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Poster Abstract Booklet

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001. The antibacterial effect of ordered fluorapatite dental implant coatings against periodontopathogens

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Objectives: Peri-implantitis remains one of the most difficult and challenging complications associated with Dental Implant failure. Various anaerobic bacteria have been shown to be implicated in peri-implant disease. With increasing concern over the growth in antibiotic resistance, there is considerable interest in the preparation of antimicrobial dental implant coatings that also enhance osseointegration. One such potential coating material is fluorapatite (FA). The aim of this study is to physiochemically characterise a novel ordered FA coating, manufactured using the hydrothermal method and to investigate its antibacterial efficacy against Porphyromonas gingivalis (P. gingivalis), a pathogen implicated in peri-implantitis.

Methods: Ordered FA coatings were produced on the surfaces of piranha acid-etched Stainless Steel (SS) and machine cut commercially pure grade 4 Titanium discs (cpTi) using the hydrothermal method. Material characterisation was carried out using Scanning Electron Microscopy (SEM) 3D Optical Profiler (OP) and Energy Dispersive Spectroscopy (EDS), X-Ray Diffraction (XRD), X-ray Photoelectron Spectroscopy (XPS), Streaming Potential (SP), Contact Angle Measurements (CAM) and Fluoride release measurements. Antibacterial activity against single species culture of P. gingivalis W50 was assessed in vitro using viable counts, Confocal Laser Scanning Microscopy (CLSM) and SEM 48hrs post-inoculation.

Results: The SEM images showed that the hydrothermal method successfully produced well aligned FA crystals, measuring 6µm±2, where the c-axis of the crystals were perpendicular to the underlying SS and cpTi substrates. In terms of surface roughness, OP analysis showed that the average surface roughness (Sa) values for the uncoated substrates were SS: 500nm±50 & cpTi: 480nm±27, and these were increased after coating both substrates with FA to 4.84µm±0.3 and 3.88µm±0.9 respectively. EDS results confirmed the presence of fluoride (F), calcium (Ca), phosphorous (P), and sodium (Na), of which Ca/P was presented as 1.62-1.78% in the coatings. This was also confirmed by XPS. The XRD characterisation confirmed the apatitic structure of the crystals in the coatings. The CAM showed that the wettability was dramatically increased after FA coating, for which the water contact angle ranged between 10-19˚ for both groups. Surface energy calculations indicated that both SS and cpTi substrates were non-polar, while the FA coating appeared polar with high electron donor character 40mN/m±5. Fluoride release in Brain Heart Infusion media after 48hrs was 5.1ppm±1.5 for SS and 0.25ppm±0.6 for cpTi. The viable counts showed significant reduction of P. gingivalis growth on the FA coatings by 68±4% in comparison to the control. FA reduced not only bacterial viability but adhesion too; microscopy demonstrated 32±3% coverage of the FA coating by bacteria, in contrast to the fully covered uncoated substrates. This was attributed to the negative surface charge of the coating (-10.51mV±3.23), that led to electrostatic repulsion and reduced bacterial adhesion, and to the configuration of the crystals that disrupted the biofilm formation.

Conclusion: The ordered FA crystals produced using the hydrothermal method could act as a potential novel implant coating due to its unique physiochemical properties. In addition to its osteoinductive property, this study also showed promising signs of antibacterial activity against bacteria implicated in peri-implantitis.

002. Influence of titanium disks surfaces on the adhesion, proliferation and differentiation of human gingival fibroblasts and osteoblast-like cells - analysis in vitro

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Background: Different surface treatments exert different effects on bone growth of implant threads depending on its roughness characteristics, affecting the process of osseointegration.

Objectives: The objective of this study was to investigate the adhesion, proliferation and differentiation of human gingival fibroblasts (HGF) and osteoblast-like (BG) cells cultivated on titanium disks submitted to different surface treatments.

Material and Methods: The surface microtopography characteristics and chemical composition of commercially pure grade IV titanium discs with (1) machined surfaces (M); (2) sandblasted (SB); (3) sandblasting and acid subtraction (NP); (4) hydrophilic treatment (ACQ) were investigated by scanning electron microscopy (SEM) and energy dispersive X-ray spectrometry (EDS). The adhesion and proliferation of BG and HGF cells cultivated on Ti disks were investigated at 24 and 48 hours in SEM photomicrography. Alkaline phosphatase and mineralization activities were investigated by enzymatic methods.

Results: No significant differences were found among groups in roughness parameters, except for Rsk favoring M (p= 0.035; ANOVA). M disks showed a slightly superior (p> 0.05; Kruskal-Wallis/Dunn) adhesion of HGF-1 (89.43 % ± 9.13 %) than BG cells (57.11 % ± 17.72 %). ACQ showed a significantly higher number of BG (100%) than HGF (69.67 % ± 13.97 %) at 24 hours. BG cells expressed increased ALP activity in osteogenic medium at M (213 %) and NP (235.04 %) surfaces. Higher mineralization activity was expressed by BG cells cultivated on ACQ (54.94 % ± 4.80 %) at 14 days.

Conclusion: These findings suggest that hydrophilic surfaces is able to induce the adhesion, proliferation and differentiation of osteoblast-like cells.

003. Zirconium nitride coating on titanium abutment enhances fibroblast attachment and proliferation and reduces bacterial adhesion *in vitro*

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Objectives: Improvement of soft tissue attachment and reduction of bacterial colonization on titanium abutments are key factors for the long term maintenance of healthy soft and hard peri-implant tissues. The primary aims of this in vitro study are to compare (1) fibroblast adhesion and proliferation and (2) inactivation of bacterial biofilms among 4 different surfaces: machined uncoated Ti, anodized Ti, Ti nitride and zirconium nitride coated. Secondary aim is to characterize the surface topography to assess the eligibility for clinical use.

Methods: Anodized, Ti nitride and zirconium nitride coated 13x3 mm titanium disks were tested. Uncoated machined Ti disks were used as controls. Fibroblast adhesion was investigated by SEM and immunofluorescence analyses. Human gingival fibroblast (HGF) proliferation rate was assessed using the MTT-based cytotoxicity test. HGF adhesion and proliferation were evaluated using real time PCR with selected target genes. The mutagenic potential of chemical compounds

of different surfaces was determined by the AMES test. Haemolysis test was performed to assess blood compatibility. Bacterial strains isolated from the oral cavity (Streptococcus salivarius, S. sanguinis, S. mutans, S. sobrinus, S. oralis) and identified by mass spectrometry were plated (10^7 CFU/mL) on the different disks and grown in L-broth for 120 hours at 37°C. At the end of incubation, bacterial cultures were transferred into separate tubes, washed in 0.85% NaCl and stained using Live/Dead BacLight Bacterial Viability kit (Molecular Probes). Samples were analyzed by flow cytometry and the percentage of dead bacteria was calculated. Topographical cues were investigated by using a high resolution system for surface finish measurement.

Results: HGFs were able to attach and to proliferate when cultured onto the disks, without significant difference between the groups. After 7 days of culture, SEM and immunofluorescence analyses revealed HGFs well spread over and attached to all the tested surfaces. In all samples HGFs showed a good production of extracellular matrix components as confirmed by PCR. In detail, when HGFs were cultured on zirconium nitride treated disks, fibroblast growth factors, type I collagen and integrin related protein showed the highest values. For all surfaces, no haemolytic activity was detected, and clinical safety was confirmed by the AMES test. For all the tested bacterial strains the biofilms grown on zirconium nitride treated disks reported increased percentage of dead bacteria as compared with uncoated machined Ti disks. For example, the percentage of dead S. oralis grown on zirconium nitride treated disks was 69.45±1.15 whereas on uncoated machined Ti disks was 6.40±3.38 (P< 0.001). Albeit to a lower extent, Ti nitride coated disks inactivated bacterial biofilms, too. Roughness measurements confirmed a substantial similarity between the surfaces and their compatibility with the current clinical applications.

Conclusion: All the examined surfaces have proven safe for use as implant abutments. Zirconium nitride coated disks exhibited higher cell adhesion and fibroblast growth factor production and lower bacterial colonization rate, when compared to the other surfaces. Topographical cues further confirmed the validity of zirconium nitride coated Ti abutment for clinical applications.

Acknowledgements: This work was partially supported by Megagen Implant Co., Ltd. (South Korea), which provided the disks.

004. Osteogenic potential of extracellular vesicles derived from microcarrier cultures of human periodontal ligament stromal cells

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Background: Regeneration of alveolar bone represents a major challenge of modern periodontology. We propose that extracellular vesicles (EVs) may represent a promising alternative to the existing treatment strategies. Therapeutic effects of EVs depends on cell type and culture conditions, therefore simple and efficient methods for scaling-up EV production with desirable therapeutic properties would be beneficial.

Objective: To investigate osteogenic potential of EVs derived from microcarrier cultures of human periodontal ligament stromal cells (hPLSCs).

Methods: Primary PLSC cultures were isolated from healthy periodontal tissues of 18 years old Caucasian female using explant outgrowth method. Material was collected under approval of Lithuanian Bioethics Committee. hPLSC lines were cultured in a low glucose DMEM supplemented with 10 % FCS, 100 U/ml penicillin, 100 µg/ml streptomycin and 2mM L-glutamine (basal medium). EVs were purified by ultracentrifugation from hPLSCs grown on the gelatin-coated microcarriers (Global Cell Solutions) in bioreactor (BioLevitator, Hamilton). For differentiation experiments hPLSCs from the 3 rd passage were transferred on 6-well plates and pre-incubated in EV-free basal medium for 72 h. Then, hPLSCs were divided into three groups: 1. hPLSCs cultured in the basal EV-free medium (control); 2. hPLSCs treated with osteogenic induction medium (basal medium supplemented with 100 nM dexamethasone, 50 µg/ml ascorbic acid and 10 mM β-glycerophosphate); 3. hPLSCs treated with osteogenic induction medium and EVs. hPLSCs received three EV treatments-on 4 th, 7th and 10 th day after induction of osteogenic differentiation. For one treatment we used EVs collected from 40 ml of supernatant from microcarrier culture of hPLSCs. Detection of extracellular calcium deposits has been performed by staining with 2 % Alizarin RED S on 7th, 10th and 14th day after induction of differentiation. Total RNA was isolated from control and differentiating (7, 10 and 14 day) hPLSCs. Real-time polymerase chain reaction was performed using the CFX96 instrument (Biorad) and CFX manager software. The expression levels of alkaline phosphatase (ALP), BMP2, Runx2, Msx2, CD14, TLR2, TLR4, cementum derived protein 23 (CP-23), bone sialoprotein (BSP), and periostin (POSTN) were analysed using Maxima SYBR Green qPCR/ROX Master mix (Fermentas).

Results: Alizarin staining revealed no calcium deposits in all three experimental groups after 7 and 10 days of osteogenic differentiation. However, significant increase in mineralization was observed on 14 th day in EV-treated PLSCs cultures. We found that EVs induced significant up-regulation of ALP, Runx 2, CD 14, TLR2, TLR4 and CP23 gene expression during early phases of osteogenic differentiation (on 7th day). In addition, we detected up-regulation of BMP2 gene expression in EV-treated hPLSCs after 14 days of osteogenic differentiation.

Conclusions: EVs derived from microcarrier hPLSCs cultures may act as promoters of osteogenic differentiation of hPLSCs grown under standard conditions. These findings may be instrumental for the development of new protocols for the reconstruction of periodontal tissues.

005. Osteogenic efficacy of rhBMP-2 mixed with hydrogel and bone substitute at the periimplant dehiscence defects in dogs: 16 weeks of healing

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Objectives: To test the osteogenic efficacy of bone morphogenetic protein-2 (BMP-2) mixed with either the polyethylene glycol hydrogel or synthetic bone substitute (SBS) at the periimplant dehiscence defects in 16 weeks of healing period. This is a subsequent study of our previous article which evaluated same hypothesis at 8 weeks of healing period (Jung et al. Clin Oral Implant Res 2015;26: 1456-1465).

Materials and Methods: A total six beagle dogs were used. Following extraction of the mandibular premolars, the edentulous alveolar ridge was induced. Guided bone regeneration procedure was performed at the surgically prepared box type periimplant defects. The experimental groups were divided as follows; i) no graft, ii) SBS + hydrogel, iii) SBS + BMP-2 mixed hydrogel, iv) BMP-2 mixed SBS + hydrogel. Volumetric analysis using micro computed tomography and histomorphometric analysis were performed 16 weeks postoperatively.

Results: Larger mean values of new bone volume and total augmented volume were found in both BMP-2 treated groups than the others, however there was no significant difference in volumetric analysis among all groups (p>0.05). Likewise, no histometric differences were observed in the values of the new bone formation and bone to implant contact ratio among all groups (New bone formation, group i) 0.06 ± 0.08 mm2, ii) 0.19 ± 0.20 mm2, iii) 0.48 ± 0.37 mm2, iv) 0.56 ± 0.60 mm2; Bone to implant contact, group i) 9.44 ± 11.51 %, ii) 19.91 ± 15.19 %, iii) 46.31 ± 29.82 %, iv) 42.58 ± 26.27 %; p>0.05). The mean distance from the implant platform to the most coronal point of osseointegration in the SBS + BMP-2 mixed hydrogel group (1.67 ± 1.11mm) was significantly different from the results in no graft and SBS + hydrogel groups (3.67 ± 0.39mm and 2.86 ± 0.95mm, respectively, p< 0.05).

Conclusion: Within limitations of this study, the osteogenic efficacy of BMP-2 diluted after 16 weeks regardless of the carrier material at the periimplant dehiscence defects. These results were contradictory to the results of 8 weeks in the previous study.

006. Radiographic bone level changes at Straumann® SLActive Tissue level implants placed in the aesthetic zone: A five year follow-up study

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Objectives: In the recent years, different implant surfaces have been introduced to improve implant outcomes. The Straumann® roughened hydrophilic implant surface (SLActive) was designed to enhance the speed of osseointegration and consequently survival and success rates. Radiographic bone level changes are one of the key components used to assess long-term implant success. Radiographically, bone loss of 1.5-2mm during the first year after placement and 0.05-0.2mm per year thereafter is anticipated as part of the physiological remodelling process. There is limited evidence for bone level changes in Straumann® SLActive Tissue level implants.

The aim of this retrospective study was to assess bone level changes at least 5 years after placement around Straumann® SLActive Tissue level implants placed in the maxillary aesthetic zone.

Methodology: A retrospective analysis of radiographic records of patients treated with Straumann® SLActive (hydrophilic) Tissue level implants in the maxillary aesthetic zone (inter-canine) since 2006 at The Royal London Dental Hospital was conducted. Radiographically, the immediate post-implant placement radiograph was compared to the radiograph taken at delivery of the restoration and the most recent review appointment with at least five year follow-up period. Images were imported into ImageJ® software and the magnification error was eliminated. The bone levels were measured at the mesial and distal aspects of the implant separately by two calibrated investigators. The results were tabulated and statistically compared to ascertain the bone level change over time

Results: 43 patients received 43 hydrophilic tissue level implants. All implants replaced maxillary anterior teeth in the inter-canine region. The mean observation period was 8.1 years from the time of implant placement (ranging from 5.1 to 10.7 years) and 6.9 years from the time of the delivery of the definitive prosthesis (3.9 to 9.6 years). The average time from the implant placement to the fit of the definitive prosthesis was 1.3 years (0.6 to 2.5 years). The implant survival rate was 100% with success rate of 98% over the observation period. The mean magnification error was 10.65% with a range of 6.1% to 41.02%. The mean change in bone level at the mesial aspect of the implant was 1.83 (ranging from 0.90 - 3.24) from the time of placement to the time of the definitive prosthesis fit. For the same observation period, the mean change in bone level at the distal aspect was 1.36 (0.85 - 3.78). The mean change in bone level from the time of the delivery of definitive prosthesis to the most recent review appointment at the mesial aspect of the implant was 0.2 (0.1 - 1.10), and the distal aspect was 0.12 (0.08 - 1.30).

Conclusions: Within the limitations of the present study, radiographic bone level changes around Straumann® SLActive Tissue level implants placed in the maxillary aesthetic zone showed similar outcomes compared to other implant surfaces reported in the literature and demonstrated high survival and success rates.

007. Evaluation of mechanical strengths of three types of mini-implants in artificial bones

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Objectives: To investigate the effect of the anchor area on the mechanical strengths of infrazygomatic mini-implants.

Methods: In this study, we used 30 mini-implants of 3 brands, which were divided into 3 types based on the material and shape: Type A (titanium alloy, 2.0 × 12 mm), Type B (stainless steel, 2.0 × 12 mm), and Type C (titanium alloy, 2.0 × 11 mm). The artificial infrazygomatic crest was composed of a 2-mm cortical bone and cancellous bone. The mini-implants were 90 degree and 45 degree inserted into the artificial bone to a depth of 7 mm, without predrilling. The mechanical strengths (insertion torque [IT], resonance frequency [RF], and removal torque [RT]) and the anchor area were measured. One-way analysis of variance and Spearman's rho correlation coefficient were used for intergroup and intragroup comparisons. We hypothesized that no correlation exists among the mechanical forces of each brand.

Results: In the 90 degree tests, the IT, RF, and RT of Type C (8.5 N.cm , 10.2 kHz , and 6.1 N.cm, respectively) were significantly higher than those of Type A (5.0 Ncm, 7.7 kHz, and 4.7 N.cm, respectively). In the 45 degree test, the RFs of Type C (9.2 kHz) was significantly higher than those of Type A (7.0 kHz) and Type B (6.7 kHz). The anchor area of the mini-implants was in the order of Type C (706 mm2) > Type B (648 mm2) > Type A (621 mm2). Type C exhibited no significant correlation in intragroup comparisons, and the hypothesis was accepted.

Conclusions: In the 90 degree and 45 degree tests, Type C exhibited the largest anchor area and the highest mechanical strengths (IT, RF, and RT) among the 3 types of mini-implants. The anchor area plays a crucial role in the mechanical strength of mini-implants.

008. Personalizing Craniofacial-oral-dental health care. Part III. Genetic basis of osseointegration: State of the art

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A number of significant advances (Omics era & bioengineering) now seamless enable stratification of patients according to their individual genotypes, precise diagnosis coupled with patient phenotypes, improved treatment planning and predictable outcomes. Collectively, these advances are designated « personalized dental medicine». In this brief review we proposed the term conceptualizing osseointegration beyond its definition but also understanding its history and determinants as a phenomena.

To become an essential characteristic of the personalizing dental medicine which in turn will have robust impact in dental implant practice as well as other associated care clinics. This mini-review will elucidate how important to utilize advance molecular biology (i.e. Genome Wide Association Study) and dental implant bioengineering (i.e. micron & nano scales as well as outer surface coatings) in understanding and unraveling genes expression controlling endosseous wound healing and bone formation. It is well acknowledge that cells orchestrate osteogensis is well controlled by sequential activation of typical genes, which, in turn are activated by soluble cytokines and molecules from the extracellular matrix as well as cell-cell cross-talk. Categorizing gene profiles and their signalling cascades in tandem with endosseous wound healing stages will impart implant dentistry to tailor dental implant system to their potential bio-mechanistic up-regulating genes in favour of osseointegration and may ultimately coin the notion of conceptualizing osseointegration phenomena. In addition, this approach will help in stratifying featured dental implant and improve patient selection.

We recognize that myriad obstacles must be overcome to achieve these goals. For examples from GWAS, we must employ a suitable bioinformatics program to precisely determine which genes in each stage of endosseous wound healing will have positive impact and the other genes having off target effect in the process of osteogensis around dental implant. Thus, broad spectrum of experimental and clinical studies are needed.

009. Osseointegration of titanium implants anodized with and without fluoride in the electrolite - A study in rats

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On the hypothesis that fluoride acts as an anabolic to bone tissue, the aim of this study was to measure the osseointegration in the rat, of implants (grade II titanium wire, 1mm diameter, 4 mm long) submitted to anodic oxidation in 2M phosphoric acid solution (control implants) or b) in 2M phosphoric acid solution plus 0.2M NaF (F-modified implants). Chemical composition of the implants surface was assessed by energy-dispersive X-ray spectroscopy: F-modified implants exhibited a 2.57% in weight and 2.98% of fluorine atoms.

Adult male Sprague Dawley rats, 300-350 g of body weight received two implants (in the femur and in the tibia, close to the knee) in each hind leg. Control and F-modified implants were insertes in the left and the right legs, respectively. Three weeks after surgery the animals were sacrificed. The undecalcified bones were embedded in methylmetacrylate. Sections were obtained to measure two histomorphometric quantities: bone to implant contact (BIC) and bone volume in a defined volume of tissue around the implant (BV/TV)

BIC was significant increased on F-modified implants with respect to their controls (66.2% ± 3.2% vs. 52.9% ± 4.4%, $P < 0.01$). BV/TV did not differed significantly between F- modified and controls implants (24.5% ±2.2% vs 22.9% ±1.4%, P=0.3007).

010. Dental implant surface contamination. A pilot study

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Titanium osseointegration is influenced by different factors like topography and chemistry of it´s surface. Titanium is a high bio compatibility material because it´s oxide layer (around 10 nm). Strange particules in contact with titanium oxide layer could generate toxicity and lose of bone implant contact.

Seven sterile-package dental implants were analyzed (qualitative/ cuantitative elemental) with spectroscopy of X ray dispersion in an electronic microscope. Six argentinian national dental implant and one gold standard dental implant (USA).

The EDS analyses show the presence of contaminaion in the surface with minerals like Carbone, Aluminium, Silice, Cloride, Iron.

The imported implant was the less contaminated implant in this study.

011. Topological morphology and histology of allogeneic collagen scaffolds; an in vitro study

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Objectives: Recently, allogeneic collagen soft tissue materials have become popular in dentistry. Despite the huge number of biomaterial products that have become available for dental practice, fundamental evidence is lacking in terms of difference among the biomaterials. The purpose of this study was to clarify topological morphology, cellular proliferation, cellular penetration and density in collagen scaffold materials.

Methods: Four commercially available collagen scaffolds were evaluated; Mucograft ® (MG, Geistlich Pharma AG, Switzerland), Mucoderm® (MD, Botiss Dental GmbH, Germany), AlloDerm® (AD, BioHorizons, US) and Derma (DD, Tecnoss, Italy). Firstly, the morphologies of sectional surfaces for all collagen scaffolds were observed using scanning electron microscopy (SEM). The observations were conducted on both sides of the collagen scaffolds. Secondly, cellular proliferation, cellular penetration and density of collagen scaffolds were assessed using human gingival fibroblasts (HGF). HGF were cultured using medium containing 10% fetal bovine serum and 1% penSicillin streptomycin. Cells were cultured at standard culture conditions and the 3rd passage was used for the following assessments. After 30-min-, 24-h-, 5-days- and 9-days-cellular culturing, cryo-sections of the collagen scaffolds were prepared in order to operate histological observation. H and E staining was performed on each section, and the cellular penetrations of the collagen scaffolds were measured implementing an optical microscope. The densities of the collagen scaffolds were calculated using image analysis software (Image-Pro, Media Cybernetics, Inc, USA). For cellular proliferation, after 5 and 9 days in culture, the collagen scaffolds were recorded for both live and dead HGFs by means of separate images using a fluorescence microscope fitted with the correct filters (Leica, DMIRB).

Results: The SEM images showed that, MG revealed a border layer between a compact and spongy layer, whereas there was no border layer observed in the other scaffolds. According to the histological observations, cellular penetration into the collagen scaffolds were observed in AD and DD at 30 min and 24 h, and in DD at 5 days, while no HGF were found at 9 days. The LIVE/DEAD images showed the growth behavior of HGFs on the collagen scaffolds. Live HGFs fluoresced with green radiance, whilst red fluorescence was revealed within dead cells as a result of their cellular membrane becoming compromised. There were cellular proliferation on all the scaffolds, whereas no dead cell was observed on DD. However, the number of dead HGF accounted for significantly less activity than that of live HGF cells on the scaffolds in MG, MD, CP and AD. Moreover, MG revealed strong HGF proliferation on the surface after 24 hours in culture.

Conclusions: It can be clearly seen that there are significant differences among commercially available collagen scaffolds, in terms of micro topologies, densities and cellular bioactivities.

012. Comparison of heat generation between guided and non-guided implant surgery

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Objectives: Guided implant surgery might lead to greater heat generation during osteotomy preparation. It can be assumed that the surgical guide impairs the irrigation fluid from entering the drilling site. The aim of this study was to compare in vitro the temperature development during drilling for guided implant surgery compared to a non-guided approach.

Methods: Drilling was performed in 50 pcf polyurethane foam blocks (Sawbones Europe AB, Malmö, Sweden). Temperature measurements were performed by means of an infrared camera PYROVIEW (DIAS Infrared GmbH, Dresden, Germany). The PYROSOFT Professional Software (DIAS Infrared GmbH, Dresden, Germany) recorded the temperature development at a distance of 0.5mm from the final cavity. A hand piece holding the drill was fixed in a lifting device and the Sawbone blocks were fixed below the hand piece. The vertical force was adjusted to 2.4 kg for the direct and 0.6kg for the sequential drilling protocol in order to avoid a higher feed rate.

