative bleeding on probing.

Conclusions: Deep isolated intrabony defects can be successfully treated using the Nonincised Surgical Approach in conjunction with cerabone® and Emdogain®. It preserves the interdental papillae and marginal keratinized tissues avoiding post-operative soft tissue shrinkage.

24. Dimensional changes in the sinus membrane following maxillary sinus augmentation.


This retrospective clinical study aims to evaluate the dimensional changes of the Schneiderian membrane following maxillary sinus augmentation and to analyze the impact of the height of the bone grafting material.

Methods: 50 patients (66 sites) underwent lateral wall maxillary sinus augmentation using cerabone® and a collagen membrane. Sinus membrane thickness was measured prior to and 9 to 11 months post sinus augmentation using CBCT scans.

Results:
- Following sinus augmentation, thin Schneiderian membranes (< 1.56 mm) thickened to a mean value of 2.89±2.33 mm (+ 482.55%), while thick membranes (> 1.56 mm) lost in thickness to a mean value of 3.10±4.45 mm (-29.84%)
- The postoperative thickness of thin and thick membranes leveled off (2.89±2.3 and 3.10±4.4 mm, respectively)
- No correlation was found between the graft height and changes in the sinus membrane thickness

Conclusions: Maxillary sinus floor augmentation is a safe procedure in terms of sinus membrane thickness. It seems that the membranes thickness at baseline affects the subsequent dimensional changes. The amount of bone grafting material used may not affect the thickness of the membrane.


This report of two cases describes the treatment of large alveolar bone defects using orally-derived stem cells in combination with autografts and cerabone®.

Methods: Several impacted, non-erupted teeth in the maxilla and mandible of two patients were extracted and the bone defects were augmented with autologous cortical plates and adipose-derived stem cells-loaded cerabone® particles.

Results: Six months after bone augmentation up to seven implants each site were successfully placed. At 48 months post-operative, radiographies showed 100% survival of all placed implants.

Conclusions: The presented approach demonstrates a considerable amount of three dimensional bone formation in both cases. The application of adipose-derived stem cells isolated from buccal fat pad in combination with cerabone® can be considered as an efficient treatment for bone regeneration in large alveolar bone defects.


The aim of this histologic and histomorphometric study was to determine the fate of the bone window, its contributing role in the healing process, and the osseoconductivity and resorption potential of the high-temperature sintered bovine bone (cerabone®) used, as well as to correlate the histomorphometric results with sinus depth and lateral wall thickness as determined on CBCT.

Materials and methods: 30 biopsy specimens were harvested from the lateral side of the maxilla of patients operated on for sinus floor elevation and implant placement at two postoperative periods: early, group 1 (mean: 5.73 ± 0.44 months); and late, group 2 (mean: 8.68 ± 1.76 months). Sinus depth and lateral wall thickness were determined on CBCT and correlated to graft maturation.

Results: The repositioned bone window was microscopically detectable in both study groups and looked well integrated. Bone was found growing out of the repositioned window toward the center of the graft, most often forming a trabecular network independently from the bone matrix, which is in
favor of osteogenic potential of the window. Also, newly built bone was found directly attached to the surfaces of the window, indicating bone growth via osseocoinduction. Repositioned window sides showed signs of low-grade inflammation. Active osteoclasts were only found to be associated with the newly built bone matrix, hinting at an active bone remodeling process. No signs of biodegradation or remodeling of the window were detected using the tartrate-resistant acid phosphatase (TRAP) technique. The histomorphometric analysis of the tissue distribution showed similar values of newly formed bone in group 1 (22.77% ± 5.89%) and in group 2 (26.15% ± 11.18%) and connective tissue values in both study groups (42.29% ± 8.98% for group 1 vs 46.03% ± 5.84% for group 2). No significant differences were found between group 1 (34.94% ± 7.10%) and group 2 (27.82% ± 11.97%) for xenogeneic bone substitute values. Statistically significant differences were only found between connective tissue values and newly built bone values (P < .01 and P < .001, respectively). Furthermore, a significant difference was found between connective tissue values and that of bone substitute up to 12 months (P < .01). No significant correlation was found between sinus depth and lateral window thickness and histomorphometric results.

Conclusions: The repositioned window technique appears to be a good osteoconductive barrier for bone formation. Its osteogenic potential needs to be confirmed immunochemically. The authors also concluded that cerabone® proved to be an effective slowly resorbing osseoconductive material.

27. Using Absorbable Gelatin Sponge to Facilitate Sinus Membrane Elevation during Open Sinus Lift: Technical Notes and Case Series.

http://jdmt.mums.ac.ir/article_11873_0.html

The goal of this case series was to evaluate a modified method for sinus floor augmentation using a gelatin sponge for Schneiderian membrane elevation.

Methods: 28 patients underwent lateral sinus floor augmentation. A gelatin sponge was used to facilitate elevation of the Schneiderian membrane. Elevated sinus membranes were covered with Jason® membrane and the sinuses were grafted with cerabone®. Implants were placed simultaneously and loaded six months post-surgery and the healing course was followed another six months.

Results/Conclusions: For all treated patients uneventful healing during the whole observation period was observed. None of the patients experienced infections, sinusitis, and graft or implant failure clinically or radiographically. CBCT analysis confirmed that the sinuses were lifted and augmented effectively. The authors concluded that gelatin sponge-assisted sinus floor augmentation is a safe approach to facilitate sinus membrane elevation in patients with hyper-pneumatized maxillary sinus or moderately resorbed posterior maxilla.
28. Periosteal Envelope Flap as a Technique for Horizontal Bone Augmentation: A Case Series Study.


https://benthamopen.com/FULLTEXT/TODENTJ-12-995

The goal of this clinical study was to evaluate the effect of the periosteal pocket flap in horizontal GBR.

Methods: 22 patients with a mean ridge width of 2.94 mm were treated by GBR using a periosteal envelope flap. Following detachment of the periosteum from the bone, a pocket was created to accommodate the bone grafting material (cerabone®) and barrier membrane (Jason® membrane). The periosteum was sutured to the membrane and the flap was closed tension-free. Ridge width was measured prior augmentation and 4 to 6 months post-surgery using CBCT.

Results: Healing was uneventful for all treated patients. A statistically significant mean gain in ridge width of 2.53 mm was achieved 4 to 6 months post-operative allowing for the placement of dental implants.

Conclusions: The authors concluded that the periosteal pocket flap in conjunction with GBR is a suitable technique to increase the width of the alveolar ridge.

29. Effectiveness of naturally derived bovine hydroxyapatite (Cerabone™) combined with platelet-rich fibrin matrix in socket preservation: A randomized controlled clinical trial.


http://www.jisponline.com/preprintarticle.asp?id=247348;type=0

This controlled clinical trial aims to evaluate prevention of alveolar ridge resorption by socket grafting using cerabone® in conjunction with PRF.

Methods: 23 patients were treated in a split-mouth design with one extraction site augmented with cerabone® and PRF (test), while the contralateral site was subjected to atraumatic extraction alone (control). The test site was sealed with a collagen sponge. Alterations of ridge width and height were evaluated clinically and radiographically at baseline and six months post-extraction.

Results: Mean ridge width loss was 2.75 ± 1.49 mm at untreated sites and 1.47 ± 1.44 mm at the sites that did underwent a socket preservation procedure. The mean reduction in buccal height was 0.96 mm at the test sites and 2.26 mm at control sites, mean reduction in lingual height were 1.04 mm and 2.17
mm respectively. 2.31 mm more bone fill was observed at the test sites, which was statistically significant.

Conclusion: The authors concluded that the described socket preservation procedure is a reliable method that minimizes alveolar bone loss.

30. The influence of initial alveolar ridge defect morphology on the outcome of implants in augmented atrophic posterior mandible: an exploratory retrospective study.