Drilling was performed with cylindrical drills of different diameters (2.2mm, 2.8mm, 3.5mm and 4.2mm) (Straumann AG, Basel, Switzerland) with rotational speeds according to the manufacturers recommendations. All implant bed preparations were completed with an Anthogyr implant motor (Anthogyr, Sallanches, France) under continuous irrigation (40ml/ min). No drill was used more than 10 times and the drilling depth was 12mm. For guided implant surgery, a specific template was produced with the Inventor 2015 Software program (Autodesk Development Sarl, Neuchâtel, Switzerland) fitting on the Sawbone blocks. The cylinder of the drill handle was inserted into the metal sleeve fixed to the surgical template (Straumann Guided Surgery concept, Straumann AG, Basel, Switzerland).

The six study groups included standard sequential drilling protocols for 2.8mm, 3.5mm and 4.2mm final drills with and without the use of a surgical guide. Temperatures were measured before and during drilling. The differences between the maximum temperatures and the start temperatures were calculated in order to determine the total heat development.

The Minitab 17 Statistical Software program (Minitab Ltd., Coventry, UK) was used for statistical analysis. A two-way t-test calculated significant differences between the two groups. Values of P< 0.05 were considered statistically significant.

Results: The mean maximum temperature changes for the standard sequential drilling protocol were as follows: 39.9°C for the 2.8mm drill (non-guided) and 41.6°C for the 2.8mm drill (guided), 29.0°C for the 3.5mm drill (non-guided) and 36.7°C for the 3.5mm drill (guided) and 19.0°C for the 4.2mm drill (non-guided) and 35.3°C for the 4.2mm drill (guided).

The highest temperatures were measured at a depth of 8-10mm. A statistically significant difference in thermal increase was found at this depth between guided and non-guided cavity preparation for the 3.5 and 4.2mm drill and a nonsignificant difference for the 2.8mm drill.

Conclusion: Guided drilling during osteotomy preparation generates higher local bone temperatures than the non-guided counterpart and can potentially lead to morphological bone damage. Clinically, intermittent drilling could alleviate heat production when guided implant surgery is performed and should be the focus of future studies.

013. Accuracy and reproducibility of abutment position in intraoral scanning

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Objectives: Recently, dental treatments have been digitalized with advance of information technology. Particularly, optical impression by intra-oral scanners is the focus of a lot of attention as a new method to reproduce and measure three-dimensional shapes of oral tissue. We examined the accuracy, including trueness and precision, of the intraoral scanners comparing with laboratory scanners to clarify the error level of intraoral scanners.

Methods: Measurements were performed using a computer numerical control coordinate measuring machine (CNCCMM) of the reference models as a control. Subsequently, four intraoral scanners (3M™Chair Side Scanner: C.O.S. (COS), the second-generation 3M™ true definition scanner (TDS2), the third-generation 3M™ true definition scanner (TDS3), 3Shape TRIOS Color (TR) and one laboratory scanner KaVo Arctica (KA) were used to capture the abutment position, and trueness and precision of the distance error were assessed by image analyzing software.

Results: With regard to reference model, there was a significant difference between the trueness measured by COS and that measured by the other scanners. The trueness measured by TDS2 and TDS3 was larger than the one by TR and KA. With regard to reference model B, error of the trueness measured by COS was significantly larger, compared with the one measured by the other scanners. However, error range of intraoral scanners, except for COS, was considerably small and it should be covered with cement space.

Conclusions: The results of this study indicated that optical impression method with an intraoral scanner could be applied to the implant therapy for not only single tooth but also multiple teeth missing.

014. Histological and immunohistochemical investigations of peri-implant bone from retrieved implants

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Objective: Histological investigations of retrieved implants from animal studies or from patients are traditionally carried out on undecalcified grinding sections, which enable god overviews and histomorphometrical analyses. Due to methodological problems, evaluation in higher magnification or the application of immunhistochemistry, which would allow insights into the fine structure of peri-implant tissues and into cellular aspects of osseointegration, is nearly impossible. Therefore, investigations using decalcified and paraffin-embedded sections could be an alternative. This proof of concept study tested the feasibility of such methods.

Material and methods: Titanium implants from different manufacturers explanted from 12 patients due to different indications, e.g. implant fracture, prosthodontic problems or peri-implantitis, being in situ between 7 months and several years were fixed in formalin, decalcified in EDTA, and the peri-implant bone stripped off carefully. Bone was embedded into paraffin and serially sectioned. Sections were stained with H.E., trichrome, PAS, TRAP and immunohistochemically using antibodies against runx2, alkaline phosphatase (ALP), collagen type I, osteocalcin (OC), osteopontin (OP), RANKL system, TNF-Ð using standard detection methods for characterization of bone remodeling. Sections were evaluated qualitatively and semi-quantitatively applying light microscopy.

Results: A detailed structural evaluation of the peri-implant tissue showing bone and soft tissue areas was possible. In higher magnification, the former interface to the implant surface was visible showing details like osteocytes lying in close contact to the surface or the thin proteoglycan-rich organic layer bordering titanium surface. Bone mostly consisted of lamellar type, but also remnants of fibrous bone were visible even for implants retrieved after years. Lamellar bone was immunoreactive for bone matrix components like collagen type I, OC and OP. In nearly all cases, ongoing osteogenesis was visible nearby the surface, but also as contact osteogenesis showing osteoblasts and osteoid deposition. Osteoblasts were immunoreactive for osteogenic markers like runx2 or ALP. TRAP-positive osteoclasts were found mainly in the peri-implant bone and on crestal bone surfaces. Immunostaining for components of the RANKL system indicated osteoclast regulation by these factors. In the peri-implantitis cases, crestal infiltrations and increased numbers of osteoclasts, but no bone necrosis, could be observed. Nerve fibers near the implant surface could be seen frequently.

Conclusions: Findings of this study show that by applying methods of decalcification, stripping of peri-implant bone and paraffin histology including immunohistochemistry, valuable data can be obtained for the evaluation of the biology and pathology of osseointegrated implants after retrievement. Interface, bone structure and remodeling, inflammatory changes, peri-implant innervation and other phenomena can be studied in detail. However, due to the small sample size of this study, further investigations are necessary.

015. Photofunctionalisation of different implant surfaces and their evaluation in simulated guided bone regeneration situations: Use of an indigenous preclinical model for a controlled laboratory trial

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Objectives: 1. Evaluating the effect of photofunctionalization on various commercially used implant surfaces by assessing their hydrophilicity and surface chemical compositions. 2. Assessing the utility of photofunctionalization of implants as a method for achieving better, faster osseointegration with higher bone to implant contact in compromised bone situations.

Materials and methods: 2 surfaces (Resorbable blasted textured - RBT surface and Calcium enriched nano-porous surface) of 2 commonly used implants in India were studied. The respective implants were photofunctionalized in a UV chamber, following the protocol described by Ogawa et al. The chemical composition of the titanium surfaces was evaluated using Scanning Electron Microscope coupled with EDS analyzer. Hydrophilic areas of these titanium surfaces were examined by contact angle measurement. An indigenous model was developed to replicate Guided Bone Regeneration (GBR) conditions in vitro. (Kheur et al 2016) Each chamber was loaded with an implant of one of the 2 surfaces studied. Half the implants utilized were photofunctionalized in a UV chamber for 15 minutes. Along with the implants, the device was also designed to accept nutrient media, natural scaffold biomaterials such as chitosan, cellulose and gelatin. Osteoblast attachment, migration and

differentiation in the presence of graft material was thereby assessed, simulating GBR. The experimental design was a between-group comparison. Between groups, the data was analyzed using analysis of variance (ANOVA) with Duncan›s multi comparison procedure at the 5% level.

Results: Both implant surfaces studied showed a dramatic reduction in the surface Carbon content following photofunctionalization. The untreated implant surface was dominated by Carbon. After photofunctionalization, the surface Carbon content reduced by 60% from 28.64% to 11.02%. The surfaces of both implants were rendered superhydrophilic. When the photofunctionalized implants were placed in the indigenous GBR simulation chamber, the osteoblastic cells adhered to the surface within 24 hours in culture. In 48 hours, the cells spread over the implant surface, and after 72 hours a proliferation of cells with large and flat bodies was observed over the photofunctionalized implant surface. The same effect was seen in the presence of all the biomaterial scaffolds sued. These results demonstrate that the photofunctionalized titanium surface studied is highly biocompatible and allows better adhesion and proliferation of the osteoblast cells with increased mineralization as compared to the control implants.

Conclusion: UV photofunctionalization of titanium implants can be successfully achieved for RBT and calcium enriched nonporous Ti oxide surfaces. Both surfaces showed reduction in carbon and increase in titanium and calcium contents making them superhydrophilic. The micro device developed in this research successfully simulated GBR situations in vitro. The present study shows that the photofunctionalized titanium surface is directly associated with early osteoblast adhesion and proliferation and the consequent development of mineralized tissue at the implant interface. Photofunctionalized titanium surfaces could be better suited in compromised bone conditions as it stimulates osteoblastic activity and enhances hard tissue formation around the implant in the presence of biomaterial scaffolds.

016. Surface properties and osteoblast attachment of periodontal-bacteria-infected titanium discs after various treatment

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Objectives: Peri-implantitis is defined as an inflammatory process affecting the tissues around an osseointegrated implant. Although peri-implantitis is a common clinical phenomenon, no standard treatment protocol has yet been established because of limited knowledge on implant surface changes after bacterial contamination. The objective of this in-vitro study was to investigate the surface properties and residual lipopolysaccharides (LPS) of Porphyromonas gingivalis-inoculated titanium discs after various treatments.

Methods: A biofilm containing the periodontal bacteria P. gingivalis was inoculated on commercial grade 4 pure titanium discs (15 mm in diameter, 2 mm in thickness, and Ra = 1.3) in vitro. They were divided into five groups: Group 1 received no treatment and served as control. Group 2 received P. gingivalis inoculation without treatment. Group 3 received P. gingivalis inoculation, curette debridement, and phosphate-buffered saline (PBS) irrigation. Group 4 received P. gingivalis inoculation, curette debridement, PBS irrigation, and ultrasonication. Group 5 received P. gingivalis inoculation, curette debridement, PBS irrigation, and 0.12 % chlorhexidine treatment. The contact angle, surface roughness, and hydrophilicity were studied. The adhesion and proliferation of human embryonic palatal mesenchymal (HEPM) cells on the titanium discs were observed. The residual LPS were measured using Fourier transform infrared spectroscopy (FTIR), x-ray photoelectron spectroscopy (XPS), and a limulus amebocyte lysate (LAL) assay.

Results: Scanning electron microscopy results indicated that ultrasonication eliminated P. gingivalis on the titanium discs and was the most effective method of removing the biofilm in this study. The results of the HEPM cell adhesion assay indicated that the attached cells decreased regardless that P. gingivalis was completely removed by ultrasonication when compared with the control group. The LPS-coated titanium discs showed an increase in contact angle and a decrease in water wettability. However, LPS could not be detected using FTIR and XPS. The LAL results showed the presence of residual LPS after ultrasonication.

Conclusion: We concluded that re-osseointegration failure after peri-implantitis is due to endotoxin residues on implant surfaces. Additional studies are warranted to determine an efficient decontamination protocol combining chemical and mechanical therapies aimed at eliminating endotoxin on implant surfaces.

017. Creation of occlusal screw access hole, and it›s effects on fatigue fractureload of phonares II and SR ortholingual DCL denture teeth: A fractal analysis

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Objectives: Dental implants for fixed implant-supported complete dentures (FICD) have demonstrated promising results for masticatory performance, bite force, and patient satisfaction. Given an increase in full mouth rehabilitations with FICDs, one may also expect to see an increase in prosthetic complications associated with these prostheses. Due to the space requirements for FICDs, the denture tooth is the first material to be relieved to achieve adequate space. Gross removal of the denture tooth for space and for creation of a screw access channel often compromises its integrity. The lack of proprioception, leads to increased bite force generated onto the prosthesis , with fractured denture teeth the inevitable result. Few, if any, studies in the literature have reported a fractal analysis on the effect of an occlusal access hole through a denture tooth on fatigue fracture strength. The purpose of this study is to evaluate two methods of creating an occlusal access hole, and the effect each has on the fatigue fracture load of two types of denture teeth for implant supported fixed complete dentures.

Methods: Six sample groups were fabricated as is done in clinical situations for implant supported fixed complete dentures using a Ivobase injecting system. SR Ortholingual DCL and Phonares II denture teeth were selected. Two control groups were fabricated (DCL and Phonares II) without a screw access hole. For the remaining sample groups, two protocols were developed for creating the screw access hole, utilizing a carbide and diamond bur (with and without polishing and irrigation). Screw access holes were closed with teflon and tetric evoceram composite. Using a chewing simulator, the six sample groups are put under an occlusal load and evaluated for fracture. All fractured samples were analyzed with fractography to determine the fracture origin.

Results: Pending conclusion of study

Conclusion: Pending conclusion of study

018. Constructing the forecasting models for dental implant results with a supervised learning approach

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Background: The traditional dentures were replaced with dental implant surgery insertion due to scientific and technological progressing. Dental implant surgery involves range to be quite extensive, include physical condition of patient, personal habit, surgical experience , and the choice of implant system etc, so all of the projects that must be considered. Because the charge of dental implant is better than other treatment in Taiwan , many dentists preferred to perform implant surgery without thinking about the complications which cause the emergence of the medical dispute.

Objectives: In the past literature, most of the exploratory factors were statistically significant only for single disease such as systemic disease, surgical procedure and prosthetic type. We wants to establish early warning mechanism including factors of surgery and characteristics of implant- retained prosthesis to reduce the chance of failure.

Methods: We collected clinical data of patients undergoing dental implant treatment in Chia-Yi Christian Hospital of Taiwan , including age, sex, causes of tooth loss, systemic diseases, smoking, drinking, chewing betel nuts, department of dental division, physician practice years, implant position, bone density, bony augmentation, maxillary sinus augmentation, implant systems, implant length, implant width, prosthetic form, the angle of the abutment and fixation of implant-retained prosthesis. A total of eight categories of 20 variables, Decision tree, support vector machine and logistic regression were used to analyze the early success or failure prediction and the late success or failure prediction.

Results: C4.5 (J48) decision tree had the highest predictive efficiency of 62.6% and 69.8% respectively, regardless of the early or late successes and failures in a single classifier. In addition, the early and late risk prediction models were established based on the classification regression tree (CART) , and the association rules were established to affect the early and late success of the implant.

Conclusion: We hope to establish the prediction models of early and late success or failure of the implant by using the results of the study, and help the clinicians to choose the optimal implant system and the prosthetic therapy to reduce failure of treatment.

019. Effect of sintering on physicochemical, mechanical and antibacterial properties of fluorapatite dental implant coatings

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Objectives: Hydroxyapatite (HA) coated dental implants have reported to fail due to high HA dissolution and delamination. Fluorapatite (FA), is more stable, with proven ability to enhance osseointegration and promising antibacterial effects against pathogens implicated in peri-implantitis. However, long-term coating stability and resistance to delamination are essential to ensure the longevity of dental implants. The aim of this study was to perform a detailed physicochemical, mechanical and antibacterial characterisation to investigate the effect of sintering on the surface properties, durability and antibacterial efficiency of FA coated titanium.

Methods: FA coatings were deposited onto in-house prepared commercially pure titanium (Grade 4) (cpTi) discs using a mild hydrothermal method. Half of the coated discs were sintered at 800°C for 180min. A morphological characterisation of both groups was performed using Scanning Electron Microscopy (SEM) and a laser profiler used for Surface roughness (Sa) and thickness measurements. Energy Dispersive Spectroscopy (EDS) and X-Ray Diffraction (XRD) was used to examine the chemistry and crystallinity. Water contact angle (WCA) and surface energy were calculated for both groups. Daily fluoride release in Brain Heart Infusion at pH 7.0 and 4.0 was evaluated using a fluoride ion selective electrode for 8 weeks. A diamond stylus scratch test (ST) was used to determine FA coating adhesion strength to the cpTi. The antibacterial activity against Porphyromonas gingivalis W50 was assessed in vitro using viable counts (VC).

Results: The hydrothermal method produced ordered FA coatings with well-aligned hexagonal crystals perpendicular to the cpTi substrate and Sa of 3.88µm±0.9 and thickness of 9.43µm±0.7. Sintering significantly reduced these values to 1.89µm±0.3 and 8.43µm±0.5 respectively. EDS analysis confirmed the FA Ca/P at 1.81±0.05 which was significantly reduced to 1.74±0.02 after 7 days of acidic aging, while it was 1.7±0.03 after sintering that insignificantly decreased to 1.68±0.02 after 7 days of acidic aging, indicating that sintering enhanced the FA stability. XRD confirmed that FA was the only crystal phase present for both groups. FA coatings displayed low WCA 19°-12°, which decreased after sintering to 12°-6°. FA coatings, especially the sintered ones, presented higher polar (41-49mN/m) and electron donor (46-47mN/m) character, in comparison to the uncoated cpTi. Daily F release at pH 4.0 ranged between 4.7-12ppm for both groups and this was dramatically decreased to 2-5ppm on the 7th day and entirely lost on the 14th day, due to complete degradation of the non-sintered coatings. Sintered coatings maintained a stable daily F release of 2.5ppm±1.2 for 14 days that was reduced to 0.3ppm±0.1 for up to 8 weeks. This indicates that sintering significantly reduced FA acidic degradation, maintaining stable coatings. Scant F release at pH 7.0 was observed. ST adhesion strength was significantly increased after sintering, with an increased stylus travel distance from 1.27 to 1.6mm. VC showed a reduction of P. gingivalis growth on the FA coatings in comparison to the cpTi control, which was maintained after sintering.

Conclusions: Detailed characterization of the FA coatings allows for better interpretation of the performance of the sintered FA. Sintering is effective in bringing an enhancement in the chemical and mechanical stability of FA coatings without affecting its antibacterial efficacy.

020. A long-term implant stability score for success monitoring in implant dentistry

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Objectives: In order to monitor all aspects of dental implant state and make qualified predictions as to the implant's prospects we need to convert subjective assessments and impressions into quantitative measures. We have assembled a robust methodology using such measures and giving a comprehensive score for dental implant success assessment and status monitoring. The score was designed so that it employs only standard and minimally invasive techniques accessible to general dental practices and which require no special equipment.

Methods: The methodology is developed by combining the consensual global knowledge base regarding aspects of dental implant success with the standard examination tools available and accepted for regular recall assessment. Five three-grade parameters identified and defined on clinical basis are retrospectively evaluated for a pool of 869 implants with sand-blasted, acid-etched surfaces with time in service from 0 to 11 years. The proposed score, named the Long-term Implant Stability Score (LISS), is calculated for each implant as a simple sum of the 5 parameters. The five parameters identified for use in the LISS are measures of: vertical BONE loss, peri-implant INFLAMMATION, amount of attached MUCOSA, exposure of implant component (a.k.a. tissue RECESSION), and the horizontal buccal PROFILE of the alveolar process. The data sets are statistically tested for correlation with the reference success score after Buser et al, for mutual correlations and for the dependence on the implants' time-in-service.

Results: We demonstrate the methodology on a sample pool of 869 implants from a retrospective clinical study covering 0-11 years in service. Over the entire surviving set the successful (after Buser) 828 implants' LISS fell in the range 7.76±1.59, while non-successful subset (42 implants) was characterized by LISS 3.02±1.62. The comprehensive score (i.e. the LISS) showed the expected high agreement (cca. 93%) with the reference Buser success score on the given test pool of implants. This correspondence identified 3 intervals in LISS, which could be interpreted clinically as: excellent status and prospects for 476 (54,8%) of implants (values 8-10), showing early signs of being in danger of failure for 368 (42,4%) of implants (values 4-7) and being compromised with high likelihood of loss for 25 (2,8%) of implants (values 0-3). The overwhelming benefit of this score (and any analogue that can be proposed) is its usability as a monitor allowing some interventions made to reverse negative trends. The score showed to be invariant in time in service and so did most of the five components.

Conclusions: The LISS demonstrated to be highly representative of the Buser success score, while offering the added value of a finer eleven-grade scale (from 0 to 10). Like the reference, the new score can be assigned to an implant using standard calibrated probe and x-ray radiographs without special implements. The score responds to an existing need in the field and shows promise to general dental practice.

At the same time, LISS needs thorough testing on several implant pools before it can be declared sufficiently all-embracing and recommended for general use.

021. Antibacterial effects of bio-inspired nanostructured titanium

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Objectives: Periimplantitis is mainly related to bacterial adhesion on implant surfaces. Several properties of bio-inspired surfaces like chemical composition, surface topography, surface hydrophilicity and even surface charge could influence bacterial adhesion. Nano-modified surfaces could avoid bacterial colonization and adhesion by its physico-mechanical and chemical aspects.

Methods: Titanium discs of 15mm were modified according to the following protocol [1]

1) H2SO4 97% / HCl 36% / H2O 6+1+5; at boiling (approx. 140°C) for 1 min.

2) H2SO4 97%/ H2O2 30% 1:1, 30min at room temperature

The first acid etching creates cavities of 1-2µm range. The second etching creates cavities on top of the first ones with a 10-20nm edge to edge diameter. Untreated titanium (SLA and PT) and circonia (ZLA and M) discs with a diameter of 15mm were used as controls. Porphyromonas gingivalis (ATCC 33277) was grown for 96 h in anaerobic conditions and harvested in stationary growth phase. The bacteria were resuspended into simulated body fluid enriched with 0.2% glucose and allowed to adhere on the nanostructured and control material discs (ZLA and M for zirconia, SLA and PT for titanium) for 6 h, at 37°C in anaerobic conditions. Thereafter the discs were gently dipped in 0.9% NaCl and bacteria were either stained with LIVE/DEAD BacLight™ Bacterial Viability Kit (Thermo Scientific) and analyzed by confocal scanning laser microscopy (CLSM, Leica SP8) or the bacteria were harvested and cultivated by conventional culturing on Columbia blood agar (BBLTM, BD). One sample of each material type was dehydrated, prepared and analyzed by scanning electron microscopy (SEM, Fei Nova NanoSEM 230®).

Results: Conventional culturing revealed the reduction of bacteria on nanostructured materials (5.27±0.8 x 104 CFU/mm2) in comparison to rough-surfaced control materials (ZLA 6.16±4.86 x 104 and SLA 1.53±0.75 x 105 CFU/mm2). The smooth-surfaced control materials (M 2.25±0.84 x 104 and PT 6.63±5.77 x 103 CFU/mm2) showed similar results to the nanostructured material. However, the live/dead staining demonstrated the antimicrobial efficacy of the nanostructured material revealing reduction of vital bacteria population up to 70%. This effect was not observed on the control materials (bacterial vitality ≥95%). SEM illustrated the bacterial distribution on different materials confirming the results of staining experiments.

Conclusion: In conclusion, nanostructured titanium surface shows a reduction of vital bacteria. These results suggest bio-inspired nanostructures can modify the bacteria - titanium interaction.

Reference: 1. Luo Q, Huang Y, Zha G, Chen Y, Deng X, Zhang K, Zhu W, Zhao S, Li X: Topography-dependent antibacterial, osteogenic and anti-aging properties of pure titanium. Journal of Materials Chemistry B 2015, 3(5):784-795.

022. Resistance to fracture of implant supported cantilevered zirconia fixed dental prostheses

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Objectives: This study aimed to evaluate the resistance to fracture of cantilevered Zirconium oxide fixed dental prostheses (FDPs) supported by one or two implants after fatigue loading in a mastication simulator.

Methods: Thirty-two samples were fabricated to simulate the clinical situation of 2 or 3 missing maxillary incisors. Half of the samples received single implants to support 2-unit FDPs with a cantilever extension, whereas the other half received 2 implants to support 3-unit cantilevered FDPs. Each group was divided into 2 subgroups of 8 specimens each (CC-I, CC-II, Zr-I, Zr-II) (n=8). Groups CC-I and CC-II received Chromium-Cobalt (Cr-Co) cantilevered 2- or 3-unit FDPs, respectively, whereas Zr-I and Zr-II groups received Zirconium oxide (Zr) prosthesis. Standardised 2- and 3-unit Cr-Co frameworks with 6 mm cantilever were fabricated using a laser-sintering system and Zr frameworks were fabricated using Lava system with the same design of metal frameworks. All of the samples were subjected to thermo-mechanical fatigue load to simulate 5 years of clinical service. Afterwards, the samples were loaded until fracture in a universal testing machine. A 2-way analysis of variance (ANOVA) was used to examine the effect of number of supporting implants and framework material on resistance-to-fracture values.