The purpose of this retrospective study was to examine the influence of initial atrophic posterior mandible morphology on the outcome of implants placed following augmentation.

Materials and methods: A total of 52 patients contributed 71 edentulous sites, and 185 implants were placed with mean follow-up of 37.97 months. The initial defect morphology was classified according to ABC classification (Journal of Oral Implantology, 37, 2013a and 361). Ridge augmentation was performed by "cortical autogenous tenting" (CAT) followed by either simultaneous or delayed implant placement after 4-6 months of healing. The European Academy of Osseointegration success criteria were used to evaluate implant outcomes.

Results: The overall survival and success rates of dental implants were 98.91% and 80%, respectively. Cumulative success and survival rates in CAT group were 95% and 100% after 2 years of follow-up. The highest marginal bone loss (MBL) was observed (1.26 mm ± 0.99) around implants placed in augmented edentulous sites with initially narrow and flat alveolar crest (defect class CII). Conversely, least MBL (0.48 mm ± 0.78) was detected around implants placed into edentulous sites with two sloped boney walls (defect class AII). Differences between MBL observed around implants placed into initial defect class C, initial defect type and class A (I, II), as well as class BII, were statistically significant (P < 0.05). Among all implants, 148 were considered as successful, 26 exhibited satisfactory survival, nine with compromised survival, and two implants failed.

Conclusion: The present data confirmed the effect of initial ridge morphology on the outcome of implants placed into augmented bone. Specifically, class A and class B atrophic ridge defects, with one and two vertical boney walls, respectively, may be considered as more favorable recipient sites than class C defects with flat morphology. This conclusion is based on least MBL around implants placed into initial defect class A and class B augmented sites, and higher MBL in implants placed into class C recipient sites. A randomized controlled trial is warranted to examine these exploratory observations.


The present study aimed at evaluating the efficacy of a novel technique, the bone lamina technique, in horizontal ridge augmentation clinically & radiographically using a combination of allogenic cortical shell, particulate xenograft and resorbable collagen membrane.

Material and methods: Localized horizontal ridge defects, in ten patients (6 male, 4 female), with buccopalatal ridge width less than 5 mm were included in this study. Localised ridge augmentation was performed using bone lamina technique with mineralised allogenic shell of 1 mm thickness trimmed to the appropriate size using stereo-lithographic models and fixed to the recipient site with stainless steel micro-screws of 1 mm diameter. The space between the shell & host bone was filled with particulate xenograft followed by placement of collagen membrane and primary closure of the site. Clinical parameters including ridge width before & after flap reflection & radiographic (CBCT) ridge width measurements were recorded pre-operatively, and six months after the augmentation procedure. Results obtained were analyzed statistically.

Results: The mean clinical ridge width before flap reflection (BFR), after flap reflection (AFR) & radiographically was 3.7 ± 0.74 mm, 2 ± 0.70 mm & 1.77 ± 0.71 mm respectively at baseline which increased to 6.8 ± 0.95 mm, 5.15 ± 0.98 mm & 4.90 ± 0.90 mm with a mean gain in ridge width of 3.1 ± 0.63 mm (p< 0.005), 3.15 ± 0.63 mm (p<0.005) & 3.13 ± 0.70 mm (p< 0.005) respectively.

Conclusions: The present study demonstrates that bone lamina technique can be effective means of horizontal ridge augmentation and the use of mineralized allograft in combination with xenograft and collagen membrane leads to good amount of bone regeneration for subsequent implant placement.

32. Ridge augmentation with titanium mesh: A case report.


The aim of this case was to demonstrate that the use of rigid titanium occlusive barrier is a reliable alternative to perform a lateral alveolar bone augmentation and treat localized ridge deformities before reaching an ideal implant placement.

A 25-year-old healthy male was referred for implant placement in the maxillary central incisor. The alveolar bone width at the implant site 21 was less than 5mm. Hard tissue augmentation was accomplished using guided bone regeneration. A rigid titanium occlusive barrier was customized to
desired shape of future alveolar ridge then secured with tent and fixing screws. Autogenous bone graft harvested with an auto-chip-maker adjacent to the surgical site were mixed with a xenograft and putted under the barrier. The wound was closed using a vestibular mucoperiosteal flap. At 4 months, the rigid barrier was removed, and a 7mm crestal width transversal bone was observed. At the same time, a fixture (4×10mm) was placed. A definitive ceramometal crown was completed after full osseointegration with periodical clinical maintenance. The exposure of the titanium mesh occurred in this case and was visible with a circular flap dehiscence at 1-month follow-up visit. This exposure did not affect the successful regenerative outcomes. After removal of the titanium mesh from the grafted defects, the space beneath the membrane enclosure was seen to be almost completely filled with new hard tissue covered by a thin layer of soft tissue. The postoperative follow-ups revealed that the implant was stable with excellent osseointegration and the buccal depression of the surgical area was reconstructed.

Conclusion: The use of rigid titanium occlusive screwed barrier with autogenous and bovine bone graft might be a reliable technique for alveolar ridge reconstruction. This approach achieve excellent final esthetic outcome of the implant-supported restoration.

33. Presurgical Cone Beam Computed Tomography Bone Quality Evaluation for Predictable Immediate Implant Placement and Restoration in Esthetic Zone.


Despite numerous advantages over multislice computed tomography (MSCT), including a lower radiation dose to the patient, shorter acquisition times, affordable cost, and sometimes greater detail with isotropic voxels used in reconstruction, allowing precise measurements, cone beam computed tomography (CBCT) is still controversial regarding bone quality evaluation. This paper presents a brief review of the literature on accuracy and reliability of bone quality assessment with CBCT and a case report with step-by-step predictable treatment planning in esthetic zone, based on CBCT scans which enabled the clinician to evaluate, depending on bone volume and quality, whether immediate restoration with CAD-CAM manufactured temporary crown and flapless surgery may be a treatment option.


The objective of this study is to histologically and radiologically compare a sintered and a non-sintered bovine bone substitute material in sinus augmentation procedures.

Materials and methods: Thirty-three patients were included in the clinically controlled randomized multicentre study resulting in a total of 44 treated sinuses. After lateral approach, sinuses were filled with either a sintered (SBM, Alpha Bio’s Graft®) or a non-sintered (NSBM, BioOss®) deproteinized bovine bone substitute material. The augmentation sites were radiologically assessed before and immediately after the augmentation procedure as well as prior to implant placement. Bone trephine biopsies for histological analysis were harvested 6 months after augmentation whilst preparing the osteotomies for implant placement.

Results: Healing was uneventful in all patients. After 6 months, radiological evaluation of 43 sinuses revealed a residual augmentation height of 94.65 % (±2.74) for SBM and 95.76 % (±2.15) for NSBM. One patient left the study for personal reasons. Histological analysis revealed a percentage of new bone of 29.71 % (±13.67) for SBM and 30.57 % (±16.07) for NSBM. Residual bone substitute material averaged at 40.68 % (±16.32) for SBM compared to 43.43 % (±19.07) for NSBM. All differences between the groups were not statistically significant (p > 0.05, Student’s t test).

Conclusion: Both xenogeneic bone substitute materials showed comparable results regarding new bone formation and radiological height changes in external sinus grafting procedures.

Clinical relevance: Both bone substitute materials allow for a predictable new bone formation following sinus augmentation procedures.

*Study refers to Alpha Bio’s Graft®, which is a former private label of cerabone®.
35. Sinus Floor Elevation Using the Lateral Approach and Bone Window Repositioning I: Clinical and Radiographic Results in 102 Consecutively Treated Patients Followed from 1 to 5 Years.


Determination of potential complications and clinical outcomes using the lateral sinus elevation technique with window repositioning.