Results: All specimens survived aging. No screw loosening was recorded. The mean resistance-to-fracture values were 416 N, 548 N, 601 N and 664 N for Zr-I, Zr-II, CC-I and CC-II, respectively. Statistically significant differences were found for the comparisons between CC and Zr groups ($p < 0.05$). The number of supporting implants showed a significant effect on the resistance-to-fracture of Zirconium oxide FDPs whereas there was no significant effect for the Cr-Co group. Regardless of the restoration material, the resistance-to-fracture values for 3-unit FDPs were greater than those of 2-unit FDPs.

Conclusions: Although all tested implant-supported restorations have the potential to withstand physiological occlusal forces applied in the anterior region, cantilevered FDPs supported by 2 implants demonstrate higher resistance than that supported by a single implant. Before considering as a reliable treatment modality, long-term clinical studies are needed to verify the outcome of implant-supported cantilevered zirconium oxide FDPs.

023. Effect of cleaning methods on retentive values of saliva contaminated implant-supported zirconia copings

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Introduction: Adhesive bond strength of zirconia-based restorations is a challenging problem because they cannot be etched or silanized. In addition, contamination of the intaglio surface of these restorations with saliva, blood, and fit indicator materials during try in procedures may affect adhesive bond strength. The aim of this study was to evaluate the effect of different cleaning regimens on retentive strength of saliva contaminated implant-supported zirconia copings. In addition, the efficacy of new universal primer on retentive strength of these restorations was also tested.

Method and Materials: Seventy solid abutments with 5.5 mm height (048.541, Straumann AG) were attached to the regular neck implant analogs (048.124, Straumann) and torqued to 35 Ncm. The abutment-analog complex was mounted vertically in an autopolymerized T-shaped acrylic resin block. After scanning the abutment-analog (Cercon Eye; Degudent), 70 zirconia copings (Cercon Base; Degudent) with an occlusal loop were made. The copings were ultrasonically cleaned in 96% isopropanol and then contaminated with fresh human saliva for 1 minute (except the control group). Afterwards the specimens were washed with water spray for 15 seconds and dried for 15 seconds. The copings were divided into seven groups according to cleaning methods (n=10). Group 1: no contamination (control group); Group 2: water-spray rinsing; Group 3: airborne-particle; Group 4: 96% isopropanol; Group 4: Ivoclean (Ivoclar Vivadent); Group 5: 1% sodium hypochlorite; Group 7: applying Monobond N (Ivoclar Vivadent). The copings were luted with resin luting agent (RelyX Unicem; 3M ESPE). After 5000 thermocycling, the retentive values of the restorations were tested using universal testing machine. The dislodging forces were analyzed using one way analysis of variance and Tukey HSD test. ($\alpha = 0.05$)

Results: The copings, which were cleaned with Ivoclean and 96% isopropanol, showed the highest retentive values. There was a significant difference between the studied groups (F=2.735; P=0.02). Tukey HSD showed that there was no significant difference between the different cleaning procedures and control group except water cleaning group. (P=0.14)The lowest retentive value was related to the saliva-contaminated group, which was only cleaned with water rinsing method. For all the studied groups, except the group that was cleaned with water, the failure mode was completely adhesive at the inner surface of zirconia copings without any luting agent residues on the abutment surfaces. In the water cleaning group resin cement had mostly remained on the abutment surfaces.

Conclusion: The retentive values of zirconia-based restorations were adversely affected by saliva contaminations. These restorations can be cleaned by Ivoclean, 96% isopropanol airborne-particle abrasion, 1% sodium hypochlorite, or applying Monobond N before luting procedures.

024. The experimental evaluation of stress distribution on dental implants with different abutment - implant connection

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The basic treatment approach in current dental implant therapy for the replacement of missing teeth is to long term serve the patients. It has been reported that stable crestal bone values play a major role in the longevity of implants. The effect of variations in abutment-implant connections have been deemed to be responsible for crestal bone loss in dental implants in time.

The objective of the study was to evaluate the stress distribution on prostheses, abutment, implant, screw and the surrounding bone by using a 3 dimensional finite element analysis on different diameter implants with different abutment-implant connections.

Bone level (BL) and tissue level (TL) implants (Straumann Bone Level, Standard Plus, Switzerland; ø3,3mm x ø4,1mm x ø4,8mm) with 10 mm lengths were analyzed under 100N vertical and oblique static load by a 3 dimensional finite element analysis. Bone modeling, including both cortical and cancellous bone, was made as homogenous, isotropic and linearly elastic.

The highest von Mises stres distributions under vertical and oblique loads were observed at the area of load application. When the elements of an implant were evaluated, highest von Mises stresses were observed at the abutment on BL models while on the implant in TL implants. Von Mises stresses on the screw of TL models resulted in higher values when compared with BL models. Compressive stresses on bone tissue on TL implants were found to be higher than BL implants under both loading conditions, however, insignificant differences were observed in tensile stresses.

FEA results were concluded that bone level implants minimized the stress transmitted to the crestal bone than tissue level implants for the preservation of the crestal bone.

025. Accuracy of digital vs conventional full-arch implant impressions

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Objectives: To test whether or not digital full arch implant impressions with two different intra-oral scanners (CEREC Omnicam and True Definition) have the same accuracy as conventional ones. The hypothesis was that the splinted open tray impressions would be more accurate than digital full arch impressions.

Materials and methods: A stone master cast representing an edentulous mandible using five internal connection implant analogs (Straumann Bone Level RC, Basel, Switzerland) was fabricated. The 3 median implants were parallel to each other, while the far left implant had 10° and the far right had 15° distal angulation. A splinted open-tray technique was used for the conventional polyether impressions (n=10) for Group 1. Digital impressions (n=10) were taken with two intraoral optical scanners (CEREC Omnicam and 3M True Definition) after connecting polymer scan bodies to the master cast for Groups 2 and 3. Master cast and conventional impression test casts were digitized with a high-resolution reference scanner (Activity 880 scanner) to obtain digital files. Standard tessellation language (STL) datasets from the 3 test groups of digital and conventional impressions were superimposed with the STL dataset from the master cast to assess the 3-D deviations. Deviations were recorded as root mean square error. To compare the master cast with conventional and digital impressions at the implant-level, Welch's F test was used together with Games-Howell post-hoc test.

Results: Group I had a mean value of 167.93 µm (SD 50.37); Group II (Omnicam) had a mean value of 46.41µm (SD 7.34); Group III (True Definition) had a mean value of 19.32 µm (SD 2.77). Welch's F test was used together with the Games-Howell test for post-hoc comparisons. Welch's F test showed a significant difference between the groups ($p < 0.001$). The Games - Howell Test showed statistically significant 3-D deviations for all three groups ($p < 0.001$).

Conclusion: Digital full-arch implant impressions using True Definition scanner and Omnicam were significantly more accurate than the conventional impressions with the splinted open-tray technique. Additionally, the digital impressions with the True Definition scanner had significantly less 3-D deviations when compared with the Omnicam.

026. The influence of BioOss® collagen on dimensional changes of the maxillary lateral incisor socket in a canine model

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Objectives: To investigate the dimensional changes that occur following the extraction of maxillary lateral incisors in a canine model, and to evaluate the influence of deproteinised bovine bone mineral on the healing outcomes.

Materials and methods: The second maxillary incisors in nine greyhounds were extracted bilaterally in a minimally traumatic manner. BioOss® Collagen and Mucograft® Seal was placed in one socket in each greyhound with the contralateral socket left to heal naturally. After three months of healing, the dogs were sacrificed and the pre-maxilla resected. Cone beam computerised tomography scans (CBCT) were obtained for each specimen. Specimens were then prepared for histological preparation. Surface scans of study models taken pre- and post-extraction were subtracted from each other in order to analyse volumetric changes.

Results: All dogs healed uneventfully without any complications. No inflammation was seen and BioOss® well integrated into a network of mineralised tissues, bone marrow and connective tissue. Grafting had no influence on vertical resorption, with the buccal crest always located apical to the palatal crest. The horizontal changes were less at the grafted sockets, but a statistically significant difference in ridge width was only seen at the level of the palatal crest (non-grafted: 4.20 ± 1.46mm vs. grafted: 5.66 ± 0.88mm). Radiographic analysis confirmed no significant differences in vertical resorption, but the degree of horizontal resorption of the buccal crest was found to be significantly greater in non-grafted sockets. Volumetric subtraction revealed no significant differences between grafted and non-grafted sites.

Conclusion: The use of BioOss® Collagen post-extraction in the maxillary second incisor of dogs was shown to significantly minimise the degree of horizontal dimensional changes at the ridge crest. Volumetric analysis revealed no significant difference between grafted and non-grafted sockets, suggesting possible soft tissue thickening post-extraction to counteract osseous resorption.

027. Analysis of surface morphology of titanium and zirconia implants using SEM 3D imaging

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Objectives: The formation of direct contact between implant and surrounding bone is strongly influenced by the implants› surface roughness and therefore an important parameter for its clinical success. Surface roughness values depend on the measuring method and evaluated area and are consequently difficult to compare. Purpose of this study was therefore to evaluate implant surface morphology of different titanium and zirconia implants using scanning electron microscopic (SEM) 3D imaging.

Methods: Surface roughness characteristics of 2 titanium (OSSEOTITE NT, Biomet 3i; SLActive, Straumann) and 6 zirconia implants (ceramic. implant, vitaclinical; Pure Ceramic, Straumann; white-SKY, bredent medical; ZERAMEX T, Dentalpoint; Ziraldent, Metoxit; zit-z, Ziterion) were evaluated. Sa (arithmetic mean height of the roughness area), Sz (maximum amplitude of the roughness area) and SK (Core roughness depth) of the implant surfaces were determined using SEM 3D imaging at magnifications of 1000x [60 x 100 µm] and 5000x [10 x 15 µm].

Results: Surface morphology in SEM varied significantly between the implants. Sa ranged between 0.57 µm (OSSEOTITE NT) - 2.16 µm (SLActive) at 1000x and between 0.38 µm (zit-z) - 0.73 µm (SLActive) at 5000x. SK was between 1.37 µm (OSSEOTITE NT) - 7.52 µm (SLActive) at 1000x and 0.70 µm (OSSEOTITE NT) - 4.68 µm (ZERAMEX T). Surface roughness depended rather on the pretreatment than on the type of implant material.

Conclusion: Implants with similar Sa values varied in Sk and qualitative surface morphology visualized with SEM. Roughness parameters were strongly influenced by the chosen measurement area. Evaluating the osseointegration of an implant according to the Sa value as it is widely participated can be considered insignificant.

028. Salivary protein profile as a tool for patient stratification in periimplantitis

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Objectives: Dental implants are one of the most frequently used treatment options for tooth replacement. Approximately 30% of patients with dental implants develop peri-implantitis, which is an oral inflammatory disease1-4. Our goal was to examine a group of patients with different degrees of periodontal disease including peri-implantitis and use protein profiles to stratify them.

Methods: Oral health from 78 patients was examined and unstimulated whole saliva was collected and processed according the standard operating procedure described by Rosa and colleagues (2016)5. Statistical analysis was performed to determine which were the molecular weights more relevant to the stratification.

Results: The study group was composed of healthy, mucositis, gingivitis, and peri-implantitis patients. In the protein profiles analyzed there were over 490 bands corresponding to specific molecular weights. Some of the bands are frequently found in different individuals while others seem to be more specific some of them occurring in only one individual. Conversely, some individuals have up to 48 bands while others have only 6. The average number of bands per individual is 11.

Conclusion: It is possible to stratify patients relative to their oral health by analyzing their total protein profile which might be a useful tool for periimplantar disease management, diagnosis and prognosis.

029. Soft tissue volume alterations after connective tissue grafting at teeth: the subepithelial autologous connective tissue graft versus a porcine collagen matrix. A pre- clinical volumetric analysis

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Aim: This study evaluates a porcine collagen matrix (CM) for soft tissue thickening in comparison to the subepithelial connective tissue graft (SCTG).

Material and methods: In eight beagle dogs, soft tissue thickening was performed at the buccal aspects of the upper canines (SCTG and CM). Impressions were taken before augmentation (i1), after surgery (i2), after one (i3), three (i4) and ten month (i5). Casts were optically scanned with a 3D scanner and each augmented region (unit of analysis) evaluated (primary outcome variable: volume increase in mm3; secondary outcome variables: volume increase in percent, mean and maximum thickness increases in mm).

Results: 3D tissue measurements after surgery revealed a significant higher volume increase in the CM (86.37 mm3 ±35.16 mm3) than in the SCTG group (47.65 mm3 ±17.90 mm3). After 10 months, volume increase was non-significant between groups (SCTG:11.36 mm3 ± 9.26 mm3; CM: 8.67 mm3 ±13.67 mm3). Maximum soft tissue thickness increase (i1-i5) was 0.66 mm ±0.29 mm (SCTG) and 0.79 mm ±0.37 mm (CM) with no significant difference.

Conclusions: Ten months after soft tissue thickening, the CM is statistically noninferior to the SCTG in terms of soft tissue volume and thickness increase. Further 3D studies are needed to confirm the data.

030. Dentist education and awareness of implant care for elderly patients in the Community Dental Services

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Aims and Objectives: To assess the level of dental implant training and experience of dentists working within the Community Dental Service (CDS) who are treating elderly patients.

Materials and methods: The study population was made up of 900 dentists working in the Community Dental Services in England and Wales. An online questionnaire was developed using specific survey and data analysis software produced and owned by Bristol University and was distributed via an email containing a web link to the online questionnaire. Anonymous data was received directly to the questionnaire website for analysis.

Results: A low response rate of 8% was achieved, reasons for which are discussed. Half of the dentists reported examining an elderly patient with dental implants within 12 months. A wide variety of fixed and removable implant retained prostheses were encountered, which had required treatment by one fifth of the dentists within the past 12 months. The general confidence of dentists to be able to identify implant complications was high, but very much lower for being able to treat the same complications. Higher confidence scores were related to those with more dental implant experience and training.

Conclusions: The results of this study suggest that dental implant education improves the ability of dentists to identify and treat common dental implant complications. With the increasing use of dental implants in an aging population, this study may act as a platform for future work to develop educational training tools for community dentists and the care staff of elderly patients with dental implants.

031. Fresh dental pulp and periodontal ligament tissues in combination with Enamel matrix derivative as a potential regenerative therapy

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Objectives: Human tissues are a natural reservoir of different stem cells with not fully explored regenerative properties. Some areas within the adult human body are colonized by a significant number of stem cells such as dental pulp and periodontal ligament tissues. Bone regeneration is a complex process that is initiated by coordinated biochemical signaling and angiogenesis. In this study, we present a protocol to recover the tissues from dental pulp and periodontal ligament as a graft source, simulating the clinical application (i.e. filling of the gap between buccal plate and the implant), and we also investigate the angiogenic and osteogenic potential of fresh harvested dental pulp and periodontal ligament tissues in combination with Enamel Matrix Derivative (EMD) stimulation through gene and protein expression analysis.

Methods: Thirty-six fresh tissue samples from dental pulp and periodontal ligament of immediately extracted teeth were harvested and left under an ischemic condition for 20 minutes at room temperature to simulate the handling challenge of tissue recovery and grafting procedure.

Half of the samples underwent the same challenging ischemic condition period but they were mixed with enamel matrix derivative in the test group.The following genes RUNX2, Osterix, ALP, BSP, OPN, VEGF-A, FGF-2 and proteins OCN, OPN, EGF, Angiopoietin-2, BMP-9, FGF-1, FGF-2, VEGF-A, VEGF-C, VEGF-D were evaluated.

Results: Dental pulp test group presented higher gene expression of Osterix and FGF-2 ($p< 0.05$) and lower expression of BSP and OPN ($p< 0.05$). Dental pulp test group presented higher protein concentration levels of Angiopoietin-2, BMP-9, FGF-1, VEGFA, VEGF-C, VEGF-D ($p< 0.05$) and lower concentration levels of OCN and OPN ($p< 0,05$). Periodontal ligament test group presented higher gene expression of FGF-2 ($p< 0.05$) and higher protein concentration levels of VEFG-A and VEGF-D ($p< 0.05$).

Conclusions: In conclusion, successful dental pulp and periodontal ligament tissues harvesting and mixing with EMD biomaterial promoted increased expression of angiogenic factors and suggests these tissues can be further explored as a potential strategy to promote bone regeneration as a combined grafting together with biomaterials, carriers or scaffolds.
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032. The effect of hyperlipidemia on bone graft regeneration of peri-implantal created defects in rabbits

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Aim: It is reported that hyperlipidemia affects quality and density of bone and adversely affect wound healing. The effect of hyperlipidemia on implant osseointegration and perimplant defect regeneration has still not fully explained. The purpose of this study was to examine the effects of hyperlipidemia on the healing potential of the materials used for peri-implant bone regeneration.

Materials and methods: Ten male, New Zealand rabbits were used in this study. Half of the rabbits were fed a 2% cholesterol diet for 8 weeks in the study. A peri-implant defects (6mm diameter) were created in tibias of rabbits and placed implants (3.3 mm in diameter). This study was conducted as asplit-mouth design. Animals were randomly divided into two groups; 1) hypercholesterol+autogenous graft group and hypercholesterol+xenograft group (n:5), 2; autogenous graft and xenograft groups as a controls (n:5). At 8 weeks after surgery, the rabbits were sacrificed. During implant surgery and at 8- weeks implant stability were measured with magnetic resonance method (ISQ values). Bone-to-implant contact (BIC) were analyzed via histomorphometrical analyses.

Results: According to baseline ISQ values, there was no significant difference between control and hyperlipidemic groups. Hyperlipidemic group showed significantly lower ISQ and BIC values than those of the control groups at 8 weeks ($P< 0.05$). Also, the hypercholesterol+autogenous graft group was significantly lower ISQ values than those of the hypercholesterol+xenograft group ($p< 0.05$).

Conclusion: Within the limitations of this study; it was observed that hyperlipidemia may adversely affect the implant stability and also, may decrease periimplant bone graft regeneration. However, future studies are needed to confirm these results moreover.

033. Heat generation caused by the involvement of the apical cortical bone during the preparation of the implant site: An ex vivo study

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Objectives: The accidental perforation, or simple engagement of the bur, in the lingual or apical cortical of the lower jaw, is a frequent complication during the preparation of the implant site. These areas are often not under direct irrigation from the cooling liquid of the handpiece. The purpose of this study is therefore to evaluate the increase of temperature of the apical cortical, during the perforation performed with two different devices, the traditional drills and the piezosurgery, in order to evaluate the possible harmful effects on bone vitality. An increase of more than 10°C is considered to impair the vitality of the bone based on previous studies.

Methods: Twenty-four blocks of swine ribs were divided into 2 groups according to the device used and further divided according to the pressure applied during the cut (900g or 1500g). For a total of 4 groups of 6 samples each. Scale weights were used to set the pressure on the desired force. In order to standardize the procedures a device was built with a sliding arm to hold the handpieces, a clamp to hold the bone block and hooks to hang the weights. During the perforation procedures a rubber dam was used around the bone block to avoid any leaking of the irrigation below the block on the lower side thus impairing the measurement. The temperature increase was recorded by mean of an infrared thermometer (Dr.Meter® IR-20). The results were statistically analyzed using a two-way ANOVA.

Results: The mean temperature increase was 0,067°C (SD 0,1033) for the Traditional900 group, 0,2167°C (SD 0,2639) for the Traditional1500 group, 9,1833°C (SD 4,5146) for the piezo900 group and 8,1667°C (SD 6,1200) for the piezo1500 group. The overall difference of temperature increase between traditional and piezoelectric method was statistically significant ($p< 0,05$). There was no statistically significant difference reported when comparing the two different pressures applied ($p = 0,783$). Furthermore, the mean increase of temperature resulting from the use of the piezoelectric device, was only slightly below the critical threshold of 10°C, and in some cases this threshold was even exceeded.

Conclusions: The perforation of the apical cortical during implant preparation may result in a harmful temperature increase when using the piezoelectric device if the area is not under direct irrigation.

034. Hydrogel fibers encapsulating hiPSC-MSCs, hESC-MSCs and hUCMSCs in injectable calcium phosphate scaffold for bone tissue engineering

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Human induced pluripotent stem cells (hiPSCs), human embryonic stem cells (hESCs) and human umbilical cord MSCs (hUCMSCs) are exciting cell sources for use in regenerative medicine. There has been no report on long hydrogel fibers encapsulating stem cells inside injectable calcium phosphate cement (CPC) scaffold for bone tissue engineering.

Objectives: (1) To develop a novel injectable CPC construct containing hydrogel microfibers (MF) encapsulating cells for bone engineering, and (2) investigate and compare cell viability, proliferation and osteogenic differentiation of hiPSC-MSCs, hESC-MSCs and hUCMSCs in injectable CPC. Methods: Cell-encapsulating MF were mixed with CPC paste at a 50% volume fraction. Injectability and mechanical properties of the constructs were measured. hiPSC-MSCs, hESC-MSCs and hUCMSCs were encapsulated in MF.

Results: The stem cell-encapsulating pastes were fully injectable under a small injection force (40N). The injection viability of three types of cells were 82-85%, matching to cell viability without injection 78-84% ($p>0.1$). Flexural strength of stem cell-CPC construct was (8.2±1.1)MPa, much higher than previous injectable polymers and hydrogels for cell delivery ($p< 0.05$). The fast-degradable MF were able to release the cells inside CPC at day 1. Cells proliferated robustly from (100±12) (cells/mm2) at 1 day to (1750±90) (cells/mm2) at 14 days, a 17-fold increase in live cell density ($p< 0.05$). All three cells yielded high alkaline phosphatase, runt-related transcription factor, collagen I, and osteocalcin expressions (mean ± sd; n = 6). Cell-synthesized minerals increased substantially with time ($p < 0.05$), with no significant difference among the three types of cells ($p > 0.1$). Mineralization by hiPSC-MSCs, hESC-MSCs and hUCMSCs in CPC at 14 d was 13-fold that at 1 d.

Conclusion: All three types of cells (hiPSC-MSCs, hESC-MSCs and hUCMSCs) in CPC scaffold showed high potential for bone tissue engineering, and the novel injectable CPC construct with cell-encapsulating hydrogel fibers is promising to enhance bone regeneration in dental, craniofacial and orthopedic applications.

035. Engineering bone regeneration with injectable calcium phosphate scaffolds with novel cell-laden hydrogel microfibers

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To date, bone defects with limited intrinsic regenerative potential represent a considerable surgical challenge to clinicians. Cell-based tissue engineering holds promise to address this issue through the construct of a scaffold with living cells with the aim to generate a cell-driven, functional tissue rather than to fill the defect with a nonliving scaffold. The seeded cells should be evenly distributed in the scaffold, be fast-released to the defect area and maintain high viability in order to actively participate in the regenerative process.

Objectives: To develop a novel injectable calcium phosphate cement (CPC) scaffold containing cell-encapsulating hydrogel microfibers with desirable degradability that could deliver cells in a timely manner and maintain cell viability.

Methods: Hydrogel microfibers were synthesized using partially-oxidized alginate with various concentrations (0,0.2%,0.4%,0.8%) of fibrinogen to optimize the degradation rate of the alginate-fibrin microfibers (Alg-Fb MF). Human bone marrow stem cells (BMSCs) were encapsulated in the Alg-Fb MF and then mixed with CPC paste at 1:1 volume ratio to fabricate the tissue engineered construct. Cell release, proliferation, osteogenic differentiation and mineral synthesis were investigated in vitro. The bone regenerative ability was investigated in a rat mandibular bone defect model.

Results: A fibrin concentration of 0.4% in Alg-Fb MF resulted in the greatest enhancement of cell migration, release and proliferation. Beside cell release, a significant amount of cell-cell contact along the long-axis of the microfibers was established in the Alg-0.4%Fb MF as early as day 2. The injectable tissue engineered construct for bone repair was fabricated by mixing the fast-degradable Alg-0.4%Fb MF with CPC paste. In vitro study showed that after mixing and injection with CPC, the cells re-collected from the construct maintained good viability and osteogenic potentials. In vivo study demonstrated that the hBMSC-encapsulated CPC-MF tissue engineered construct displayed a robust capacity for bone regeneration. At 12 weeks after implantation, osseous bridge in mandibular defect in rats was observed in CPC-MF-hBMSCs group with a new bone area fraction of (42.1 ± 7.8) % in the defects, which was more than 3-fold that of the control group without cell encapsulation.

Conclusions: Alg-Fb MF protected the cells during CPC mixing and injection, and supported the viability, migration and differentiation of encapsulated hBMSCs. hBMSC-encapsulated CPC-MF tissue engineered construct displayed a robust capacity for bone regeneration. The novel tissue-engineered construct presents an excellent prospect for a wide range of dental, craniofacial and orthopedic applications.

036. Evaluation of the behavior of 4 MAC implants (decellularized and desiccated reabsorbable chorionic amniotic membrane) at 4 and 8 weeks of placement in rabbit

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Objective: To evaluate the behavior and state of reabsorption of 4 membranes ameliorecomic resorbable decellularized and dried human (MAC) at 4 and 8 weeks of their placement in rabbit radio.