Materials and Methods: One hundred nine sinus elevations were performed on 102 consecutively treated patients. Following lateral window outward fracturing, sinus mucosa was elevated, and the sinus was grafted with anorganic bovine bone. Two hundred five implants were placed: 160 concomitantly with grafting, and 45 six months after grafting. Seventeen implants replaced single missing molars. One hundred eighty-eight implants replaced multiple missing posterior teeth. The bone window was repositioned over the osteotomy site and the flap sutured. Implants were connected at 6 months and followed up from 12 to 60 months (mean: 29.8 months). In 30 cases, biopsy specimens were harvested from the lateral wall of the sinus for histomorphometric analysis. The Fisher exact test and Kruskal-Wallis test followed by the Mann-Whitney test were used for statistical analysis. Results: No clinically significant complications were encountered in using this technique (mucosa tear, intraoperative bleeding, window sequestration). In three cases, the window was separated in two before outfracturing. In 20 cases, it was stabilized with a collagen fleece. Limited sinus mucosa tears occurred in 14 cases during elevation. They were patched with a collagen membrane, and 18 implants were placed in these cases. All of the latter cases osseointegrated at abutment connection with no statistically significant difference in the outcome compared with implants placed with no tear of the membrane (P < .05). The reconstruction of the lateral wall was confirmed in all cases. No significant differences in outcomes were found between the immediately and delayed placed implants (P < .05). One implant failed in the immediately placed group due to a sinus infection. All other implants were loaded and remained in function during the observation period. Conclusion: Lateral sinus elevation with window repositioning is safe and effective with minimal risks, such as mucosal tear, intraoperative bleeding, or window sequestration. The repositioned window can serve as an alternative for collagen membrane in containing the graft. Graft maturation, percent of vital bone formation, and the potential of the window to serve as a source of osteogenic cells need to be confirmed histomorphometrically. This will be reported in a subsequent article.
36. Tuberosity-alveolar block as a donor site for localised augmentation of the maxilla: a retrospective clinical study.


Retrospective assessment of the efficacy of tuberosity-alveolar block bone (posterior maxillary alveolar ridge) in the augmentation of adjacent defects in the maxilla using data from 14 patients (10 men and four women, mean (range) age 55 (38-69) years) who had had 20 bony augmentations with block bone from the alveolar tuberosity during 2014. Patients were divided into three groups according to the technique by which the bone was collected. The first group had a graft from the alveolar tuberosity covered with titanium mesh (titanium mesh group); the second group had the block bone covered by platelet rich fibrin and collagen membrane (platelet rich fibrin group), and in the third group the graft was covered only with periosteum (periosteum group). The primary width of the bone was recorded at the time of placement of the graft and changes were evaluated 4-6 months later when the implant was inserted. The changes in the width of the bone were 4.1, 3.3, and 2.5 in the platelet rich fibrin, titanium mesh, and periosteum groups, respectively. The difference in bony change among groups was not significant except between the platelet rich fibrin and and periosteum groups (p = 0.005). Tuberosity-alveolar block bone graft may be a good source of bone for augmentation of deficient ridges, and more favourable results can be expected by the addition of resorbable membranes and growth factors.

37. Management of acute maxillary sinusitis after sinus bone grafting procedures with simultaneous dental implants placement - a retrospective study.


The sinus lift was first described in 1974 and it has proven to be a predictable procedure ever since. We aimed to evaluate the rate of acute maxillary sinusitis after sinus lift procedures and the appropriate management strategies.

Methods: Between 2013 and 2015, 245 dental implants were placed in 116 patients (76 males and 40 females) with concomitant bone augmentation of the maxillary sinus floor. The sinus lifting procedure was bilateral in 35 patients and unilateral in 81 patients (a total of 151 sinuses).