Materials and methods: Animals: 2 New Zealand breed rabbits (CLG), young males of approximately 3.0 to 3.5 kg . Grafts: 1) Human decellularized and desiccated reabsorbable amniocorionic membrane. (Ostium ® Laboratory Biotar) 2) Human lyophilized human bone (Ostium ® Lab Biotar) Surgical procedure: Rabbit 1: Anterior right limb: A MAC was placed on the mediacraneal side of the radius so that the chorionic portion makes contact with the bone. Left anterior limb: A double MAC was placed (folded) with a bony defect made with a round bur, n 6 of 2.5 cm long, the membrane was placed so that the chorionic portion made contact with the bone and double layer of the same. Rabbit 2: Anterior right limb: On the mediacraneal side of the radius a simple bone defect was performed, with a round 6 mm round bur, filled with Human Lyophilized Bone and coated with a MAC placed so that the chorionic portion Make contact with the bone. Left anterior limb: On the mediacraneal side of the radius, a simple bony defect was made with round strawberry n 6 of 2.5 cm long, where it was filled with Human Bone Lyophilized and was Coated with a double (folded) MAC positioned so that the chorionic portion makes contact with the bone

Results: Rabbit number 1: Reopening in 4 weeks. Bone Radio: signs of bone repair, proliferation of fibroblasts and osteoblasts that form osteoid substance. Vascular proliferation and the presence of necrotic remains. Collagen fibers are evident among inflammatory cells, predominantly polymorphonuclear eosinophils. Collagen membrane: remains of amorphous and fibrillar eosinophilic material, with a large number of surrounding cells, predominantly eosinophilic polymorphonuclear cells. Counter 2: Reopening at 8 weeks.Anterior right limb: mature bone tissue that in sectors presents osteoid tissue with incorporation of basophilic crystals of round shape and irregular border.In the periosteum, sectors with total repair, with attached muscle and others with proliferation of vascular connective tissue and remains of eosinophilic material. No significant inflammatory reaction was observed.Left anterior limb: mature bone tissue is observed, which in the periosteum shows a proliferation of mature connective tissue with abundant collagen fibers. Both bone samples are seen in the advanced state of repair.

Conclusion: Taking into account what was observed macroscopically in the grafts performed, it was evident that the human desiccated and decellularized chorionic ammonia membrane would have responded satisfactorily in terms of biocompatibility and biological barrier in rabbits.Histological studies would suggest a very good biocompatibility and a high degree of bone repair, revealing its mechanical properties that allowed to maintain its integrity long enough to fulfill the function of barrier and thus avoid the invasion of epithelial cells to the regeneration zone.

037. Effects of the physicochemical properties of anodized-hydrothermally treated titanium on in mesenchymal stem cell lines derived from the bone marrow of mice

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Objectives: Dental implants is considered as one of the highly predictable treatment and its surface is important for the long-term stability and maintenance of the implant therapy. We have previously reported that discharge anodic oxidation (AO) followed by hydrothermal treatment (spark-discharged anodic oxidation (SA) treatment) was used successfully to coat the pure titanium (pTi). Mesenchymal stem cells (MSCs) were derived from bone marrow and were characterized by their self-renewal ability and their capacity to differentiate into numerous different tissues. In this study, we investigated effects of discharge anodic oxidation followed by hydrothermal treatment on the proliferation and osteogenic differentiation in mesenchymal stem cells.

Methods: pTi disks used in this study were 15 mm in diameter and 1.5 mm thick. AO pTi disks were prepared by machining and were anodized at 350 V in an electrolytic solution containing 0.01 M b-glycerophosphate disodium salt penthydrate and 0.15 M calcium acetate monohydrate dissolved in distilled water. SA-treated pTi disks were prepared from AO pTi that hydrothermally heated using high-pressure steam at 300Ð for 2 h in an autoclave, resulting in the precipitation of HA crystals on the disk surface. MSC lines derived from bone marrow of mice were cultured in DMEM supplemented with 10% FBS on pTi, AO pTi, and SA-treated pTi disks. The cell proliferation was evaluated using WST-1 assay. Osteogenic ability of MSC was evaluated with quantitative real-time PCR for osteogenic differentiation marker including ALPL, RUNX2, OSTERIX, and OCN at 1, 2, and 4 weeks.

Results: Proliferative activity is lower on SA-treated pTi than on AO pTi and pTi disks. qRT-PCR analysis revealed that mRNA expressions of ALPL, RUNX2 were synergistically higher on AO pTi and SA-treated pTi than on pTi disks at 4 weeks. Expressions of OSTERIX, and OCN were not significantly different between pTi, AOpTi, and SApTi disks at 1 week, while those expressions on SA-treated pTi was higher than the one on pTi and AOpTi at 4 weeks.

Conclusions: The results of study suggested that SA-treated surface antagonizes might accelerate proliferative activity and synergistically enhanced osteogenic differentiation of MSCs through the intracellular signaling pathway.

038. Clinical and biological effects of adjunctive photodynamic therapy in refractory periodontitis

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Background/Aim: To date, no novel approach is available for optimum outcomes that manage refractory periodontitis. Photodynamic Therapy (PDT) has recently emerged as a new trend in therapy adjunct to Scaling and Root Planing (SRP). Several clinical trials have revealed that it can progress the clinical result in comparison to SRP alone. The main objective of this study was to assess the efficiency of PDT as an adjunctive therapy to non-surgical periodontal therapy in refractory periodontitis by assessing clinical parameters (Plaque Index (PI), Gingival Recession (GR), Bleeding on Probing (BOP), Periodontal Probing Depth (PPD) and Clinical Attachment Level (CAL)) as well as biological parameters (IL-1β,IL-6 and TNF-Ð) in the GCF.

Materials and methods: A total of 16 patients with refractory periodontitis (9 males and 11 females) aged from 30 to 60 years participated in this study. At baseline, clinical examination was performed for all participants and each patient's oral cavity was divided into four quadrants . At least two or more independent sites with a PPD of 5 mm or more in each quadrant was randomly selected from the 16 participants, with a total of 64 quadrants, and was divided into two groups: Control group (SRP): 257 sites from 32 quadrants (16 upper and 16 lower)were treated by SRP alone. Test group (SRP+PDT): 245 sites from 32 quadrants (16 upper and 16 lower) were treated by SRP with PDT as adjunctive treatment. Both clinical examination (including PI, GR, BOP, PPD and CAL) and biological parameters (IL-1β,IL-6 and TNF-Ð) in the GCF have been done at 0 , 2 and 6 months.

Results: Results showed significant clinical improvement with regard to clinical attachment gain, PI reduction, PD reduction and BOP reduction. Additionally, there was no significant effect of both therapies on the appearance of cytokines(IL-1β) assessed in the management of refractory periodontitis.

Conclusions: It was concluded that after 6 months, adjunctive use of PDT to SRP was more effective than conventional treatment in patients diagnosed with refractory periodontitis in terms of clinical parameters (PI,BOP,PPD and CAL).

039. Accuracy, clinical and patient-centered outcomes of esthetic implants: A 2 years RCT comparing conventional with guided surgery approach

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Objectives: The aim of this study was to evaluate and compare the outcome of post extractive dental implants placed using a guided surgery protocol and immediate provisorization with a immediate provisorization of post extractive implants inserted with a conventional protocol. Secondary objectives were to describe encountered complications, prostethical results, execution time of the two techniques and patient's opinion.

Methods: 30 patients with a maxillary edentulous were treated using Straumann bone level SLA-active implants. Patients were randomly assigned in test group Guided Surgery (GS) or control implants Conventional Surgery (CS). In test group implants were placed in the maxilla using a tooth supported surgical guide with a connective tissue graft on the vestibular aspect and Deproteinized Bovine Bone Material to fill the post extractive gap and immediately installed a provisional realized before surgery on the base of the surgical stent. In control group implants were inserted with following a conventional surgery, connective tissue graft and DBBM in the remaining socket and immediately loaded with a provisional built on the base of the wax-up. Clinical and radiographic evaluation of peri-implant tissues was performed at time of implant surgery, and after 6 week, 6, 12 and 24 months. Descriptive statistics was based on all measured parameters. For each patient, the mean bone level, bone loss and VAS scores were calculated for statistical analysis by means of Wilcoxon's signed rank test. PES WES indexes at the end of the treatment were recorded. The sample size was chosen to be 32 in order obtain a power of 80% with a significance level of 0.05 using a two-sided Wilcoxon's test. It was decided to include 37 patients in the trial to compensate for possible dropouts or exclusions.

Results: 30 implants were placed (15 test; 15 control). No implants were lost during the follow up period with a success rate of 100% for both the groups. Marginal bone levels were not statistically significantly different between the test and control implants (P > 0.05). The mean bone level for test and control implants was 1.95 mm ± 0.70 and 1.93 mm ± 0.42 after 24 months, respectively. During the provisional phases were observed 28% of complication in CG and 7% in GS group. 7% of surgical complications were reported in the CG due to an unexpected GBR. No technical failures were reported for the final restorations. Statistically significant differences were found between the test side and the control side for patient opinion about self-confidence, assumption of analgesic tablets and pain perceived in the first 6 weeks. Test group registered a statistically significant reduction (P< 0.05) in term of time of surgery and time of provisional insertion respect to control group with a 76% and a 40% of reduction of time, respectively.

Conclusion: Implants can successfully integrate in the anterior maxilla using a guided surgery approach. The use of guided surgery helped to reduce the surgery duration, pain intensity, analgesic consumption and a more predictable provisional installation. Patients referred a more self-confidence by undergoing a guided surgery than a conventional surgery, even if the overall appreciation of the treatment at the end of the study showed no statistically differences between the groups.

040. Accuracy variables analysis and clinical results of implant guided surgery: A 10 years retrospective study

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Objective: Even though high-precision technologies have been used in computer-guided implant surgery, studies have shown that linear and angular deviations between the planned and placed implants can be expected. The of aim of this study is to analyse clinical factors that affect imprecision in guided surgery technique by comparing bone, tissue and teeth supporte guided surgery. To evaluate long term clinical and radiographical guided implants outcomes.

Materials and methods: All the patients treated with a guided surgery approach were recorded and follow up through the years. Records, mountings, wax-ups, and scanning appliances were made for patients to wear during CT/CBCT scans following established manufacturer-guided surgery protocols. Virtual planning was performed using either the Codiagnostix/Dentalwings or the SimPlant/OMS softwares. Manufacturer-produced stereolithographic guides and implant-specific instrumentation were used to place implants. Descriptive statistical analysis were carried out for clinical and radiographical implants results. Three-dimensional information of the planned and placed implants were then superimposed. The deviations at both the apex and platform levels and the angular deviation were measured and compared between the experienced and inexperienced groups with the independent t test with Bonferroni adjustment (Ð=.05). The magnitude and direction of the horizontal deviations were also measured and recorded.

Results: From 2007 to 2017 were analyse a total of 302 patients and 946 straumann implants. 322 surgical guides were carried out. Among the 946 implants placed, 10 implants failures were recorded for a Cumulative Survival rate of 98,9% and a Implant Success Rate of 95,4%. Mean marginal bone Levels were 1,3 mm mesial aspect and 1,4 mm distal aspect.

Conclusions: Fully guided implant CSR was 98,9%, which is comparable to «freehand» placement. Bone supported guide resulted to be more imprecise respect mucosa and tooth supported guide (p< 0.05). No statistical differences were found between mucosa and tooth supported guide. Guided singol implant plcement tooth supported resulted the more precise technique (p< 0.05).Distal implants seemed to affect the precision of implant placement whatever guided surgery technique the operator use (p< 0.05). Post-extractive didn't effected the precisoin of implants placement. Maxillary implants have statistically significant more precision for both mucosa and bone supporte guide respect to

mandibular implants. Bone and tooth supported guide led to an implant vertical misplacement in a more superficial position conversely mucosa supported drove to slightly deeper implant placement.

041. Clinical application of three dimensional printed nano-hydroxyapatite bone graft for alveolar ridge preservation, A pilot study

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Objectives: To evaluate a new clinical application of novel 3D printed hydroxyapatite bone graft in post-extraction alveolar ridge preservation in human.

Methods: 10 patients from Thammasat University Hospital who needed an extraction of anterior teeth and scheduled for implant replacement were enrolled in this pilot study. Alveolar ridge impression and cone beam CT scan were done prior to extraction. Ridge preservation procedure with placement of test graft material was then performed after atraumatic extraction; the socket was closed with stiches or covered with a resorbable membrane. At 6-8 weeks after ridge preservation procedure, all patients were recalled for stage I implant placement. 2 mm. trephine bur was used for harvesting the bone at the extracted site prior to implant osteotomy preparation. Bone samples from grafted area were stained with H&E for histology and histomorphometry analysis.

Results: No sign of infection or evidence of local or systemic reaction to the grafts in all patients. At 8 weeks, the samples from the grafted area were completely filled with woven bone and formation of new vessels. In addition, the bone quality and quantity of the grafted site when placing the implant showed efficient implant stability without additional bone need of bone graft surgery

Conclusions: Overall, preliminary results shown that new novel bone graft materials could have potential to be applied for ridge preservation at lower cost for patients. Further investigation for other bone graft procedures including guided bone regeneration (GBR) and block graft augmentation will be performed and evaluated.

042. Comparison of short-term post-operative pain and discomfort following insertion of mini-implants and standard size implants in same individuals

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Objectives: One recent study reported that insertion of four mini dental implants (MDI) induced more intense post-operative pain than the insertion of two MDIs or two standard size implants, as well as more difficulty in oral hygiene maintenance. Moreover, in the respective study, different groups of patients received either 4, or two MDIs, or two standard size implants. However, MDIs were not inserted by the flapless technique in all patients, flap reflection was done instead. Therefore, the aim of the present study was to assess short-term post-operative pain, discomfort, swelling and easiness of oral hygiene maintenance in patients who received both, standard size implants and MDIs.

Methods: Twenty patients with a need for dental implants were selected. Before starting the interventions, patients' ridges and surrounding structures were examined on panoramic radiographs and CBCT images. Patients received standard size implants when the width of the ridge was > 5.5 mm. In sites outside of the chewing centre (lower incisors or second upper incisors, or first premolars) where alveolar width was less than 5 mm, the MDIs (fixed type) were inserted without flap reflection. Flap was reflected only for placement of standard size implants. The respective patients had no history of bruxism. Each patient received one standard-size implant and one MDI, or 2 standard-size implants and 2 MDI implants in 2 separate visits. Ten patients first received MDIs and other 10 patients first received standard-size implants. Antibiotics were prescribed 2 hours before surgery and 3 days after. Patients also received instructions to put ice bag over the skin after surgery. The implants were placed under local anaesthesia by one oral surgeon. The first, third, seventh and the tenth post-operative day patients came for a control exam and answered questions (100-mm VAS) related to pain, swelling, discomfort with chewing and hygiene. Patients also provided data about analgetics intake for pain prevention.

Results: Patients reported slightly, but significantly ($p< 0.05$) more self-perceived pain after receiving standard size implants than MDIs, especially when they received two standard size implants, no matter which implants were inserted first. Similar results were obtained for swelling. Patients also reported significantly more swelling and analgetics intake after surgery of standard size implants ($p< 0.05$). Chewing ability was slightly better after MDI insertion, but the difference was not statistically significant ($p>0.05$). There was also no significant difference in ease of oral hygiene maintenance.

Conclusion: Patients who received both, standard-size implants and MDIs reported more pain and swelling after standard-size implant surgery, as well as more analgetics intake, no matter which implant(s) was/were inserted first. Patients experienced similar difficulties in oral hygiene maintanance for the first three days.

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Acronim: Mini dental implants

043. Implant survival rates and predictors of implant failure

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Objectives: The purpose of the present study was to retrospectively 1) investigate the association between implant-, patient- and bone-related parameters with the risk of implant failure; 2) analyze the survival rates of dental implants placed in a university setting.

Methods: Data were retrieved from patient charts from the University of Minnesota School of Dentistry to identify patients older than 18 years of age who received at least one dental implant by faculty, residents or students in the university dental clinics. Implant-, patient- and bone-related parameters such as implant brand, length, diameter, jaw, region, installation protocol, sex, smoking, medical history, diagnosis of periodontal disease, self-reported oral parafunctions and pain, type of bone, sinus elevation, ridge augmentation procedures, multiple bone graft procedures and operator were retrieved from the dental records and analyzed. Continuous variables were compared with the t-test, while categorical variables were expressed as proportions and compared with chi-square test. Independent parameters with a p-value of < 0.1 were included in the multiple logistic regression analysis. All tests of significance were evaluated at the 0.05 error level with a statistical software program (SPSS v.19.0, IBM, Armonk, NY, USA).

Results: Five hundred and fifty-three implants were randomly selected from a total of 4,520. Of these 553 implants, 440 (79.6%) were associated with a >10 mm length, 371 (67.1%) with a >4 mm diameter and 431 (77.9%) had replaced a single tooth. The location of the implants was 314 (56.8%) in the maxilla and 411 (74.3%) in the posterior regions. Submerged healing mode was followed in 363 (65.6%) of the implants with the mean healing time being 3.2 months. Periodontal disease was diagnosed in 294 (53.2%) of these cases, while periodontal residents had placed the vast majority of implants (52.1%). A total of 17 implants after a mean time of 6.3±6.8 years failed, resulting in an overall survival rate of 96.9%. Three hundred and thirty-seven implants were placed in augmented bone, 74.2% of them after ridge augmentation procedures and 19.9% of them after simultaneous implant placement with sinus augmentation. Based on a univariate analysis, implant system, operator, sinus augmentation, simultaneous implant placement with ridge or sinus augmentation, tobacco use as well as clenching and grinding were considered potential implant failure predictors and were further included in the multiple logistic regression analysis. Implant system (odds ratio of 1.4, $p=0.046$), simultaneous implant placement and ridge augmentation (odds ratio of 3.8, $p=0.02$) as well as tobacco use (odds ratio of 8.5, $p< 0.001$) were statistically significant independent predictors for implant failure. Time of the 2nd stage sugery was a statistically significant predictor for implant failure ($p=0.007$).

Conclusion: Within the limitations of this retrospective randomly selected university-treated sample, ridge augmentation procedures with simultaneous implant placement, implant system and tobacco use increased the risk for implant failure. Failure occurred in 17 implants representing a 3.1% failure rate.

044. Buccal bone thickness around single dental implants in the maxillary esthetic zone

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Objectives: To compare the thickness of buccal bone around single dental implants placed in the anterior maxilla (premolar to premolar) inserted with different placement protocols.

Data Sources: An electronic search was conducted using MEDLINE (PubMed), Cochrane Central Register of Controlled Trials (CENTRAL) and EMBASE, from January 1980 to July 2015. Mean buccal bone thickness around single dental implants was measured and correlation with implant placement protocols, loading protocols and augmentation method was assessed. A Q-test was used to access the homogeneity of effect sizeslevels of effect. A univariate meta-regression analysis was used for further investigation of the between-study heterogeneity. Two randomized clinical trials and twelve cohort studies were included for statistical analysis. The difference in buccal bone thickness for implants placed with different implant placement protocols (early vs immediate vs delayed) was not statistically significant ($p>0.05$). Loading protocols (immediate vs delayed) also did not significantly influence the thickness of buccal bone. Descriptive analysis showed different buccal bone thickness for dental implants that received different bone grafting materials at the time of placement.

Conclusion: Different implant placement and loading protocols may not significantly affect the thickness of the buccal bone around single dental implants in the anterior maxilla, when correct 3-D implant positioning is achieved. Different bone graft materials at the time of implant placement may have an effect on buccal bone thickness.

045. Clinical evaluation of SLActive Titanium-zirconium narrow diameter implants for anterior and posterior crowns in smokers and non-smokers group

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Objectives: To evaluating the clinical results including survival rate, radiographic measurements and periodontal examination of SLActive Titanium-zirconium narrow diameter implants applied for anterior and posterior crowns in smokers and non-smokers.

Methods: Seventy three patients (age between 25~56) were categorized into two groups (smokers and non-smokers) by cotinine concentrations of their urine measured by high performance liquid chromatography tandem mass (HPLC-MS-MS) in conjunction with Fagerstrom Test for Nicotine Dependence. All the patients received one or two SLActive Titanium-zirconium narrow diameter implants (SLActive®, Institut Straumann AG, Basel, Switzerland) in their tooth-missing sites and the implants were loaded 2 or 4 months later. The implants of the two groups were monitored for at least 6 months using the following outcome measurements: implant survival, peri-implant marginal bone loss (MBL) by measuring X-ray paralleling radiographs, occurrence rate of bleeding on probing (BOP) and probing depth (PD) of the implant site. Two-independent samples student T test was used to analyze the statistical difference of the measurements between two groups.

Results: Out of sixty implants placed in non-smoker group (thirty six patients) , fifty nine survived at the end point of the present follow-up, whereas one implant failed in osseointegration 8 weeks after surgery. As for smokers group (thirty seven patients), all implants survived and were in function. The mean mesial marginal bone loss was 0.89±0.14mm for smokers and 0.64±0.26mm for non-smokers six months after surgery. The mean distal marginal bone loss was 0.76±0.28mm for smokers and 0.64±0.37mm for non-smokers six months after surgery. No statistical difference was found of MBL between two groups. Smokers group revealed significantly higher BOP+ occurrence rate (smokers: 76.4±24.3%; non-smokers: 24.8±13.5%). The mean PD of four different aspects of the implant site was 3.8±1.2mm for smokers and 2.5±1.6mm for non-smokers.

Conclusion: SLActive Titanium-zirconium narrow diameter implants received similar marginal bone loss both in smokers and non-smokers group for six-month observation. However, smokers appeared in poorer periodontal health than non-smokers around the implant site.

046. Alveolar atrophy in edentulous elderly patients in relation to implant placement and to the need for bone augmentation

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Objectives: To describe the amount of alveolar bone atrophy in a large group of elderly individuals with edentulous arches or with a mutilated dentition. To evaluate the need for bone augmentation in case an implant supported restoration would be indicated.

Methods: From the database of ASLRM/A in Rome CT scans the of edentulous arches or of jaws with hopeless dentition (max. 4 teeth) were selected. Patients age 60 or more could be included. It was decided to include consecutively 250 scans. All CT were performed using the same CT scanner and were analyzed using the same software (GE corp.). Arches that presented bone loss clearly caused by major osteolitic lesions and/or resective surgeries were excluded from this study. A total of 113 maxillas and 137 mandibles were included. It was assumed that in elderly patients implants might be used as an "anchoring system" both for fixed (hybrid) or removable restorations, thus eliminating the esthetic prosthetic limitations. The areas of the lateral incisor (LI), the first premolar (FP) and the first molar (FM) were analysed in each jaw bilaterally. The height and the width of the crest were measured at each site. The measurements were used to evaluate each site and include it in various groups according to predetermined parameters. In the anterior and posterior sections of the jaws atrophy was classified in different groups depending on the presence of the desired amount of bone, or different degrees of horizontal and/or vertical bone atrophy.

Results: Among 250 scanned arches, just 18 (16 in the mandible) did not need any augmentation for implant placement. In the maxilla 89,19% of the arches needed some kind of bone augmentation in the anterior sites (LI, FP) in at least one site. 80,81% of the bone augmentations needed in the anterior sites were found to be major (needing a staged surgical procedure). 99 of the 113 analysed maxillary arches needed a bone augmentation procedure in the molar sites (FP) with only 4 in need for a minor augmentation, while 75 arches needed a bilateral sinus lift procedure with lateral approach. Of the arches that needed any kind of posterior augmentation, the 88,88% needed also an anterior augmentation. In the mandible 99 arches, out of 137, presented no need of bone augmentation in the anterior zone. Of the 38 arches that presented at least one site needing a hard tissue augmentation procedure (in LI, FP) 17 needed a complex one. In the posterior area, the 75,12% of the arches need a bone augmentation procedure. Of these, the 80,58% present at least one site that needed a complex procedure. Of the mandibular arches needing a posterior regeneration, the 28,15% will need an anterior regenerative therapy as well.

Conclusions: Edentulous maxillas or mandibles in the elderly have a different degree of atrophy as it relates to implant placement. In the anterior mandible implants may often be inserted with no or only minor augmentation procedures. In the posterior mandible there is a high frequence of vertical defects. In the maxilla some kind of defect is frequently found both in the anterior (89%) or posterior part of the jaw (90,5%). Vertical defects are very common in the posterior maxilla but are frequently associated with horizontal defects in the anterior maxilla as well, thus indicating the need for augmentation both in the anterior and posterior part of the jaw, introducing a complex surgical treatment.

047. Casuistic of surgical cases in a University Dental Clinic with the SAC Assessment Tool - a preliminary study

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Objectives: SAC Assessment Tool is a clinical decision support system that allows clinicians to define the level of treatment complexity and the potential complications for surgical and restorative cases. The aim of this research was to assess the complexity level of dental implants surgical cases in partial edentulism situations, by means of the SAC Assessment Tool.

Methods: Cross-sectional preliminary study. 30 patients from the Oral Rehabilitation Area of a University Dental Clinic were randomly chosen. Patient's data was collected using the electronic oral-health record and a clinical examination. Finally, SAC Assessment Tool was used to assess the complexity level of potential dental implants surgical cases considering patient's edentulous areas.

The variables included in this analysis were: gender, age, partial edentulism classification, number and location of edentulous areas, abutment conditions, occlusion, residual ridge characteristics, patient's expectations, general medical status, history of periodontitis, oral hygiene and compliance, smoking habit, long or short rehabilitation, immediate placement protocol involved, bone volume and loading protocol.A descriptive statistic analysis was performed.

Results: The sample average age was 61 years old, with 51% male and 49% female. 100 edentulous areas were identified. On the maxilla - 53% were Kennedy's Class I, 3% Kennedy's Class II and 46% Kennedy's Class III. On the mandibular side 29% were Kennedy's Class I, 15% Kennedy's Class II and 56% Kennedy's class III. The major edentulous areas were in the posterior sector with 71%, in the other hand 29% were in anterior zone. The SAC Assessment Tool results indicated: 8% straightforward cases, 4% advanced and 88% complex. A deep analysis of the variables included in this tool revealed: the majority of the patients had medium expectations (68%); 51% had a healthy medical status, and 49% were medically compromised; 86% had history of periodontitis or genetic predisposition; 70% had sufficient oral hygiene; 90% do not smoke; 40% had a single-tooth gap, 34% had a short gap (less that 3 teeth) and 26% had an extended gap (more than 3 teeth); all the patients were evaluated as type 4 considering implant placement, and for a conventional loading protocol; most patients presented some bone deficiency. In 10% of the patients bone volume was considered sufficient. 58% of the patients presented an horizontal deficiency, requiring prior grafting, and 32% had a vertical deficiency or horizontal and vertical deficiency.

Conclusion: The vast majority of cases observed in the University Dental Clinic were classified as “Complex”, regarding a surgical case evaluation for dental implants placement. In a Dental Education perspective, these observations suggest that the Curricula of the DMD Program, and particularly Postgraduate Training, should provide tools for the students to diagnose and treat complex cases specially if we consider that half of the patients were medically compromised, almost 90% had history of periodontitis and 90% had bone volume loss.

048. CANCELLED

049. A new classification system for radial root position - clinical implications and guidelines for immediate implants in the anterior maxilla

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Objectives: This study aimed to retrospectively review 3-dimensional radiographic data to determine the incidence of tooth positions in the radial plane, and ascertain bone thickness as it relates to immediate implant

placement planning.

Methods: 591 maxillary anterior teeth were analysed, viewed in the radial plane of CBCT scans from 150 patients. Each tooth was classified according to its position and inclination within its alveolus (class I – middle of the alveolus, IA – thick facial bone, IB – thin facial bone, class II – retroclined, IIA – thick crestal bone, IIB – thin crestal bone, class III – proclined, class IV – facially outside bone envelope, class V – both thin facial and palatal bone with apical isthmus). Bone thickness was measured for both facial and palatal walls at points: crestal (A), mid-root (B), and apex (C), as well as at 4 mm beyond the apex. Bone wall height was also evaluated.

Results: The majority of the teeth included in this study had a thin facial bone wall (≤ 1 mm) at the crest (83%) and the mid-root point (92%). The majority of palatal walls were thin (<1 mm) at the crest (63%) and thick (≥2 mm) at the mid-root point (98%) and apex (99%). For tooth position classification, class I accounted for 6.1%, class II 76.5%, class III 9.5%, class IV 7.3%, and class V 0.7%. Gender and tooth location were not significant.

Conclusions: The majority of maxillary anterior teeth have thin facial bone walls, which makes palatal wall thickness a crucial variable. The new classification system for radial plane tooth position is a simple clinical tool to include in a comprehensive analysis at immediate implant treatment planning.

050. Schneiderian membrane appearance: Is it affected by periapical and periodontal pathologies? Systematic review of studies using cone-beam computed tomography

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Objectives: A radiographic maxillary sinus assessment is often crucial in presurgical implant planning. This systematic review aimed at evaluating the relation between periapical and periodontal pathologies and the appearance of the Schneiderian membrane in cone-beam computed tomography (CBCT).

Methods: A systematic literature search of five electronic databases (Cochrane Library, Embase, OpenGrey, PubMed, Web of Science), complemented by hand search, was conducted up to May 9, 2016. Human clinical studies that contained information on the periapical/periodontal status in the posterior maxilla and CBCT imaging data on Schneiderian membrane appearance were included. A weighted vote counting (WVC) method was employed to analyze results across studies.

Results: Twenty studies out of 413 records met the inclusion criteria. In the WVC, the studies demonstrating a positive association between periapical pathologies and the appearance of the Schneiderian membrane preponderated over those showing no association (WVC 51 % and WVC 33 %, respectively). Some studies reported indeterminate results (WVC 16 %). Concerning the relation between periodontal pathologies and the appearance of the Schneiderian membrane, WVC resulted in a tie between studies observing a positive association (WVC 46 %) and those finding no such association (WVC 44 %). One study yielded indeterminate results (WVC 10 %).

Conclusions: Periapical lesions in the posterior maxilla have a likely association with Schneiderian membrane thickening on CBCT scans. By contrast, available evidence on the relation between periodontal diseases and the appearance of the Schneiderian membrane in CBCT is inconclusive. Schneiderian membrane thickening may frequently be related to dental pathologies, which warrant adequate care prior to implant surgery.

Reference: Eggmann, F., Connert, T., Bühler, J., Dagassan-Berndt, D., Weiger, R., & Walter, C. (2016). Do periapical and periodontal pathologies affect Schneiderian membrane appearance? Systematic review of studies using cone-beam computed tomography. Clinical Oral Investigations, 1-20.

051. Alveolar bone-periosteum and bone-collagen membrane interface: Histology and periostin / laminin-5 expression in humans

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Objective: Several groups have reported superior clinical outcome for lateral GBR and alveolar ridge preservation if using ribose cross-linked collagen membranes (RCCM). According to clinical observations in our patients we hypothesized that there were interactions taking place at the interface between the inferior side of membranes and blood clots underneath. Recent animal and human studies after application of RCCMs have shown an intimate contact between newly formed bone and membrane remnants revealing periosteal osteogenesis, where the protein periostin, which is involved in periosteal bone apposition, may play a role. Therefore, we compared histology and periostin immunodetection in biopsies retrieved from sites augmented with RCCM membrane application after socket preservation using same material and from native periosteum-covered bone during implant insertion. Additionally, a probable absorption of periostin and laminin from serum was tested in native membranes.

Material and Methods: Biopsies ("membrane related tissues", MRT) from 15 patients and 16 extraction or augmented sites, respectively covered with cross-linked collagen type I porcine membrane (RCCM; Ossix Plus, Regedent, Dettelbach, Germany) were harvested after 3 to 6 months. "Periosteum related tissues" (PRT) from native bone were sampled during implant placement in posterior regions of maxilla and mandible from 4 patients. Specimens were fixed, decalcified and processed for paraffin histology and HE and trichrome staining according to standard methods. Periostin immunohistochemistry was performed using an anti-human polyclonal rabbit antibody. A monoclonal mouse anti-human antibody was used for detecting laminin-5. Immunohistochemical staining was evaluated semi-quantitatively. Additionally, 4 membranes were kept in human serum in vitro at room temperature for 12 and 24 hours, respectively, and processed for histology, periostin and lamini-5 immunohistochemistry in order to test probable absorption of these factors.

Results: In-vitro-testing revealed no adsorption capacity of the membranes for serum periostin. Histology of PRT showed vascularized periosteal tissue with lamellar bone fragments. In the MRT group, sub-membraneous membraneous osteogenesis could be observed. Different stages of membrane degradation with the occurrence of multinucleated cells were detected. Moderate to strong periostin immunostaining was visible at periosteum-bone interfaces in the PRT group, while in the MRT group in most cases strong immunoreactivity was seen around newly formed ossicles regardless histological appearance of membrane remnants. Bone was unstained.

Conclusions: Periostin may play a role in collagen membrane-related bone formation comparable to its physiological function in the periost and appositonal osteogenesis, and may be important in guided bone regeneration. Probably, the membrane used in this study may locally upregulate periostin at its interface to bone independently of systemically available periostin.

052. Is mucosa augmented by xenogenic collagen matrix a real keratinized tissue? A preliminary prospective comparison of two commercial products

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Objectives: Using a xenogenic collagen matrix (XCM) at the time of vestibuloplasty is regarded as an alternative treatment option in augmenting keratinized tissue around dental implant to restore esthetics and reduce patient morbidity from harvesting autogenous donor tissue. However, few histologic observations show similar cellular morphology between XCM and autogenous attached tissue. No direct evidence confirms the phenotype performance of the augmented mucosa. At the molecular level, keratin is a family of about 21 polypeptides that can determine epithelial differentiation. The aim of this study was to compare the expression of keratinized phenotype (K1 and K4), cellular morpholgy and augmented area stability between two commercial xenogenic collagen matrix .

Methods: Six patients (8 edentulous area; four maxilla, four mandible) with insufficient keratinized mucosa were randomly assigned to soft tissue augmentation with two kinds of xenogenic collagen matrix (Mucograft® ; Geistlich Pharma AG v.s. TERUDERMIS®, TERUMO Corporation) three months after implant placement. Another patient received augmentation with free gingival graft as control. After six months, nine specimens were processed for immunohistochemical (IHC) staining for two keratin(K1/K4) expressions to confirm the histologic and phenotype performance. All surgical sites of test group (four of each XCM group) were recorded with 3D intraoral scanner and digital photograph before and six months after surgery. The images were superimposed to calculate the tissue thickness and augmented area change.

Results: Each specimen showed similar cellular morphology and augmented area change. Mature connective tissue were covered by well developed rete pegs and epithelium. However, only Mucograft specimens

expressed positive of keratin-1 (K1/10; pair of keratins typically expressed by masticatory mucosa), while Terudermis specimens expressed positive of keratin-4 (K4/13; expressed by lining mucosa). The control group showed clear demarcation of K1 (keratinized mucosa) and K4 (Non-keratinized mucosa) expression.

Conclusions: Our study indicates that the epithelium of non-keratinized alveolar mucosa specifically expresses K4, while keratinized mucosa expresses K1. Both specimens augmented by Mucograft and Terudermis demonstrate similar cellular morphology and area stability. However, at the molecular level, only Mucograft specimen expresses positive of K1. Terudermis specimen expresses positive of K4. Additional investigations are necessary to identify the mechanism and clinical importance of different phenotype expressions of xenogenic collagen matrix augmented mucosa.

053. The effect of protrusion height on implant success following trans-alveolar sinus lifting approach

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Objective: To evaluate the effect of protrusion height on implant success following trans-alveolar sinus lifting approach

Methods: Patients had single tooth missing with limited alveolar bone height (4-7mm) in posterior maxilla were enrolled in the study from July 2014 to July 2015. Patients were randomly divided into two groups according to the perforation height in sinus: group A with 1~3mm and group B with 3~5mm. Clinical with radiographic examination was used to measure the treatment outcome.

Results: A total of 37 Straumann implants were inserted into 37 patients (male: 23; female: 14; average age: 43.2±20.2 years old) with an average residual bone height of 6.1±1.1mm (4~7mm). Eighteen patients in group A had an average protrusion height of 2.3±1.2mm and 19 patients in group B with the height of 4.4±1.4mm. Two patients in group A and 3 patients in group B were detected sinus membrane perforation during surgery and 2 patients in groups B had mild nasal bleeding post-surgery. All implants achieved osseointegration and were restored with crowns. The implant success rate in the study was 100% during one-year follow-up.

Conclusion: With the limitation of the study, it might increase the risk of sinus membrane perforation to place implant with a protrusion height more than 3mm during trans-alveolar sinus lifting. However, no negative effect was detected on short-term implant success rate with this procedure.

054. Clinical and histologic evaluation of healing following tooth extraction with ridge preservation technique using a xenograft protocol in aesthetics sites

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Objectives: Tooth extraction normally results in a significant reabsorption of the alveolar ridge with quantitative and qualitative changes of its profile that tends to decrease and results in the disappearance of bundle bone. To modify bone remodelling after extraction, especially in absence of the vestibular bone wall, various ridge preservation techniques have been proposed. The objective of this study was to evaluate and to compare changes of hard and soft tissues in post-extraction sockets and histologically quantify the alveolar ridge preservation after tooth extraction using a new surgical protocol.

Methods: Ten subjects who required tooth extraction and implant placement in an aesthetic site were enrolled in this study. All subjects presented, at the end of the tooth extraction, different level of defects in the buccal bone. The buccal wall was subsequently remodelled to create a standardized defect, 4 mm wide coronally, 2 mm wide apically, and 6 mm high. deproteinized bovine bone mineral (DBBM) xenograft granules were used to fill the defects. All surgical sites were subsequently covered vestibular by with a resorbable membrane composed of 90% anorganic bovine bone in combination with 10% porcine collagen fibers and, occlusal, with a resorbable 3D collagen matrix membrane and a non-submerged healing was obtained. Following 14 weeks of healing, clinical measurements as horizontal ridge width, vertical ridge changes and width of keratinized gingiva were recorded and a core biopsy was obtained and prepared for histologic evaluation of percentages of vital bone, residual graft, and soft tissues assessment in each patient.

Results: At 14 weeks, the mean horizontal ridge width at the buccal crest decreased from 8.2 ± 1.1 to 7.8 - 1.2 mm for a mean loss of 0.4 ± 0.8 mm (P>0.05) and the vertical change at the lingual sites was 0.5 mm respect to baseline; the keratinized gingiva showed a coronal shift of 1.2 mm. In addition, only 14% of sites required an additional bone augmentation at implant placement. The biopsies harvested from the grafted sites revealed the presence of trabecular bone, which was highly mineralized and well structured. Particles of the grafted material could be identified in 71% of the samples in the treated subjects and the bone formed in the sites was also well structured with a minor percentage of mineralized bone. The amount of connective tissue was significantly higher.

Conclusions: The use of xenograft particles concomitantly with the application of two different collagen membranes used for the vertical ridge preservation approach immediately after tooth extraction contributed to the preservation of the alveolar process. Furthermore, the histologic analysis showed that the porcine-derived xenograft particles were not resorbed but became surrounded by new bone and that was present a significantly higher percentage of trabecular bone and total mineralized tissue in ridge-preservation sites 14 weeks after tooth removal.

055. Anatomy and morphology of the nasopalatine canal: A CBCT study

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Purpose: To analyze the dimensions and anatomic characteristics of the nasopalatine canal and the corresponding buccal bone plate by application of CBCT imaging.

Methods: The study population was comprised of 24 men and 31 women with a mean age of 56.2 years. CBCT was performed using a standard exposure and patient positioning protocol. The data of the CBCT images were sliced in three dimensions. The shape of the nasopalatine canal in coronal view and number of foramen of Stenson were assessed. The anatomical variants were morphologically classified as follows: A (single canal), B (double canal), or C (Y-shaped canal with one or more foramens of Stenson). In addition,the dimensions of buccal bone wall,canal length,canal diameter at the palatal,middle and nasal levels in cross-sectional images were measured. The correlation of age,gender and status of central incisors (both present, one missing, and both missing) with all the variables was evaluated.

Results: The anatomy of the nasopalatine canal showed significant variability in morphology and dimensions. Type A was observed in 20 patients (36.4%), type B in 1(1.8%), and type C in 34(61.8%). The mean diameter of the nasal opening was 3.67 ±1.81 mm and 3.77 ± 1.18 mm in the case of the oral opening. The mean length of the canal was 12.08 ±3.20 mm. Results showed that gender of the included patients had a statistically significant influence on the dimensions of the buccal bone plate and length of nasopalatine canal,the mean values being generally higher for male subjects. In addition,the dimensions of buccal bone plate and diameter of incisive foramen were influenced by the status of central incisor.

Conclusion: The present study highlighted important variability observed in the anatomy and morphology of the nasopalatine canal. Gender and status of central incisors influenced anatomy characteristics in the pre-maxilla region. Given the diversities in the size and shape of nasopalatine canal, we recommend CBCT presurgical evaluation to optimize surgical planning and avoid complications.

056. Use of diode laser in clinical management protocol for dental implants placed in patients with Oral Lichen Planus

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Background: Oral lichen planus (OLP) is a chronic mucocutaneous disease with an unknown aetiology, affecting 0.5-2% of the population and with a predilection for females in fourth to fifth decade of life. Atrophic and erosive forms of OLP can cause soreness to severe pain and severe burning sensation. Treatment of OLP includes corticosteroids and other immunomodulators but none as the single most effective. The light energy from the diode laser with a specific wave length (810-980 nm) is greatly absorbed by the soft tissues than the hard tissues.Implant rehabilitation in oral lichen planus (OLP) is a major challenge.There is limited evidence on the safety and benefits of implant placement in OLP patients. Studies associate desquamative gingivitis (DG) with a higher rate of Periimplantitis on implants of the Oral Lichen Planus patients. Erosive/ulcerative oral lichen planus tends to become malignant, urging appropriate therapy. Diode Lasers therapy have recently been suggested as a new treatment option without significant side effects.

Hypothesis/Aim: To propose diode laser as a predictive treatment protocol for management of implant candidates suffering from oral lichen planus. Method: The present study was conducted on 10 patients with oral lichen planus (OLP) and few missing teeth . The cases were selected from the out patient Department of Rama Dental College Kanpur (U.P) India. OLP was diagnosed clinically and histologically. All patients had atrophic or erosive type of Lichen planus and missing few posterior teeth. Age group of the patient varied from 35 to 70 years (6 females and 4 males). No habits were seen. Pregnant patients were excluded.

Histopathologic examination: Biopsy specimens were taken to rule out malignancy before laser treatment. Specimens were fixed in 10% buffered formalin and send to pathology lab for investigation.

Procedure of Diode laser application: The site was infiltrated with local anesthesia. The patient was advised to wear special eyeglasses for protection.The lesion was irradiated and ablated with Biolase 980 nm 10-watt Diode laser at 3W, in contact and continuous mode using a 400 µm diameter glass fiber as the delivery system. Remnants of the abraded tissue were removed using sterile gauge dipped in saline and the procedure was continued until desired depth of the tissue was achieved. Postsurgical topical anesthetic gel for pain and cold pack to prevent edema. Patients were reviewed on the third day, 1, 2 and 4 weeks after the surgery. The present study was conducted on patients, without any previous treatment of the lesion. No serious complications were recorded, apart from slight edema and pain. Complete healing occurred after the second week. Implants were planned after 6-8 weeks. Diode laser (980nm) provides a marked clinical improvement without the need for neither local nor systemic treatment.

Results: Of the 10 patients three patients complained of moderate pain and oedema and 3 patients complained of mild pain and 4 patients did not complain of pain in the first 3 days of diode laser treatment, and pain disappeared by first week. As this study is still in process preliminary results cannot be shown presently.

Conclusion: Clinical implications for use of diode laser in oral lichen planus managed with and soft tissue laser irradiation before insertion of dental implants will be presented in the final version.

057. Is low level laser therapy and gaseous ozone application effective on osseointegration of immediately loaded implants?

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Objectives: The purpose of this study was to assess the possibility of enhancing the osseointegration of immediately loaded implants by using biostimulation lasers and ozone therapy.

Methods: A total number of 100 implants (DTI Implant Systems) applied in 25 patients who referred to our department with proper indications. Four dental implants placed in posterior mandible of each patient. Dental implants placed in proper locations and angulations in the posterior mandible. Immediately after implant surgery, while the patient was still under anesthesia, the restorative treatment was started. Within 24 hours of implant placement, a temporary screw-retained acrylic resin fixed partial denture was connected to the implants. Implants were randomized into four treatment groups, each with 25 implants [three study groups (group 1= Low Level Laser Therapy (LLLT), group 2=ozone therapy, group 3= different prothocol of ozone therapy and control group (no LLLT or ozone therapy)]. Pain levels of the patients determined by VAS (visual analog scale) postoperatively and at the 1, 3, 5, 7 days after surgery. A wireless magnetic-based Osstell Mentor Radiofrequency Analyzer (RFA) was used to evaluate both primary implant stability and osseointegration. RFA measurements were done immediately after the surgery and at the 6th month in all groups. The irradiations were performed with a gallium-aluminum-arsenide (GaAlAs) diode low-level laser with continuous emission of 830-nm wavelength (Laser BTL- 4000). The LLLT were repeated every 2 days for two weeks. Ozone therapy was performed by using an ozone generator (OzoneDTA) with an intraoral probe according to information given by the manufacturer. The ozone generator was applied intraorally with an intensity of 80% for 3 minutes at 1,3,5,7,10. days in group 2 patients. In group 3 patients, ozone therapy performed for 6 minutes 3 times a week for 2 weeks.

Results: In this study the overall implant survival rate was 92 % after a 6 month observation period. 8 implants failed for unknown reasons, and as a consequence of this failure, new implants placed to the same regions after adequate bone healing occurred. All the other implants and related prostheses were stable and no complication was observed during follow-up period. In the present study, the level of primary implant stability exceeded 65 ISQ in all study and control groups. The lowest measured value of primary implant stability was 68 ISQ in 100 implants. Over the observation time, the implant stability increased in all groups. The ISQ values was found slightly higher in the LLLT group than the other groups after 6 months. There was no significant difference in ozone applied and control groups at the 6th month follow-up.

Conclusions: The increase in osseointegration could be referred to an improvement in bone-healing phase around the implants. LLLT has demonstrated biomodulary effect of the laser light by regulating cell physiology or stimulates the proliferation and differentiation of undifferentiated cells. We observed that LLLT has a beneficial effect on stimulation of bone healing around immediately loaded dental implants.

058. Evaluation of 10-year cumulative survival rate and failure patterns of Straumann tissue-level implants

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Objective: The purpose of this study was to evaluate the cumulative survival rates (CSR) of Straumann tissue-level implants over 10-year period and identify the type of implant failure in single research institution.

Materials and methods: A total of 1692 implants were installed in 881 patients who visited the Department of Periodontology, Dental hospital, Yonsei University, Seoul from Jan, 2003 to Dec, 2009. The state in which the implant was completely removed was defined as “implant failures”. Radiographs and electronic charts were used to determine whether the implants failed. The survival rate of implants was analyzed using life-time table, Kaplan-Meier survival estimates. Log-rank test and cox regression with shared frailty were used for analysis of risk factors and implant failure type.

Results: 10-year cumulative survival rates were 98.23% and 95.70% in the implant-level and patient-level analysis respectively. Before prosthodontics (defined as “early stage”), 13 implants in 10 patients were removed. After mounting the prosthesis (defined as “late stage”), 8 implants in 7 patients were removed. The cumulative survival rate was related with diameter, length, site and insertion torque. Most of the implant failures were due to failure of osseointegration in early stage. All of these cases occured within a year. Specifically, there were several cases in late stage that failed without apparent marginal bone loss.

Conclusion: Straumann tissue-level implant showed limited failure rates and can be considered as a successful long-term treatment option. The implant diameter, length, placement site and insertion torque might affect implant survival, thus clinicians are advised to consider these factors when performing implant surgery.

059. Microarchitectural study of the augmented bone following sinus elevation with an albumin coated demineralized freeze-dried bone allograft (BoneAlbumin): Preliminary report of a prospective clinical, histological, and micro-computed tomography analysis

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Objectives: Sinus pneumatisation and alveolar atrophy frequently cause insufficient bone volume for implant placement in the edentulous posterior maxilla. Numerous bone substitute materials have been successfully applied for sinus grafting, however, bone remodelling is still an issue. According to preclinical studies albumin induces mesenchymal stem cell growth on the surface of bone allografts and albumin addition to bone allograft (BoneAlbumin) has shown clinical advantages in orthopaedic bone grafting applications. We aimed to evaluate the performance of BoneAlbumin in maxillary sinus augmentation.

Methods: Eleven patients (4 male, 7 female; age: 52,9±9,39 years) were included in the study and 14 sinus augmentations were performed with a lateral window technique. The combination of BoneAlbumin and a porcine collagen membrane was used in each case. After a 6-month healing period 8 bone core biopsy samples were obtained and implants were placed in the augmented sites. The bone core biopsy samples were examined by histological and micro-CT analysis.

Results: Qualitative histological analysis of the biopsy samples revealed that the particles of the graft material were surrounded by newly formed bone trabeculae and marrow spaces. Three dimensional rendered micro-CT images suggest that the BoneAlbumin particles were in direct contact with the newly formed bone trabeculae.

Conclusions: Histologic and micromorphometric data of the micro-CT analysis suggests that the BoneAlbumin material successfully integrates into the bone of the posterior maxilla when applied as graft material for sinus elevation. Micro-CT analysis provides invaluable information of the microarchitecture of the augmented bone.

060. Immediate vs. early loading of short Straumann® TE implants with a chemical modified surface (SLActive) inserted in the posterior mandible: 10-years results of randomized control clinical trial

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Objectives: The aim of this study was to compare clinical results of immediate and early loading conical shaped self-tapping implants with chemical modified surface placed in posterior mandibles.