Results: Maxillary sinusitis occurred in 5 patients (4.3 %). The clinical signs of infection were: headache, locoregional pain, cacosmia, inflammation of the oral buccal mucosa and rhinorrhea or unilateral nasal discharge. A mucosal fistula was observed during inspection in one patient. The management included only the removal of the grafting material in 3 patients, in 1 patient the grafting material was removed together with all the implants, and in 1 patient only 2 implants and the grafting material were removed,
1 implant being left in place. The sinus cavity was irrigated with metronidazole solution and antibiotic therapy with clindamycin and metronidazole was prescribed for 10 days. Subsequently, all signs of infection disappeared within 5 to 7 days and normal sinus function and drainage were restored.

Conclusions: Although sinus lift is regarded as a safe and reliable procedure, acute sinusitis is a possible complication which has to be managed immediately in order to reduce the risk of further complications like pansinusitis, osteomyelitis of the maxillary bone, and spreading of the infection in the infratemporal space or orbital cavity. To minimize risk, caution must be taken with all the steps of the procedure, in order not to obliterate the ostium, impairing maxillary sinus clearance.

38. Histological and histomorphometric study using an ultrasonic crestal sinus grafting procedure. A multicenter case study.*


The aim of this study was to evaluate the efficacy of a hydrodynamic ultrasonic driven transcrestal sinus grafting procedure (Intralift®, Acteon Company, Bordeaux, France) and the use of a bovine high temperature sintered grafting material in sinus sites with less than 5 mm remaining bone height with no additional autogenous bone in order to create a sufficient recipient site for implants. Material and Methods: 12 patients (16 sinus) in this multicenter case study were included. Using a crestal approach, bone under the sinus was prepared with ultrasonic tips until the Schneiderian membrane was reached. With a trumpet shaped instrument, the Schneiderian membrane was elevated. In the new created subantral space a high temperature sintered bovine grafting material was introduced (Bego Oss, BEGO Implant Systems GmbH & Co. KG, Bremen, Germany). After 6 months biopsies were taken with a trephine bur and histologies were generated following histomorphometric analysis. Results: The results showed new vital bone in average of 33.4% ± 17.05%, and 43.6% ± 16.70 of bone substitute material. No signs of abnormal inflammation were observed. Conclusions: This procedure (Intralift®) allows, using a bovine material with no additional autogenous bone, new bone formation in the sinus in order to allow place implant subantral.

*Study refers to BEGO OSS, which is a former private label of cerabone®.

This case report discusses an irreparable lower left second premolar tooth with a periodontal lesion on the buccal side. A preservative tooth extraction was performed. Then, the socket was grafted with bovine bone, a collagen membrane was placed between the buccal bone and the attached gingiva, covering the bone dehiscence buccally, and the socket without a flap was raised. After a 6-month healing period, there was minimal socket width resorption and a shallow buccal vestibule. The implant was placed with high primary stability and sufficient buccal plate thickness. In conclusion, this guided tissue regeneration technique can minimize alveolar bone resorption in a socket with buccal dehiscence, but technical difficulties and shallowing of the buccal vestibule still exist.

40. Flapless implant surgery: A review of the literature and 3 case reports.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4368003

The present work aims to produce a thorough review of the literature published on the field of Implantology with flapless surgery, to determine the current scientific evidence of the technique, along with illustrating the results with different clinical cases. After presenting the clinical cases, and the review of literature, we can say that flapless surgeries should be restricted to well-selected cases in which a proper clinical and radiological planning has been made. Patients treated with anticoagulant drugs or medically compromised equally can get benefitted by this minimal invasion technique.