Material and methods: Fifteen patients (nine women and six men; with a mean age of 47.3 years; range: 24-54) with bilateral edentulous posterior mandibular were randomly assigned to treatment either with immediate (IL) or early loaded implants (EL). Ninety short conical shaped self-tapping implants with SLActive surface (Ø 4, 1/4, 8 mm; length 8 mm) were analyzed in this study. Implants from IL group (45) were loaded on the day of surgery and from EL group 3 weeks later. The measuring of implant stability quotient (ISQ) was performed on day of implant placement as well as 1,2,3,4,5,6,12, and 52 weeks after. The bone resorption, modified bleeding index (MBI) and modified plaque index (MPI) were notified 1, 5 and 10 years after implant loading.

Results: After 10 years, survival in the both groups were 100%. The mean value of primary implant stability was 80.80 ± 0.49 ISQ. Significant decreasing in implant stability was noted in booth groups during first week of loading. A significant longitudinal increase in ISQ value was recorded in IL and EL group during observing period of 52 weeks. The differences between immediate and early loaded implants were statistically insignificant ($P > 0.05$). At the 10 years, no statistically significant differences were found between immediate and early loaded implants with respect to mean crestal bone loss measurements (0.5 ± 0.22 vs. 0.6 ± 0.1 mm), MBI and MPI.

Conclusion: Based on these results, the self-tapping implants with conical shape and chemical modified surface and length 8mm inserted in posterior mandible can provide adequate primary stability value as the main factor for immediate and early loaded protocol. Long observing period confirming that analyzed implant can provide successful treatment in the immediate and early loading protocol.

061. Evaluations of the indication rate of ridge preservation for implant therapy: A retrospective study

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Objectives: Following tooth extraction, the alveolar ridge undergoes an inevitable remodeling process that influences implant therapy of the edentulous area. Socket grafting is a commonly adopted therapy for the preservation of alveolar bone structures. However, it takes longer time for socket healing. The aim of this single-center, retrospective study is to evaluate the indication rate of ridge preservation for implant therapy.

Methods: A clinical retrospective study of patients receiving single gap dental implants placed from April 2009 to August 2015 was conducted. Patients who received surgery after 4 months post-extraction were excluded. Patients who received surgery within 4 months post-extraction and well documented (surgical records and periapical films) were included and divided into two groups, control and test groups. The control group included patients who successfully received implant placement in the edentulous ridge within 4 months post-extraction. For the test group, the extraction sites could only received guided bone regeneration or sinus lift at the time of surgery. Due to compromised bone quality and quantity, staged approach is indication for the test group. We evaluate the factors between the two groups.

Results: 134 patients fulfilled the criteria were included; 63 male and 71 female, with mean age of 49 years. 116 patientsÐ86.6%Ðwere divided into control group. Among the control group which all the patients could receive implant placement within 4 months post-extraction, 29 patients (29.1%) didn't need additional guided bone regeneration surgery (GBR). 18 patients (13.4%) were included in test group and received staged approach technique. Review the reasons of tooth extraction in test group, 8 patients extracted due to periodontitis (44.4%), 4 (22.2%) for caries, 3(16.7%) for residual roots and 3(16.7%) tooth fracture.

Conclusions: Most of the extraction sockets (86.6%) healed well and could be successfully placed dental implant 4 months post-extraction. Only 13.4 % of patients needed to receive guided bone regeneration and /or sinus life surgery first for staged approach. And periodontal disease was the most common reason led to compromised bone volume. Socket preservation may be an alternative treatment for these cases.

062. Radiographic assessment in marginal bone loss between tissue level implants restored with platform matched and bone-level implants restored with platform switching: A randomized, controlled, split-mouth trial 3-year follow-up

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Objectives: Marginal bone loss occurs following implant placement although several factors may increase it. Implants restored according to the well-known platform switching concept, seems to preserve marginal bone level in comparison with implants restored with platform matched over time. The aim of this randomized clinical trial with 3 years of follow-up was to assess the differences in radiographic levels of peri-implant bone crest between splinted tissue-level implants restored with platform matched (implant control) and bone-level implants restored with platform switching (implant test) in the same anatomical region and following a split-mouth design.

Methods: 35 subjects, partially edentulous in posterior region, were selected for this study. There were 15 males and 20 females between the ages of 30 and 65 (mean = 48.3 years). A total of 100 implants were assigned using a randomized procedure (50 implant control, and 50 implant test). Periapical radiographs were taken to evaluate the peri-implant marginal bone level at baseline, 1 year, and 3 years after the final restoration.

Results: Tissue level implants restored with platform matching showed a marginal bone loss (MBL): baseline -1 year, 0.15 ± 0.49 mm (p = 0.052); 1 year - 3 year, 0.07 ± 0.23 mm (p = 0.237); baseline - 3 year, 0.18 ± 0.46 mm (p =0.043). Bone level implants restored according to the platform switching system yielded the a MBL: baseline -1 year, 0.08 ± 0.26 mm (p = 0.081); 1 year - 3 year, 0.06 ± 0.22 mm (p = 0.102); baseline - 3 year, 0.14 ± 0.35 mm (p = 0.514). The mean differences between tissue level implants restored with platform matched abutments and bone level implants restored according to the platform switching concept were: baseline -1 year, 0.07 ± 0.37 mm; 1 year - 3 year, 0.01 ± 0.22 mm; baseline - 3 year, 0.04 ± 0.16 mm. There was not a statistically significant difference in MBL at different interval times (p > 0.05).

Conclusion: The differences in marginal bone loss between each implant type were minimal. Both implant systems showed good performance. Other differences as insertion level or emergence profile could be decisive for making clinical decisions.

063. Comparison of the speed of osseointegration when using conventional drilling vs the osteotome technique for implant site preparation and the effect of implant length on the same

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Objectives: Which of the two techniques: Conventional drilling or osteotome technique will result in faster development of osseointegration by determining the osseointegration speed index (OSI) and if implant length has an effect on the same.

Methods: A total of 60 implants were placed in the maxillary posterior region in

30 patients.The implants were divided into four groups to test two variables 1) Implant length (< 10mm and ≥10mm) and 2) Preparation of osteotomy using conventional drilling or osteotome technique. ISQ values were recorded for each implant from the time of implant placement till loading of Implants. Statistical analysis was done using Mann Whitney U test.

Results: OSI values were statistically significant higher using the osteotome technique as compared to conventional drilling. Statistically significant higher values were noted for OSI when long implants (≥10mm) were placed using condensation technique. However, a statistically insignificant difference was observed when short Implants (< 10mm) were used.

Conclusion: The osteotome technique significantly increased primary stability compared to conventional drilling. Implant length also had a significant positive impact on primary stability. When a longer implant is planned, the osteotome technique may prove more beneficial than drilling.

064. Sinus bone grafting with simultaneous implant placement in case of residual bone height less than 4mm using internal bone level implants

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A minimum of 4~5 mm of residual bone height is traditionally recommended for the one-stage surgical procedure of sinus bone grafting and implant placement to ensure initial stability from preexisting residual bone. I would like to report the survival rates of the Internal bone level implants simultaneously placed into grafted maxillary sinus where the residual alveolar bone height was less than 4mm.

Patients were examined using panoramic radiograph and cone beam computed tomography(CT) scan. Residual alveolar bone was initially evaluated using panoramic radiograph and CT scans.The modified Caldwell-Luc approach was used to gain access to the sinus cavity. The lateral wall of the maxilla was exposed with a full-thickness mucoperiosteal flap made with crestal incision and two vertical incisions on the buccal side of the residual alveolar ridge mesially and distally. The size of the lateral window was determined by the number of implants to be installed with consideration to minimize the size of the lateral window as possible. A #2 carbide round bur was used to create a window on the lateral maxillary wall using low speed straight angle handpiece. The window bone was temporarily removed and kept in normal saline. Implant osteotomy was underprepared to optimize primary stability. Allogenic bone (OsteOss®, Hans Biomed, Korea) was soaked with normal saline for 5 minutes before application into the maxillary sinus and grafted until it filled the elevated sinus cavity. Internal bone level implants (TSIII, Ossetem, Korea) were initially placed into the grafted sites using an automated handpiece and finalized using a hand ratchet. If the initial stability of 15Ncm was not obtained, it was replaced with larger diameter implant without additional implant Osteotomy. All patients were treated with a fixed implant-supported prosthesis for final restoration. The final tightening torque of abutment was 30Ncm. The screw-retained porcelain fused metal or gold crown was fabricated for definitive restorations.

Radiographic image of 227 implants on 106 patients were measured. Mean of augmented sinus height was 13.8mm at placement, 12.7mm at loading, 12.1mm at 1year after loading and 11.4mm at 2year after loading. Mean of marginal bone loss was 0.01mm at placement, 0.02mm at loading, 0.14mm at 1 year after loading and 0.23 at 2mm year after loading. 3 of 224 implants were failed and survival rate showed 98.7%. Most perforation happened in incompletely healed site. That was because incompletely healed site where the residual alveolar bone height was less than 4 mm could have a irregular sinus floor due to incomplete remodeling of extraction socket within the maxillary sinus.

In this study, even a short period of time, but the cumulative survival rates were 98.7% with an average follow-up of 42.8 months. So, it is concluded that sinus bone grafting with simultaneous implant placement in case of residual bone height less than 4mm could be considered as a predictable procedure.

065. Comparisons of changes of alveolar bone width around implant and nature tooth: A retrospective 3-D CBCT study

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Objectives: This study aimed to determine whether there is difference between changes of alveolar bone width around implant and nature tooth by means of CBCT examination.

Materials and methods: The study comprised of 16 patients (8 males and 8 females, mean age: 59.2 years old) having at least one pair of implants and adjacent nature tooth. The first cone beam computed tomography (CBCT) scan was taken before the implant surgery. The sagittal slices were chosen at the estimated implant site and the middle of mesial-to-distal distance at the neighboring nature tooth, respectively. The second CBCT image was taken over the same arch after several months of the implantation by other treatment needs. The sagittal slices were selected at the middle aspect of the implant and the same nature tooth. Buccal-lingual/palatal bone thickness at 1mm, 5mm, and 9mm levels below the alveolar crest around implant and nature tooth were measured by in 2 CBCT scans. Wilcoxon Signed Rank Tests and Wilcoxon Rank Sum Test were used to examine significant differences of the changes of the bone width between the two CBCT data at the implant and nature tooth. The level of statistical significance was set at $p < 0.05$.

Results: A total of 21 pairs of implants and adjacent nature tooth were included in this study. Six pairs located in the maxilla and the others were in the mandible. The mean time interval of 2 CBCT images was 16 months. The mean ± standard deviation (SD) of changes of alveolar width at 1mm, 5mm, and 9mm levels below the alveolar crest in all sites were 0.57 ± 1.45mm, 0.01 ± 0.87mm, and -0.07 ± 0.99mm, respectively. The significant difference was detected only at subcrestal 1mm level ($p= .0453$). The changes of bone width at 3 levels under the alveolar crest were further divided into implant and natural tooth groups. Compared with the changes between 2 groups, no significant difference existed at 3 levels ($p> .05$).

Conclusion: No significant difference of alveolar bone resorption at coronal, middle and apical thirds between implant and nature tooth was detected. The results in this study should be interpreted cautiously due to the limited sample size.

066. Regenerative surgical therapy for peri-implantitis using bovine xenograft and enamel matrix derivative

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Objective: Experimental and clinical studies show no reliable regenerative treatment of peri-implantitis. The aim of this study was to examine the regenerative capacity of combined xenograft and enamel matrix derivatives in the management of peri-implantitis clinically.

Methods: 30 patients diagnosed with peri-implantitis (minimal probing depth of 4mm and radiographic bone loss of 20%) were included in the study. Clinical measurements recorded included probing depths, recession, radiographic bone fill, presence of gingival inflammation and bleeding on probing. Following surgical access, the implants were initially debrided with a low power ultrasonic machine. The implant surfaces were then decontaminated with 24% EDTA before the defects were filled with a cocktail of bovine xenograft, enamel matrix derivative (EMD) and doxycycline powder. The defects were finally covered with a resorbable membrane and connective tissue grafts were placed if necessary, particularly around anterior implants. The clinical measurements were repeated after 4, 6 and 24 months of healing.

Results: A reduction in mean probing depth from 8.9 mm to 3.5 mm was noted at the 24-month measurement. The mean initial radiographic bone loss of 57% was reduced to 14.5% after 24 months. These results were statistically significant. There was no statistically significant difference in the recession values between the initial and 24 month measurements. The clinical symptoms of peri-implantitis such as gingival inflammation and bleeding on probing also improved over this time.

Conclusion: Regenerative treatment of peri-implantitis using a combined mixture of bovine xenograft, EMD and doxycycline achieved promising results. The benefits of this protocol incorporating EMD should be tested in randomized clinical trials.

067. The course of aesthetic evaluations and patients´ perceptions over a period of 2 years after implant treatment of the narrow single tooth gap

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Objectives: This study aimed at determining aesthetic outcomes after implant treatment with reduced diameter implants in single tooth gaps with narrow interdental space over a period of 2 years.

Methods: In this prospective, single-cohort clinical trial, 30 patients with single tooth gaps in FDI 15-25 with narrow interdental space were included. Diameter-reduced implants (Straumann® Narrow Neck Crossfit®, Diameter 3,3mm) were placed in healed sites; final restorations were inserted 3 months after. Aesthetic as a component of oral health-related quality of life (OHRQoL) was assessed with the 49-item Oral Health Impact Profile (OHIP), and specifically by means of the Pink Esthetic Score (PES) at baseline, 6, 12 and 24 months follow-up. For the OHIP, implant placement was defined as baseline, while insertion of crowns was considered as baseline for PES. The OHIP includes four questions to evaluate aesthetics as perceived by patients (OHIP aesthetic). Changes in the instruments´ score from baseline to follow-ups were tested for statistical significance with repeated-measures analysis of variance.

Results: Two years after implant placement, survival rate for implants and crowns was 100%. However, two patients were lost to follow-up and could not be evaluated for 24 months follow-up. OHRQoL improved from baseline to all three follow-up visits indicated by decreased OHIP summary scores from 21.9 points to 14.5, 13.9 and 9.5 points, respectively. While changes in OHRQoL were not statistically significant, aesthetic evaluations improved significantly. OHIP aesthetic scores representing the patient perspective dropped from 2.9 to 1.2 and 0.5 points, and remained stable with 0.6 points at the 24 months follow-up. PES measured by the examiner increased from 6.8 to 7.9 and 8.9, respectively.

Conclusion: Aesthetic outcomes of diameter-reduced implants for single tooth gaps in the aesthetic zone with narrow interdental space are very promising and seem to last for at least 2 years.

068. Evaluation of alveolar tissue preservation and regeneration in immediate single implants with different treatment protocols in anterior maxilla

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Objectives: This study aims to demonstrate that with the use of adequate protocols for immediate implant placement, satisfactory aesthetic results can be achieved, no recession of the facial middle mucosa and also demonstrate a high frequency of a visible facial bone wall on ConeBeam computed tomography. In addition it would not be necessary previous conditions such as intact alveoli walls, facial bone wall of at least 1 mm thick and thick gingival tissue. Reducing morbidity, time and costs. We will evaluate: 1- changes in thickness and height of

the buccal bone table (ConeBeam), taking into account the incidence of the two protocols in their thickness, as well as the behavior of initial thicknesses greater or less than 1 mm.A 6 months and a year to be placed. 2- soft tissue behavior, such as papillae height, pre and post treatment gingival thickness, soft tissue contour height (zenith), color and texture of the peri-implant tissue, according to aesthetic pink index. 3-lingual buccal volume or width of the alveolar sector (Cone Beam). 4- the height of proximal alveolar ridges (periapical radiography).

Methods: Two protocols of preservation and compensation of the alveolar buccal bone contour will be implemented, through the immediate placement of unitary implants simultaneous to bone regeneration at post extraction sites, located in the anterior maxillary sector comprised of Canine to Canine: Group 1 with Flap, and Group 2 without flap, in turn each subgroup will address two variables, which will include: Alveoli without defect or dehiscence up to 3mm (three walls) and Alveoli with defect or dehiscence greater than 3mm (two walls), establishing a detailed protocol each. The inclusion criteria for recruiting patients will be as follows: 1) to be between 20 and 65 years of age and to be in good health, 2) willingness to participate in the study and provide informed consent, 3) healthy neighboring teeth , Without bone loss or periodontal processes, 4) Alveolar walls intact, or with defects of a wall involving only the buccal bone wall, 5) Healthy gingival tissue, 6) the site should not present an acute infection, 7) Availability of bone Apical and palatal of the alveolus to provide primary stability. The exclusion criteria will be as follows: 1) systemic diseases that could compromise healing, 2) alcoholism, 3) local infection or insufficient bone to place an immediate implant, 4) previous bone graft procedures in the study area, 5) Pregnancy, 6) history of radiotherapy or chemotherapy in the region of the head or neck, within five years prior to surgery. Neither cigarette consumption nor bruxism should be considered as a contraindication for treatment, but should be recorded.

Results: Preliminary results at 6 months show the presence of buccal bone wall in the range of 2 to 4 mm thick.

Conclusions: The application of this protocol, according to preliminary results, would allow the placement of immediate implants with predictable results, reducing morbidity, time and costs.

069. Regenerative treatment of peri-implantitis: long-term preliminary results

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Objectives: There was no evidence about regenerative procedures having additional beneficial effects in the outcome of the treatment, but in most recent scientific literature the regenerative approach, also with the use of fillers and absorbable membranes, have had good prospects of success. The aim of this long-term study is to evaluate the efficacy of therapy with the regenerative approach in the treatment of peri-implantitis.

Methods: Between January 2005 and November 2006, in total, 39 patients and 66 implants with peri-implantitis were treated with a regenerative approach following the CIST protocol. Inclusion criteria were PPD ≥ 6 mm, bone loss > 2 mm, Class I defects (vertical bone loss: cup shape peri-implant reabsorption) and suppuration and/or bleeding on probing (BOP). In addition, inclusion criteria were the correct implant positioning in the comfort zone, the prosthesis performed by specialists, the use of implant and prosthetic components original and certified. Furthermore, the patients who regularly followed the supportive periodontal and peri-implant treatment (SPT), the periodontally healthy patients, the periodontally compromised patients with periodontal disease under control, were included in the study. All surgeries were performed by one operator (AP) and after the degranulation of the peri-implant defects and reduction of the bacterial load on the implant surfaces, the defects were filled with bovine derived xenograft mineral (BDX) and covered with a collagen membrane. In order to have equivalent data, concerning the time of follow-up, for each implant after treatment, the data relating to 10 years of follow-up were taken into account. Therefore, data regarding dental implants with a larger period of follow-up, were recorded but not included in the present study.

Results: Five patients and a total of nine implants left the follow-up for several reasons and were considered as drop-outs. 34 patients and 57 implants were analyzed to determine the survival treatment rate (94.1%), the success treatment rate (79.4%) and peri-implantitis recidivism rate (14.7%) at patient level. At implant level, the survival and success treatment rate were 94.7% and 84.2% respectively. The total peri-implantitis recidivism rate found over the 10 years period of follow-up was 11.1%. The peri-implant health parameters, PD ≤ 5 mm and absence of suppuration and/or bleeding on probing (BOP), were achieved in 48 (84%) of 57 implants after 10 years follow-up.

Conclusions: Within the limits of the present study, the regenerative treatment of peri-implantitis is possible with good therapeutic prospects with a long term period of maintenance. The outcome's predictability of the regenerative treatment of peri-implantitis depends on the type of defect, the implant position, the prosthesis and the use of biomaterials and implant-prosthetic components original and certified, in addition to the patient's susceptibility. In the present long-term study, the implants with peri-implantitis treated with a regenerative approach seem to have survival and success rates similar to how it was from the beginning of implant-prosthetic rehabillitation. Individual program of supportive periodontal and peri-implant treatment (SPT), for each patient, is crucial for health maintenance of peri-implant tissues over the long-term.

070. Stem cell enhanced bone regeneration of alveolar cleft and trauma defects in adults

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Objective: To determine the safety and efficacy of cell therapy with ex vivo expanded stem cell populations in the regeneration of alveolar defects in patients with a history of cleft palate or craniofacial trauma.

Materials and methods: A total of 18 patients, 10 with a traumatic injury and 8 with a history of cleft palate, were included in this randomized controlled clinical trial. All patients presented with horizontal alveolar bone deficiencies associated with missing teeth. Subjects were randomized to receive either conventional autogenous block grafts (8 subjects) or stem cell therapy (10 subjects). After a healing period of 4 months, the sites were re-entered, and the crest width was re-assessed prior to implant placement. Implant stability was evaluated through torque testing of the implant upon insertion and at 6 months post-loading.

Results: No serious, study-related adverse events were reported. The gain in crest width was 1.5±1.5 mm in the stem cell therapy group and 3.3±1.4 mm in the control group. The gain of bone was higher in trauma patients as compared to patients with cleft palate, for both the control and the stem cell therapy groups (p 0.0027 and 0.09 respectively). The stem cell therapy was more efficacious in bone regeneration in the trauma group compared to the cleft palate group. Implants were placed successfully in 5 out of 10 patients from stem cell therapy group and in all 8 patients from control group. There was one pre-loading implant failure in the control bone graft group from a patient with cleft palate, while the rest of the implants were loaded successfully and remained stable at six months post-loading.

Conclusion: The present study demonstrated the safety and feasibility of stem cell therapy for bone regeneration of large alveolar defects in patients with a history of trauma. However, further optimization of this approach is required to meet outcomes of current methods used to treat more complex defects such as those resulting from cleft palate.

071. Effects of full-mouth extraction restored by Straumann implant-supported overdentures on glycemic control and C-reactive protein level in uncontrolled type 2 diabetes

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Objectives: The goal was to investigate the effects of full-mouth extraction replaced with implant-supported overdentures on glycemic control and systemic inflammation in people with uncontrolled type 2 diabetes and terminal periodontitis.

Methods: We recruited 30 participants with 1) uncontrolled type 2 diabetes defined as long-term blood glucose levels(glycated hemoglobin, HbA1c) >7.5%; 2) diabetes duration at least 6 months; 3) terminal dentition due to advanced periodontitis; 4) alveolar bone sufficient for implant placement; and 5) no other known source of inflammation. A total of 6 (20%) participants smoked cigarettes. All teeth were extracted and replaced by immediate full dentures that later were relined as needed. Three months after the extractions, two Straumann implants were placed in the mandibular canine region and restored by an overdenture opposing a full maxillary denture. Three-monthly visits included interviews; measurements of weight, height, and waist circumference; and blood draw for measuring levels of HbA1c and the acute phase inflammatory marker C-reactive protein using high-sensitivity testing (hsCRP).

Results: No implant failed (100% implant retention). No participant exited the study voluntarily (100% live participant retention). However, 1 participant died before the last follow-up visit (9 visits completed), whereas the remaining 29 completed all 10 study visits (99.7% study visit completion).

As hypothesized, HbA1c and hsCRP levels decreased upon full-mouth extraction and did not increase for 12 months after implant placement. The HbA1c levels decreased statistically significantly by an average of 1.36(+/-2.22)% [95% CI: -2.22; -0.54; p=0.0023] from the original mean of 10.2%. The hsCRP levels decreased by a mean of 1.48(+/-5.52)mg/dL [95% CI: -3.62; 0.66; p=0.1683] from the initial average of 5.31 mg/dL. However, this decrease did not reach statistical significance. Importantly, all study participants experienced greatly improved quality of life due to the study treatment.

Conclusions: In persons with severely uncontrolled type 2 diabetes, including cigarette smokers, with a recent history of severe periodontitis, the long-term blood glucose control (HbA1c) decreased (improved) significantly after full-mouth extraction, and did not increase (deteriorate) for 12 months after implant placement. The systemic inflammation assessed by high-sensitivity testing of acute-phase inflammatory marker C-reactive protein (hsCRP) level also decreased, but not statistically significantly. The greatly improved quality of life due to the study treatment may be the most significant outcome seen from the participants' perspectives. These results could impact guidelines for clinical practice regarding the consideration of restoration involving implant supported dentures as an option for people with uncontrolled diabetes and a recent history of severe periodontitis.

Sources of Support: ITI Foundation Grant #2007_539.

Clinical Study Registration: ClinicalTrial.gov Identifier: NCT01774942

072. Impact of implant surface roughness on prevalence of peri-implantitis: Systematic review and meta-analysis

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Objectives: To search if implant surface roughness influence prevalence of peri-implantitis.

Methods: An electronic literature search was conducted of the MEDLINE and EMBASE databases for articles published between 1st January 1990 and 1st December 2016. Sequential screening at the title/abstract and full-text levels was performed. Clinical human studies in the English language that had reported on prevalence of peri-implantitis in tuned (machined) and rough surface implants searched. A meta-analysis was performed using the random-effects model on the selected qualifying articles.

Results: The search resulted in 693 articles. 8 articles were included, the results of 7 studies were appropriate for meta-analysis. Peri-implantitis prevalence among turned and rough surface implants was not found to be statistically significantly different (p = 0.2606; OR = 0.373; 95% CI, 0.242 to 0.575). Except for plaque accumulation (p = 0.0071; OR = 1.206; 95% CI, 1.018 to 1.664), bleeding on probing (p = 0.321, OR = 1.072, 95% CI, 0.901 to 1.275), suppuration (p = 0.08; OR = 0.606; 95% CI, 0.237 to 1.546) as well as probing pocket depths did not differ in smooth and rough surface implants.

Conclusions: The present systematic review and meta-analysis discovered that peri-implantitis prevalence among turned and rough surface implants was not found to be statistically significantly different.

073. Does a method of implant surface decontamination have an impact on treatment outcomes in surgical peri-implantitis treatment: A systematic review

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Objectives: The objectives of the present study are: 1. to systematically review the literature, reporting on different implant surface decontamination methods in surgical peri-implantitis treatment, 2. to determine a predictable method of decontamination of ailing implant in surgical management of peri-implantitis lesions in terms of probing depth (PD), bleeding on probing (BOP) reduction and changes in marginal bone level.

Methods: A systematic electronic literature search was conducted in MEDLINE and EMBASE databases from January 1, 2000 to November 1, 2016. Sequential screenings at the title, abstract, and full-text levels were performed. Randomized controlled clinical trials comparing different implant surface decontamination methods in surgical peri-implantitis treatment and reporting changes in PB and/or BOP and/or radiologic marginal bone level were included.

Results: Out of 221 studies retrieved, 6 were included in to review. Decontamination methods could be classified into following categories: chemical (3 studies) and laser (3 studies) decontamination. 3 studies reported on resective, 2 on regenerative surgical approaches, 1 study - open flap debridement. Totally, 251 patients and 740 implants were treated. Chemical decontamination was accomplished by chlorhexidine (CHX). Although it significantly reduced BOP and PD compared to baseline, the use of CHX had no significant superiority in reducing BOP, PD or changes in radiographic bone level compared to sterile saline. The concentration of the solution also didn't have any effect in significantly reducing PD and BOP. Laser decontamination was accomplished in 3 studies by 3 types of lasers: Er:YAG, CO2 and diode. The application of Er:YAG and diode lasers significantly reduced PD and BOP values compared to baseline, but no significant supremacy was observed compared to conventional debridement. The use of CO2 laser followed by soft tissue resection showed significant superiority in radiologic bone gain compared to conventional decontamination, followed by soft tissue resection after 5 years of observation.

Conclusions: 1. The current evidence of decontamination of the surface of ailing implants in surgical peri-implantitis treatment is scarce. There is a need of long-term randomized clinical trials to clarify the effectiveness of different implant surface decontamination methods. 2. None of the investigated surface decontamination methods was preeminent to others, however, the surgical treatment of peri-implantitis may be accelerated by using a CO2 laser concomitant to soft tissue resection.

074. Is it possible to cover soft tissue recessions around dental implants in aesthetic area : A systematic literature review and meta-analysis

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Objective: To detect clinical studies, reporting on surgical treatment of labial soft tissue recessions around dental implants in maxillary anterior area with respect to complete and mean coverage (CC, MC) of the defects, changes of soft tissue thickness (STT), keratinized tissue height (KTH) and probing depth (PD); to define plausible treatment recommendations.

Methods: An electronic literature search in MEDLINE and EMBASE databases was conducted for articles published up to 30 November, 2016. Clinical human studies in English language reporting on CC, MC of soft tissue recessions, changes of STT, KTH and PD after surgical treatment of labial soft tissue recessions around dental implants in maxillary anterior area were included. A meta-analysis was performed using the random-effects model on the selected qualifying articles.

Results: The search resulted in 4 studies meeting the inclusion criteria. Applying coronally advanced flap in combination with subepithelial connective tissue graft or guided bone regeneration, complete coverage could be expected in 60,4 [53.1-82.0] % of treated cases, whilst the corresponding value for mean coverage is 83.3 [60.8-94.2] %. The meta-analysis demonstrated a significant increase in soft tissue thickness compared to baseline (p = 0.0271; SMD = -3.669; 95% CI, -5.511 to -1.827). KT height increased significantly compared to baseline (p=0,0006; SMD = -0.420; 95% CI, -1.754 to 0.914). PD increased, but not significantly (p = 0.5337; SMD =-0,618; 95% CI, -1.045 to -0.191).

Conclusions: Current evidence of covering labial soft tissue recessions around dental implants is sparse. Recession coverage can be obtained in small (up to 3 mm) defects. Coronally advanced flap in combination with subepithelial connective tissue graft or guided bone regeneration predictably increase soft tissue thickness and keratinized tissue height.

075. Narrow diameter implants to replace congenital missing maxillary lateral incisors: Preliminary results from a prospective non-ramdomized controlled comparative clinical study of 2.9 mm and 3.3 mm diameter Straumann SLAactive Roxolid BLT implants

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Background: Dental implants represent a predictable treatment option for the replacement of congenital missing teeth. However, certain biologic principles should be respected for achieving predictable results, including a minimum distance between the implant shoulder and the roots of neighboring teeth of 1 to 1.5 mm in the length of the entire implant. This distance is needed to prevent marginal bone loss due to compromised blood supply for the interproximal bone. Therefore the use of narrow diameter implants (NDIs) (Ø< 3.5 mm), can represent a treatment option in clinical situations with limited interproximal space, which is often the case when lateral upper and lower incisors need to be replaced. Concern has been raised regarding potential technical limitations of using NDIs such as implant fracture. Short-term data (< 36 months of loading) support the use of NDIs as a reliable treatment option in case of limited occlusal as documented by with survival and success rates >95% which are comparable to those of regular diameter implants.

Objectives: The aim of this report is to present the preliminary data from a prospective controlled comparative clinical study evaluating the survival and success rate of Straumann SLActive Roxolid BLT implants with a diameter of 2.9 mm compared to the 3.3 mm during a 5-year follow-up period when used to replace congenital missing upper lateral incisors.

Materials and methods: 20 consecutive healthy young patients with congenital missing maxillary lateral incisors were consecutively enrolled and treated at the Copenhagen University Hospital (Rigshospitalet) between August and December 2016, applying the following inclusion and exclusion criteria: Inclusion criteria: Congenitally missing upper lateral incisor, At least 18 years of age, Arrested skeletal growth as documented by two body height measurements at least one year apart not indicating continuous growth. Exclusion criteria: General contraindications to implant therapy, Heavy smokers: >20 cigarettes/day, Poor oral hygiene, Compromised compliance, Patients presenting with a mesio-distal distance of 5.9 to 6.3 mm of the edentulous space received a 2.9 mm implant (Test Group), while a mesio-distal distance of 6.4 and 7.1 mm qualified to receive 6.4-7.1 a 3.3 mm implant (Control Group). Three to four months after implant placement a fixed dental single crown was cemented. At this time (baseline) a standard periapical radiograph was taken and compared to the one taken immediately postoperatively. The outcome parameters evaluated were: implant survival and success rates, marginal bone level, prosthetic parameters using the Copenhagen Index Score, beside surgical and prosthetic complication rates.

Results: No surgical complications were reported. All implants osseointegrated successfully giving an early survival rate of 100%. Contour agumentation was performed in 60% of the test patients and in 50% of the control patients. Based on data still being collected and analyzed, the short-term results after prosthetic rehabilitation will be presented with focus on the stability of marginal bone level and aesthetic presentation.

Conclusions: Preliminary data indicate that the use of 2.9 mm diameter BLT implants seems to be a valuable treatment option for the replacement of congenital missing lateral incisors when clinicians face the challenge of a reduced mesio-distal width of the edentulous area.

076. Dental implants in patients with primary Sjogren's Syndrome - preliminary results from a prospective controlled clinical study

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Primary Sjogren's Syndrome (PSS) is a chronic autoimmune inflammatory disease primarily involving the salivary and lacrimal glands giving rise to dry mouth and dry eyes. The reduction in salivary secretion leads to oral manifestations including dental decay, atrophy, and lobulation of the dorsal tongue mucosa, and oral candidiasis. Few data exist regarding survival and success rate of dental implants in patients with PSS. We hypothesize that dental implants have similar survival and success rate in PSS as compared to healthy controls.

Objectives: The purpose of the present study is to present the study protocol in progress and preliminary results of a study evaluating the long term survival and success rate of dental implants in patients with PSS as compared to healthy controls.

Methods: The study patients must fulfill the Copenhagen Criteria and/or the US-EU criteria for PSS, miss one tooth and have sufficient bone volume for a single implant insertion without bone augmentation. Recruitment of PSS patients has been done via own existing data bases on PSS patients as well as repeated national announcements in the Danish Dental Journal. We anticipate including 50 consecutive patients with PSS. For each PSS patient, an age, gender, and tooth-type- matched healthy control patient is enrolled. Fifty control patients are planned. A Straumann Bone level Roxolid implant is inserted and allowed to heal for 3 months. Similar procedures for PSS patients and control patients are applied. After 3 months, the suprastructure is mounted and the patient is recalled for baseline examination. At baseline (0 years) and after 1, 3 and 5 years, biological (marginal bone level, inflammation etc.), technical (fractures, loosening's etc.) and aesthetic (Copenhagen Index score) assessments will be performed.

Results: We have contacted 290 patients with PSS (telephone screening) and screened 43 patients with clinical and radiographic examination. Of these only 16 (6%) fulfilled the enrollment criteria.

At December 1st, 2016 we have enrolled and inserted implants in these 16 PSS patients (mean age 55 years (range 23 - 73 years)). Similarly, we have enrolled 12 healthy controls (mean age 52 years (range 39 -73 years)). The PSS patients had implants inserted in molar- (n=7), premolar- (n=7) and incisor regions (n=2). The control patients had implants inserted in molar- (n=9) and premolar regions (n=3). Implant length ranged from 8 to 12 mm, diameter: 4.1 mm (n=11) and 4.8 mm (n=17). 10 patients and 6 controls have reached the baseline examination. All had stable successful implants.

Conclusion: Although PSS may lead to loss of teeth due to decay, it has been a time consuming process to identify and recruit PSS patients, as only 6% of the screened patients fulfilled the inclusion criteria. So far, all inserted implants have osseointegrated successfully and crowns have been mounted as planned. We anticipate that this clinical controlled 5 year observational study will document that dental implant treatment is a safe and predictable treatment option for rehabilitation of PSS patients in similarity with the general healthy population.

077. Comparison of sinus lifting using lateral window technique in atrophic posterior maxilla with 1-stage versus 2-stageprocedures: A retrospective study

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Objective: The aim of this retrospective study was to find the reasonable surgical approach of sinus lifting using lateral window approach in atrophic posterior maxilla through comparing the long term treatment results of the simultaneous implant placement and delayed implant placement into grafted sinus of atrophic posterior with residual bone height less than 5mm.

Methods: 1. We selected the patientswho have finishing sinus lifting using lateral window approach with implant placement and prosthodontics procedure at Shanghai Ninth People's Hospital from the year 2002 to 2011with a residual bone of less than 5mm through panoramic radiograph.Andthen,we selected group 1 patients which means without vertical or horizontal bone graft according to the atrophic posterior classification which was holdby H.Katsuyamaand S.S.Jensen.

2. All the patients were followed up and the follow up results were noted and statistic analysis were did to evaluate the implant success rate and survival rate .

Results: A total of 118 sinus lifts and275implants were placed in patients. Among all of the implants, 150 are placed simultaneously (M:F= 15:7) while 125 implants placed during the second time surgery 6 to 8 month after the first time sinus augmentation surgeryÐMÐF=15:11 Ð.The implant success rate was 92% for the simultanious group and 96% for the staged group.

Conclusion: Sinus lifting using lateral window approach and simultaneous implant placement is a feasible way when implant primary stability could be obtained. There is no statistically difference between the simultanious approach and staged approach.

Key words: Atrophic maxilla, simultaneous implant placement , sinus lifting, initial stabilityÐsuccess rate, survival rate

078. Do different personality structures influence the satisfaction with informed consent in implantology?

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Objectives: Medical briefings to obtain informed consent are a regular occurrence in implantology. While a comprehensive medical briefing can improve the patient-physician relationship by establishing realistic treatment goals, informing about possible complications and alleviating fears it tends to be time consuming. This study wants to evaluate which demographic factors and personality traits of the patients contribute to a successful briefing that benefits the patient as well as the dentist.

Materials and methods: In order to examine the influence of different settings 100 patients at a private implantological office and the department of oral surgery of the university clinic of dentistry of the Medical University of Vienna were enrolled in this study. Inclusion criteria were a planned implantation of 1 or more dental implants and the willingness to participate in the study. At both sites the briefing was performed orally supported by an identical standardized information brochure by Perimed. In the private practice an oral surgeon conducted the briefings. At the department of oral surgery the patient was briefed either by a last year dental student or a resident surgeon. To assess the lasting impressions of the talks, the patients were asked to fill out three different questionnaires right before their procedures. The 1st questionnaire examines the patients' sense of satisfaction with the briefing and the emotional response. 6 items with 6 possible answers assess the level of comprehension, the quantity and the quality of the provided information, the feeling of being understood, and the alleviation of fears. The questionnaires were processed into a Likert scale resulting in an index with values from 0 to 100. A high number indicates a high level of patient satisfaction. The 2nd questionnaire was a NEO five-factor inventory (NEO FFI). It is a standard model in personality research assessing the influence of the big five personality traits: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Demographic data was gathered with the 3rd questionnaire: Gender, level of education, and age. Descriptive statistical analysis as well as regression analysis (CI 95%) and ANOVA were performed.

Results: 44 patients handed in unusable questionnaires, resulting in utilizable data from 156 patients: 76 patients in the private office (P) and 80 patients at the university clinic (U). Both groups exhibited similar demographics without significant differences. In each group the genders were represented almost equally (P: f/m=58:42%, U: f/m=54:46%). The majority of the patients (P=45%, U=38%) were located in the age group between 51 and 65 years. The majority of patients felt very well informed about the procedure (Percentage of Patients indicating a high sense of satisfaction: P=66%, U= 50%). In the regression analysis significant correlations were only observed between the personality trait of neuroticism and the sense of satisfaction with the briefing. A high score for neuroticism correlates with a decreased score in satisfaction.

Conclusion: This study proves a high sense of satisfaction can be achieved using established methods, regardless of demographics or personality structure. Of all personality traits only neuroticism plays a significant role in patient satisfaction with the informed consent. The negative personality features associated with this trait can explain this result.

079. Clinical research of β-TCP combined with acellular dermal matrix in socket preservation after tooth extraction

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Objective: To evaluate the clinical effect of β-tricalcium phosphate (β-TCP) combined with acellular dermal matrix (ADM) in socket preservation after tooth extraction.

Methods: 45 patients who needed to extract the molar were enrolled in this clinical research. Of which 20 patients agreed to undergo the socket preservation surgery, serving as the experimental group, and their extraction sockets were filled with β-TCP and covered with ADM after tooth extraction. The left 25 patients were served as the control group, and their extraction sockets were conventionally treated, waiting for natural healing. After 1 day, 1 week, 2 weeks, 1 month, 3 months, 6 months, we observed the healing of extraction sockets in both groups. Shooting periapical film after 1 month, 3 months and CBCT after 6 months in experimental group. According to the change of density in extraction socket, the bone formation of extraction socket was evaluated. At pre-operation and post-operation 6th month, the width and height absorption of alveolar ridge were measured through preparing plaster model and shooting periapical film, and then the difference between the two groups was statistically analyzed, P< 0.05 was considered as having statistical significance. After 6 months, implants were placed in the

sockets of experimental group, checking their initial stability. At the same time, the bone formation in sockets was evaluated through the taken bone tissue.

Results: Clinical examination showed in addition to one case of experimental group appeared the necrosis and exfoliation of ADM after 2 weeks, the remaining extraction sockets healed well without any adverse complications. After 6 months, the width and height of alveolar ridge were maintained in experimental group. But in control group, the width and height of alveolar ridge decreased obviously. Imaging examination showed the bone density of extraction sockets was uniform, the bone trabeculars thicken and arranged regularly, the boundary disappeared between the extraction sockets and the surrounding bone tissue. At 6th month after surgery, contour shrinkage and bone loss were showed in both groups. The width absorption of alveolar ridge was (2.72±0.41) mm in experimental group and (4.84±0.30) mm in the control group. The height absorption of alveolar ridge was (0.83±0.27) mm in experimental group and (1.58±0.35) mm in control group. The width and height absorption of alveolar ridge in experimental group were less than that in control group, the difference had statistical significance (PÐ0.05). After 6 months, 3 patients underwent the dental implant surgery in experimental group. The quality of new bone was better in extraction socket. All the placed implants were the most wide diameter implants and obtained good initial stability. This socket preservation technology achieved the desired effect.

Conclusion: Compared with the natural healing of extraction sockets, β-TCP combined with ADM in socket preservation after tooth extraction could effectively reduce the absorption of alveolar bone, which helped to the later implant surgery. This socket preservation technology was convenient and inexpensive, having the clinical feasibility.

080. Research protocol on survival rate of short 4mm implants (Straumann) splinted to other short or longer implants in the posterior area of maxillae

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The research protocol will be presented and a clinical case to show this ongoing research. There are clinical situations where it is necessary to simplify or reduce the time, morbidity and aggressiveness of treatment, and anatomical situations, such as reduced bone availability in the sinus, which indicates the use of short implants. Today many studies show that short implants might be as successful as longer implants in the rehabilitation of partially edentulous patients. However, there is no evidence on the prognosis of the rehabilitation of the posterior maxillary region with 4¬mm¬ short implant splinted to other short or to an implant of conventional length. To know if the use of short implants (4mm length) splinted to other short implant or to longer implants of 8mm or more, in the posterior area of the Maxillae where the bone quality is mainly type III or IV may influence the outcomes of short implants in the short and medium term. The aim of the research is to to establish survival rates with scientific evidence with this protocol of treatment in posterior areas where reduced volume of bone is available, reducing costs, time and morbidity to patients if other GBR treatments were to be used instead or complementary.

Objective: 1.¬ To evaluate short term survival of 4mm implants one year after placement in the posterior area of maxilla splinted to 4 mm or 8 mm length implants. 2. To assess bone crestal stability around short implants with this protocol of treatment in the maxillae.

Methods: Prospective clinical study on patients with partially edentulous maxillae requiring implants in premolar and molar area (2¬ and 3¬unit gaps). 48 patients will be selected to rehabilitate with short implants on the posterior maxillae. Group A One 4mm implant splinted to other 8mm implant length. Group B One 4mm implant splinted to other 4mm implant length. Primary stability will be evaluated with both Osstell (RFA) and Torque device at the time of implant placement. Bone level remodeling will be assessed with RX at the moment the implant is placed and then at 2 months (8 weeks), 6 months (24 weeks) and one year (48 weeks). The RX will be taken with individualization device (customized bite blocs and paralleling technique) for each patient. Crestal bone levels will be measured, both mesially and distally, as the distance from the implant reference point (the junction between machined collar bevel and the threads) to the bone to implant contact.

The study will be approved by the ethics committee of the centers involved. Written informed consent of all patients will be obtained prior to any study activities. The inclusion criteria and exclusion for patient recruitment will be described. Neither smoking nor bruxism will be considered as a contraindication for treatment, but will be recorded previously. The follow¬ up visits will be scheduled at 2 months, 6 months, and one year after implant placement.

Results: Will be presented as an ongoing research so not definitive results available.

Conclusions: Preliminary observations will be described.

081. Distal supports of surgical guides improve accuracy of guided surgery in unilateral free-end edentulisum: An in vitro study

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Objectives: Guided surgery has been introduced with a concept of accuracy improvement of implant placement. The movements and the partial deflexions of the surgical guides during placements could influence on the accuracy, especially in unilateral free-end edentulisum. Distally temporal implants (DTIs) or bone-supported parts of the guides could be recommended for improvements, by reducing the movements and the partial deflexions, however, the effects are still unknown. The aim of this study was to evaluate the usefulness of DTIs and bone-supported parts of the surgical guides for accuracy improvement of guided surgery in unilateral free-end edentulisum in vitro.

Methods: After preoperative CT examinations with scan templates from 5 artificial models of unilateral free-end edentulisum with DTIs and 5 models without DTIs, 10 gonyX guides were established from those templates, according to the manufacture protocol. After CT examinations from 10 artificial models, 5 3D CARES guides with bone-supported parts and 5 guides without parts were established with thickness of 3 mm. Following each virtual planning, total 40 implants were placed in 45 and 47 regions using gonyX guides or 3D CARES guides by 5 residents without any placement experiences. All drillings and placements were performed using the guides. After postoperative CT examinations, inaccurate verifications between virtual and actual positions of implants were carried out, by overlaying of pre/postoperative CT data.

Results: For 47 regions, the mean value of 3D offsets for implant bases placed by 5 gonyX guides without DTIs was 2.6 ± 0.5 mm, while the values for implant tips was 3.0 ± 0.6 mm. The mean value of 3D offsets for implant bases placed by 5 gonyX guides with DTIs was 1.2 ± 0.4 mm, while the values for implant tips was 1.6 ± 0.5 mm. The mean value of 3D offsets for implant bases placed by 5 3D CARES guides without bone-supported parts was 1.0 ± 0.2 mm, while the values for implant tips was 1.0 ± 0.2 mm. The mean value of 3D offsets for implant bases placed by 5 3D CARES guides with bone-supported parts was 0.6 ± 0.2 mm, while the values for implant tips was 1.0 ± 0.2 mm. There were significant differences for 3D offsets for implant bases and tips between the value of gonyX guides without DTIs and those with DTIs (P< 0.01, P< 0.01, respectively). There were significant differences for 3D offsets for implant bases and tips between the value of 3D CARES guides without bone-supported parts and those with bone-supported parts (P< 0.05, P< 0.05, respectively). There were significant differences for 3D offsets for implant bases and tips between the value of gonyX guides without DTIs and those without bone-supported parts (P< 0.05, P< 0.05, respectively).

Conclusion: Bone-supported parts might be a best option as distal support for accuracy improvement of guided surgery by reducing the movements and the partial deflexions, as both of DTIs and bone-supported parts of the surgical guides could be useful in unilateral free-end edentulisum. In addition, 3D CARES guide with thickness of 3 mm might possess proper stiffness for the stabilization.

082. Marginal Bone Loss around platform-switched implants and platform-matched implants in immediate placement - a review of the literature

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Background: Immediate implant has the advantage of a reduced treatment time and increased patient comfort. However, this treatment modality is associated with considerable marginal bone resorption, potentially compromising soft tissue stability and aesthetic outcomes. Platform-switching has been found to reduce Marginal Bone Loss (MBL) in conventional implant placement, but evidence on its benefits in immediate placement is lacking.

Objective: To investigate if platform-switched (PS) implant-abutment connection leads to a reduction in MBL compared to a platform-matched (PM) implant-abutment connection in the immediate placement protocol.

Methods: A systematic literature search was conducted using the electronic databases Medline and PubMed for studies published between 1966 and August 2016, using pre-defined search terms, and pre-defined inclusion and exclusion study selection criteria.

Results: The search yielded 253 results, of which seventeen were eligible for full text review after their title and abstract were reviewed. An additional two studies were identified from the manual search of full text reviews and were included. From the nineteen full texts ten were excluded, as they did not meet the selection criteria. The nine selected studies included four prospective case series, one non-randomised controlled trial (NRCT) and four randomised controlled trials (RCT). Four out of the five studies that included a control PM group showed a statistically significant difference in MBL in favour of PS implants (PS 0.18-0.78mm, PM 0.51-1.19mm). The MBL for the case series studies ranged from 0.05-0.86mm. Critical appraisal of the studies revealed a high risk of bias, especially for the case series studies. A common feature in all of the studies was a small sample size. Various confounding factors were also identified, such as different selection criteria, implant and abutment designs, connection types and surgical protocols.

Conclusions: The use of PS implants leads to statistically significant reduction in marginal bone loss in post-extraction sockets compared to PM implants. However, the clinical significance of this reduction needs to be considered prior to influencing changes to clinical practice. The results need to be interpreted with caution due to the numerous confounding variables and clinical heterogeneity between the nine selected studies. Further well-designed RCTs with more relevant sample sizes are needed, which control confounding variables.

083. Replacement of individual teeth in the esthetic zone of upper jaw by using a monoblock ceramic implant: One year follow up

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Introduction: Nowadays, the material of choice for the manufacture of dental implants is titanium. However, if we consider the aesthetics, the use of metallic implants can lead to complications, namely metal translucency through the peri-implant mucosa or the presence of soft tissue recessions causing metal exposure. As an alternative to the use of titanium, we have zirconium, that is highly biocompatible and whose use in implantology has demonstrated a predictable osseointegration. In addition, some studies suggest a different histology that could help maintaining the stability of the peri-implant mucosa and, therefore, an improvement in long-term aesthetic results.