41. Comparison of two different xenografts in bilateral sinus augmentation:
Radiographic and histologic findings.

The aim of this study was to evaluate the radiographic and histomorphometric results of two different xenografts in bilateral sinus augmentation in patients with posterior maxillary atrophy. Method and Materials: Eight patients with less than 5 mm residual alveolar bone height were included in this study. One side was augmented with bovine bone graft-1 and the other side with bovine bone graft-2.
Radiographic analyses were performed before and after augmentation, and before the implant placement. After 8 months of healing period, bone biopsies were obtained during implant placement. Results: No statistically significant difference was found between the groups, based on post-augmentation and pre-implantation graft heights (P>.05). Histomorphometric evaluation demonstrated 24.63% and 29.13% newly formed bone in the graft-1 and graft-2 groups, respectively. Intergroup differences were not significant for the mean percentage of new bone formation (P > .05). Conclusion: Within the limitations of this study, it can be concluded that xenograft materials resulted in satisfactory bone height and trabecular new bone formation, and they could be used for the rehabilitation of atrophic maxillae.

42. Reconstruction of advanced bone defect associated with severely compromised maxillary anterior teeth in aggressive periodontitis: a case report.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4582840/

Report of a successful intervention outcome of a challenging case in the aesthetic zone of a patient with aggressive periodontitis.
A 34-year-old systemically healthy Malay woman was referred to the Periodontics Specialist Clinic of the Kulliyyah of Dentistry, International Islamic University Malaysia, with a chief complaint of bleeding gums and mobility of the upper anterior teeth. A diagnosis of localized aggressive periodontitis was made. A thorough non-surgical periodontal treatment was provided, followed by a series of regenerative periodontal surgeries to manage advanced bone defects. A successful treatment outcome with a good prognosis was achieved. Maintenance through the supportive treatment phase showed marked bone gain. Conclusions: Teeth with severely compromised periodontium of unpredictable prognosis can still be maintained with satisfactory restoration of the function, support, and aesthetics, despite the baseline unpredictable treatment outcome. Proper selection of an advanced periodontal treatment plan can exclude the option of tooth extraction or prosthetic replacement.
43. Influence of Material Properties on Rate of Resorption of Two Bone Graft Materials after Sinus Lift Using Radiographic Assessment.


The aim of this study was to investigate the influence of chemical and physical properties of two graft materials on the rate of resorption.

Materials and methods: Direct sinus graft procedure was performed on 22 patients intended for implant placement. Two types of graft materials were used (Bio-Oss and cerabone®) and after 8 months healing time the implants were inserted. Radiographic assessment was performed over the period of four years. Particle size, rate of calcium release, and size and type of crystal structure of each graft were evaluated. Results: The average particle size of Bio-Oss (1 mm) was much smaller compared to cerabone® (2.7 mm). The amount of calcium release due to dissolution of material in water was much higher for Bio-Oss compared to cerabone®. X-ray image analysis revealed that Bio-Oss demonstrated significantly higher volumetric loss (33.4 ± 3.1%) of initial graft size compared to cerabone® (23.4 ± 3.6%). The greatest amount of vertical loss of graft material volume was observed after one year of surgery.

44. Sinus floor elevation using a sintered, natural bone mineral - A histological case report study.*#


The aim of the present study was the histological and clinical evaluation of the xenogeneic bone substitute material (BEGO OSS, Bego Implant Systems, Bremen) for the indications one-stage and two-stage sinus floor elevation.

Materials and method: Twelve patients were included in the study, undergoing 15 simultaneous or staged sinuslift operations. Data were evaluated clinically and, for two-stage approach, histologically and histomorphometrically after trephine harvesting during implant bed preparation.

Results: Healing was uneventful in all cases. All patients showed good hard tissue regeneration of the lateral window of the sinus. Neither resorption nor dislocation of the granular bone substitute material was observed. Radiologically, good volume stability of the graft was observed. Histologically, bone substitute particles displayed complete osseous integration in newly formed bone matrix. The
The proportion of newly formed bone within the graft was 25.8-49.6%, whereas the proportion of remaining bone substitute material varied from 28.6-38.5%.

Conclusion: It was concluded that BEGO OSS acts as an osteoconductive material to support hard tissue regeneration after sinus floor elevation. Showing excellent volume stability, it is integrated into newly formed bone matrix within a six-month healing period.

*Study refers to BEGO OSS, which is a former private label of cerabone®.
#Publication in English and German.