Objective: Evaluate peri-implant hard and soft tissues's stability with the use of a ceramic implant (Implant Straumann®Pure Ceramic) during one year follow up.

Methods: This retrospective pilot study included patients requiring implant rehabilitation in single-tooth gaps in the esthetic zone (from upper left second premolar to upper right second premolar). Full-ceramic ZrO2 monotype implants were installed and 6-8 weeks after the procedure, the definitive prosthesis was fabricated. At the time of prosthesis placement (T0) photographs and periapical radiographs were taken, as well as, the following clinical parameters: probing depth (PD), plaque index (PI), bleeding on probing (BOP), suppuration on probing (SOP), distance from gingival margin to incisal edge (GM-IE) and papillary Jemt index (PJI). Follow-up appointments were established at 4 (T4), 8 (T8) and 12 (T12) months where the same parameters were recorded. In addition, a plaque control reinforcement and prophylaxis were carried out. In this last appointment a final periapical radiograph was taken to assess the marginal bone loss.

Results: A total of 11 zirconium implants in 10 patients (5 women and 5 men, aged between 34 and 66 years) were installed. None of them presented postoperative complications and all the implants were successful. This pilot study of the prospective one that we are going to carry out shows the results regarding stability of the hard and soft tissues around the implants. We will present the one year follow up results.

Conclusion: These results showed a short-term survival rate of 100% showing a very good clinical behavior. Since our results have shown to be predictable and satisfactory both aesthetically and functionally, we are conducting a prospective study with a larger sample number.

084. Influence of healing period upon bone turn over on maxillary sinus floor augmentation grafted solely with deproteinized bovine bone mineral

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Purpose: To investigate the influence of maturation timing upon histological, histomorphometric and clinical outcomes when deproteinized bovine bone mineral (DBBM) was used as a sole biomaterial for staged maxillary sinus floor augmentation (MSFA).

Materials and methods: Patients with a posterior edentulous maxillary situation and a vertical bone height ≤ 4 mm were included in this study. A staged MSFA was carried out. After MSFA with DBBM as a sole grafting material, biopsy cores were harvested with simultaneous implant placement followed by a healing period of 5, 8, and 11 months, respectively. Micro-CT, histologic and histomorphometric analyses were performed.

Results: Forty-one patients were enrolled and 38 bone core biopsies were harvested. Significantly greater BV/TV was observed between 5- and 8-month healing from micro-CT analysis. Histomorphometric analyses showed the ratio of mineralized newly formed bone increased slightly from 5 to 11 months; however, no statistically significant difference was reached (p=0.409). Residual bone substitute decreased from 37.3±5.04% to 20.6±7.45%, achieving a statistical significant difference from of 5 up to 11 months (p< 0.01). Moreover, no implant failure, biological or technical complication occurred after 12-month follow-up of functional loading.

Conclusion: DBBM utilized as sole grafting material in staged MSFA demonstrated to be clinically effective regardless of the healing period. Histomorphometrical and micro-CT assessments revealed that at later stages of healing (8 and 11 months) there is a higher proportion of newly-bone formation compared to earlier stages (5 months). Moreover, the longer the maturation period, the substantially lesser remaining biomaterial could be expected. Even though, these facts did not seem to negatively impact on the implant prognosis 1-year after loading.

085. Comparative analysis on implant placement following mandibular reconstruction with vascularized autologous ilium graft or double-barrel fibula graft

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Background: Functional reconstruction for patients with jaw defects due to tumor extirpation remains a great challenge for clinicians. Dental implant therapy following vascularized autologous ilium or fibular grafts is an effective method to rehabilitate oral function for patients with mandibular segmental defects. "Double-barrel fibula" technique makes up for the insufficient bone height of the conventional fibula graft and provides a firm basis for implant placement.

Objectives: The objectives of this study was to compare the outcomes of loaded dental implants after tumor resection through grafting with either a vascularized autologous ilium or a double-barrel fibula with special focus on implant survival, implant success, and peri-implant bone resorption.

Materials and methods: Over an 8-year period (January 2000-May 2008), 44 patients who underwent mandibular segmental resection for tumors were treated with implant placement following vascularized ilium grafts (Group A, n= 32) or double-barrel fibula grafts (Group B, n=12). Information regarding patients' age and gender, implant dimension, prosthesis type, time interval between bone grafting and implant placement was collected and analyzed. Clinical and radiographic assessments were taken for both groups to evaluate the implant success and survival rates, marginal bone loss (MBL), soft tissue inflammation, complications and patient satisfaction for a 5- year follow-up.

Results: The vascularized ilium grafts and double-barrel fibula grafts were successful in all patients. One hundred and ten implants were inserted into 32 patients in Group A and 32 implants were inserted into 12 patients in Group B. The mean MBL for Group A and Group B were 1.20 mm and 0.68 mm during the 5-year follow-up, and the difference was statistically significant (P = 0.047). There were no statistically significant differences in modified Plaque Index (mPI) nor in modified Sulcus Bleeding Index (mSBI) between Group A and Group B (P = 0.06; P = 0.40). Granulomatous soft tissue hyperplasia was the most common complication, and the incidences for Group A and Group B were 34.4% and 41.7% (P = 0.16). The cumulative survival and success rates of implants for Group A were 97.3% and 92.7%, and for Group B were 100% and 87.5% in 5-year follow-up, respectively, with no statistically significant difference found between the groups (P=0.251ĐP=0.397). Over 80% of the patients were fully satisfied with their restoration of oral function and facial contour.

Conclusions: On the outcomes of 44 patients, who received a total of 142 implants in this study, dental implant therapy combined with vascularized ilium grafts and double-barrel fibula grafts were considered predictable methods to rehabilitate oral function for patients with mandibular segmental defects. Though implants placed in fibula had a less marginal bone loss than implants placed in ilium during functional loading, both groups obtained more than 85% 5-year implant survival and success rates with no statistically significant difference found.

086. Clinical accuracy of guided implant surgery and the risk factors - a systematic review and meta-analysis

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Purpose: To systematically evaluate the current dental literatures regarding the clinical accuracy of guided dental implant surgery, and to analyze the relative risk factors affecting the accuracy.

Material and methods: Two reviewers searched MEDLINE-PubMed and the Cochrane Central Register of Controlled Trials (CENTRAL) (January 1990 to October 2016). Meta-analysis and meta-regression analysis were performed. For the assessment of accuracy, studies were included with at least the following outcome measurement: (i) angle deviation, (ii) deviation at the entry point, and (iii) deviation at the apex. For risk factors, the following were considered: age, radiology method (CT or CBCT), position of guide (maxilla or mandible), fixation of guide (fix screw or not), type of guide (totally or partially) and flap method (open flap or flapless).

Results: 14 clinical studies (6 retrospective studies and 8 prospective studies) from 1951 articles initially identified met the inclusion criteria for the qualitative analysis. Meta-regression analysis revealed a mean deviation at the entry point of 1.25mm (95% CI: 1.22-1.29mm), 1.57mm (95% CI: 1.53-1.62mm) at the apex, and the mean angle deviation is 4.1mm (95% CI: 3.97-4.23mm). Four studies (n = 274 implants) were evaluated for the factor of guide position using meta-analysis, two studies (n=506 implants) were evaluated for the factor of guide type, three studies (n=483 implants) were evaluated for the factor of flap strategy, and two studies (n=506 implants) were evaluated for the factor of fixation. A statistically significant difference (P< 0.001) was found between the mean angular deviations for the maxilla and mandibles, the differences in coronal (P=0.06) and apical deviation (P = 0.8) between the maxillae and mandibles were not statistically significant. Partially guide showed a statistically significant greater deviation in angle (P< 0.001), entry point (P< 0.001), and the apex (P< 0.001) when compared to totally guide. Guided surgery with flapless indicated a statistically significant greater reduction in angle deviation (P< 0.001), deviation at the entry point (P< 0.001), and deviation at the apex (P< 0.001) when compared to surgery with open flap. Significant differences are revealed in the deviation of angle when considering use fix screw or not (P< 0.001), no differences were seen between fixed guide and not fixed guide in coronal deviation (P=0.88) and apical deviation (P=0.93).

Conclusions: It can be concluded that the position of guide (maxilla or mandible), guide fixation (fix screw or not), type of guide (totally or partially) and flap approach (open flap or flapless) influence the accuracy of computer-aided implant surgery. Totally guide system using fixed screws with a flapless protocol performed more accuracy. Future clinical research should be directed to control all these risk factors to improve the accuracy of guided implant surgery.

087. Accuracy of virtual edentulous casts created from different scanning protocols

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Objectives: To compare the accuracy of virtual edentulous casts created with a dental laboratory scanner and a cone beam computed tomography (CBCT) imaging technique.

Methods: A standard maxillary edentulous epoxy resin cast was created as the master cast. The extension was marked to created distinct measurement area. The master cast was digitalized with a dental laboratory laser scanner (Dental Wing, Straumann) (Scanner1) as the master Standard Tessellation Language (STL) file. Ten custom trays were produced using light-polymerizing resin (Triad TruTray; Dentsply), and then 10 impressions were made with poly vinyl siloxane impression material (Virtual 380 Monophase fast Set; Ivoclar Vivadent). All impressions were firstly scanned with Scanner1 and then a CBCT (3D Accuitomo; Morita Japan) imaging unit (Scanner2). The impressions were then sprayed with titanium oxide powder (3D-Laserscanning Entspiegelungsspray; Helling GmbH, Germany) and scanned again with the same protocol. All Digital Imaging and Communications in Medicine (DICOM) files from Scanner2 were converted to STL files with InVesalius (CTI, Brazil), then subsequently converted to virtual casts with Meshmixer (Autodesk). Impressions from Scanner1 were exported directly as virtual casts. Thus 4 groups of virtual casts were created (Group1: Scanner1 without spray; Group2: Scanner1 with spray; Group3: Scanner2 without spray; Group4: Scanner2 with spray). Surface matching was performed between the surface of each virtual cast and the virtual master cast with 3D inspection software (Geomagic Control 2015, 3D System). A best-fit alignment was performed between each pair of virtual casts with an iterative closest point algorithm. Ninety-five measurement points in fixed position were created for each pair of virtual casts to investigate the accuracy in 5 specific regions: apex of denture border, crest of ridge, midpoint between denture border and crest of ridge, palate, and posterior palatal seal. Color-coded maps were generated. The overall root mean square (RMS), average deviation and ±1um standard deviation (%) for each specimen were obtained. All statistical analyses were performed with statistical software (SAS® 9.3), Repeated measures Analysis of Variance (ANOVA) was used to determine the differences in the RMS, average distance and ±1um standard deviation (%) among the four groups and different regions (a=0.05).

Results: There were significantly differences among groups for RMS ($F=220$, $P< 0.01$), average distance ($F=538$, $P< 0.01$) and ±1um standard deviation (%) ($F=248$, $P< 0.01$). Group1 had significantly larger RMS (3.98), average distance (1.62) and smaller ±1um standard deviation (77.56%). Though Group3 had the lowest average distance (0.28) and the highest ±1 standard deviation (90.13), it was not significantly different from Group4. Groups, positions and an interaction between groups and positions were statistically significant for the average distances ($P< 0.01$). All groups had similar mean values at midpoint and posterior palatal seal regions, group1 and group2 had significant higher mean values at flange and ridge regions.

Conclusion: CBCT imaging created more accurate virtual edentulous casts than the dental laboratory scanner did. Spray did not have significant effect on CBCT scan but significantly improved the accuracy of dental laboratory scanner. The resulting virtual edentulous casts may have different accuracy in different regions.

088. Randomized controlled clinical trial to compare metal-ceramic and monolithic zirconia implant-supported single crowns: One-year results

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Objective: The aim of this randomized controlled clinical trial (RCT) was to investigate the prosthetic outcomes and complications encountered with posterior implant-supported singles crowns (SCs) with a metal-ceramic or modified monolithic zirconia design at 1 year of loading.

Materials and methods: Forty patients in need of at least 1 maxillary or mandibular posterior implant-supported SCs were consecutively selected for this study. The included patients were randomly divided into the control (metal-ceramic SCs) and test groups (modified monolithic zirconia SCs). The implant-supported SCs in the test and control groups were examined for survival and technical complications like screw loosening, ceramic chipping/fractures and crown de-cementation. Descriptive statistics were applied to the data, and Fisher's Exact Test was used for statistical comparison.

Results: A total of 37 patients with 69 posterior implant-supported SCs (34 SCs in the metal-ceramic group, and 35 SCs in the monolithic zirconia group) completed the 1-year follow-up examination. The 1-year survival rates for both groups were 100%. The complication free rate of the metal-ceramic SCs was 79.4%. The most common complication was screw loosening (14.7%), followed by loss of retention (5.8%) and ceramic chipping (2.9%). The complication-free rate of modified monolithic zirconia SCs was 97.1%. Only one screw loosening was observed in one screw-retained SC. Significantly more technical complications were observed in the metal-ceramic SCs than modified monolithic zirconia SCs.

Conclusion: The modified monolithic zirconia design applied to the posterior implant-supported SCs had significantly lower technical complication rate than metal-ceramic ones.

089. Factors influencing the presence of papilla between adjacent implants and between tooth and Implant

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Objectives: To evaluate different factors that can influence the presence or absence of papilla between implants or between tooth and implant through a clinical and radiographic evaluation.

Methods: A total of 44 patients from both genders, with mean age of 49.0 (21 to 68 years) with 114 dental implants were enrolled in the study. For each implant, success criteria, periodontal biotype, vertical distance to crestal bone to implant shoulder, and horizontal distance between implant and tooth or between implants were evaluated. The presence of papilla were classified according Jemt (1997) and Nordland, Tarnow (1998) and the prognosis for presence of papilla were classified according Salama et al. (1998).

Results: Most of the implants (93%) were prosthetic loaded between 24-48 months. PD and CAL ≥ 5 mm were observed on 3.3% and 12,7% of evaluated papilla, respectively. 53.5% of the implants were considered successful and bleeding on probing had the highest percentage among the criteria, with 29.8%. The biotype was thin in 85.1% of the implants. Absence of papilla between tooth and implant, were observed in 74% and 74.2%, and 26% and 25.8% between implants according Jemt (1997) and Norland, Tarnow (1998), respectively.

Conclusion: The morphology of the interdental space (wide) and the position of the papilla in the arch (posterior), were factors most strongly associated with the absence of the interdental papilla.

090. Influence of age on knowledge and awareness of dental implants among elderly people in Croatia

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Objectives: Poor retention and stability of complete removable dental prostheses (CRDP) due to the residual ridge resorption can be solved by fabricating CRDP retained with dental implants (DIs). Therefore the aim of this study was to examine the knowledge and awareness about DIs, implant treatment options and the possibility of retaining CRDP using DIs among elderly patients wearing CRDP from Croatia.

Methods: This, questionnaire based study included 301 participants who wore mandibular and/or maxillary CRDP. The participants included in this study were residents of elderly care homes with good mental and cognitive health (capable of understanding and filling out the questionnaire). Participants were divided into four age groups: up to 65 years of age, from 66 to 75 years of age, from 76 to 85 years of age, and participants with 86 years of age and older. The questionnaire specifically designed to assess the knowledge and awareness of DIs consisted of 12 questions. The examiner interviewed all participants by the face-to-face method with response rate of 100%. The results were analysed with a significance level of 0.05.

Results: The participants were between the ages of 60 and 99 (with an average age of 74); 67 participants (22.3%) were younger than 65 years of age, 88 (29.2%) were aged between 66 and 75 years, 84 (27.9%) were aged between 76 and 85 years, while 62 (20.6%) were older than 85 years. The participants' awareness of DIs was statistically significantly ($p< 0.05$) affected by age. The majority of participants from the age group younger than 65 years had heard about DIs (88.1%; $p< 0.05$). They had also heard about the possibility of retaining CRDP using DIs (58.2%; $p< 0.05$) and believed in the possibility of retaining CRDP using DIs (74.6%, $p< 0.05$). More participants aged from 66 to 75 years (64.7%, $p< 0.05$) believed that the insertion procedure of DIs is performed under general anesthesia, and participants aged from 66 to 75 (62.5%, $p< 0.05$), as well as those up to 85 years (52.4%, $p< 0.05$) believed that hospitalization is required. If financial situation would allow it, only a majority of participants (52.2%, $p< 0.05$) in a group younger then 65 years would accept DIs insertion procedure. The age didn't significantly ($p>0.05$) influence occurence of fear regarding DIs insertion procedure.

Conclusion: Participants´ age significantly affect knowledge and awareness of DIs. Older participants were more uninformed about DIs and treatment options with DIs. Therefore, the obtained results urge the need for better education, and proper provision of information to the population about DIs.

091. Three-dimensional finite element analysis of short implant in different type of platform

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Up to date, the surface treatment of implant has been improved and short implant is being used more widely. However, short implant is generally used onto atrophic alveolar ridge and crown to implant ratio would be unfavorable. The purpose of this research is to find out the stress distribution on different type of short implant using three-dimensional finite element analysis.

The authors used 3-dimensional geometric models of short implant 4.5mm in diameter 4.5mm and 7mm in length on mandibular first molar. Four experimental groups were: group IB (internal bone level platform), group EB (external bone level platform), group ITR (internal tissue level regular platform), group ITW (internal tissue level wide platform). Vertical and 30-degree oblique load (200N) were applied on occlusal table. Fatigue analysis was also performed under cyclic loading condition. Principal stress and Von Mises stress were evaluated using the Ansys Workbench 17.0 software

The Group ITW shows the least stress of crestal bone and implant component due to the fact that crown to implant ratio of IT could be more favorable than group EB and IB, Moreover, the platform diameter of ITW is most wide that could reduce the cantilever force between crown and implant.

It seems that tissue level platform is more favorable than internal bone level or external bone level platform in case of short implant in terms of stress distribution

092. What defines the aesthetic zone - a look into the local Asian population

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In various implant treatment planning guides, management of the aesthetic zone is deemed challenging and classified as an advanced case. There are many individual variations that affect the frame (oral musculature) and contents (teeth dimensions, positions and gingiva) of the aesthetic zone. In Asia, Chinese and Malays are amongst the largest ethnic groups. Certain smile parameters have been briefly assessed in Chinese but never in Malays.

Objectives: The primary aim of this descriptive cross-sectional study is to gather prevalence data on smile characteristics.

Methods: In this cross-sectional study, subjects with healthy periodontia were included. Exclusion criteria were severe dental crowding, history of interventions that might induce muscular alterations. Subjects were recruited from March 2015 to December 2016 at National Dental Center Singapore and Jurong General Hospital. Subjects were seated with a camera at a fixed distance with an affixed flash unit. All photographs were taken by trained photographers. Subjects were asked to smile widely and the photograph with the most gingival display was selected for measurement using Photoshop® (Adobe). The following parameters were assessed: 1. Smile classification - upward (commissure), straight (cuspid) turn of the corners of the mouth, or inferior movement of the lower lip (complex). 2. Upper Lip Curvature - Upward, Straight or Downward relative to the center of the upper lip. 3. Smile Arc - based on the curvature of the maxillary incisal edges, canine and premolar cusp tips relative to the lower lip (parallel, flat or reverse). 4. Anterior Smile Line - < 75% of maxillary incisal display (Low), 75-100% (Medium), 100% with >1mm (High) or < 4mm gingiva show (Gummy). 5. Posterior Smile Line - low (< 75% maxillary first premolar visible), average (75-100%) and high (continuous band of gingiva superior to premolar). 6. A high interdental smile line (ISL) displays any portion of the interdental papillae of the maxillary anterior teeth while a low ISL does not. 7. Gingival display - from the zenith of the gingival margin to the upper lip (#13-23). 8. Most posterior maxillary tooth visible

Results: 85 Chinese (45 males, 40 females) and 42 Malay subjects (21 males, 21 females) of mean ages 27.4 and 28.3yrs respectively (21 - 38yrs old) were recruited. In Chinese and Malays, the most common smile was the cuspid smile (64.7% and 61.9% respectively). Straight upper lip curvature was the most prevalent (48.2% Chinese 45.2% Malays). Smile arcs were mostly parallel (58.8% Chinese and 61.9% Malays). In Chinese, medium anterior smile was the most prevalent (65.9%), followed by high (16.5%), low (10.6%) and gummy (7.1%). In Malays, a higher proportion had medium anterior smile line (71.4%) followed by gummy (14%), low (9.5%) and high (4.8%). Overall, 84% of Chinese subjects displayed papilla compared to 57.1% of the Malay subjects. Majority of medium smile lines had papillary display (89.3% Chinese 93.3%). The average gingival display was 0.72 mm, 1.01 mm, 0.45 mm (Chinese) and 0.84 mm, 1.04 mm, 0.51 mm (Malays) for central and lateral incisors and canines respectively. More than half (51.8% Chinese 54.8% Malays) displayed the maxillary first molar.

Conclusion: Trends in Chinese and Malays were similar with slight differences noted. Majority of Chinese and Malays displayed papilla even in those with medium smile lines. The aesthetic zone in more than half extends to the maxillary first molar.

093. Preliminary clinical report of a success of mini dental implants in strategic positions as retention and support for partial removable

dentures in patients with linear or almost linear tooth support and low number of remaining teeth

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Objectives: Most patients with severely reduced dentitions receive removable partial dentures (RPDs) retained by clasps, attachments or double crowns; however the proportion of patients dissatisfied with their chewing function and/or esthetics due to ill fitting prosthesis, clasp visibility, mucosal inflammation, needs for repair, etc. can reach up to 40%. Placement of standard size implants in strategic positions for retention and better stability of RPDs has already shown benefits. However, placement of slim implants < 3mm diameter (Mini dental implants, MDIs) in strategic positions could ensure change from linear into a triangular or polygonal more favorable denture support, which would protect the remaining teeth from overload and reduce possible rotational movements of the RPDs. Moreover, clasps could also be avoided. However, the results of a prospective clinical study on that matter has not been reported yet.

Methods: Thirty six patients, previous RPD wearers with severely reduced dentition (linear support), slim alveolar ridges (< 5 mm) and a need for new partial denture participated. Both, panoramic radiographs and CBCTs were obtained. Each patients received 2 MDIs (diameter varied from 2-2.9 mm and the length from 10-14 mm, depending on the available bone). The MDIs were inserted without flap reflection. Antibiotics were prescribed 2 hours before surgery and 3 days after. Implants were placed posteriorly from the last tooth in the dental arch on both sides, adjacent to it or at a distance of approx. two tooth width posteriorly. If the insertion torque was over 35 N/cm2 the implants were immediately or early loaded. Twenty eight patients received MDIs in the mandible and 8 in the maxilla. Patients filled in 3 questionnaires: Oral health impact profile (OHIP14), chewing function questionnaire (CFQ) and orofacial esthetic scale (OES) at baseline, after receiving new dentures and its adjustments, at the one-year control exam, and in 22 patients at the 3-year appointment. Panoramic radiographs, as well as periapical images were obtained at baseline, after implant placement, after one year and after 3 years. Periimplant tissue and oral hygiene were also assessed.

Results: Seventy two implants were placed. One patient lost one implant and another patient lost both implants (in the mandible) before the denture was delivered. In the patient who lost one implant another was inserted, but was lost too, resulting in the 94.5% MDI survival. No other implants were lost after loading. Patients improved significantly orofacial esthetics, chewing function and OHRQoL ($p < 0.05$) with consistent results through the first year, as well as through the 3-year observation period (in 22 patients). There was almost no bone loss or periimplantitis, although implant hygiene was not always best. None of the remaining patients´ teeth was lost in the observed period. One O rings was changed. No denture fractures (CoCr framework) or matrices loosening was reported.

Conclusion: Insertion of MDIs in strategic positions to provide RPD with more favourable support and retention seem to be a viable and reliable clinical procedure, however more patients and more years of observation are neccessary to aprove the protocol. To Croatian Science Foundation for funding project 218, Acronym: Mini dental implants

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094. Implant-supported cantilevers in anterior sites versus adjacent implants. A retrospective comparative case series

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Objectives: In the last decades implant dentistry has improved treatment outcomes of partially edentulous patients. However, there still are some conditions that represent major clinical challenges. In particular, the unpredictability of creating pleasing esthetics when replacing two adjacent teeth with two implants has been widely described. To overcome this problem some prosthetic alternative treatment options, like to use of cantilevers (extensions), has been proposed. Treatment with cantilevers has raised many concerns about long-term stability in terms of implant survival rate and peri-implant marginal bone loss. In addition, technical complications such as veneer fractures, abutment screw fractures and decementation were recorded, beside implant fracture. In the present literature there is limited evidence of using a implant-supported single crown with a cantilever to replace missing anterior teeth. Hence, the aim of the present study was to evaluate retrospectively two-unit implant-supported cantilever fixed dental prostheses to replace 2 missing teeth in the anterior region compared to two adjacent implants.

Materials and methods: From Sep. 2006 to Nov. 2015, 25 consecutive patients were treated with 30 implant-supported single crowns and one cantilever, while 9 consecutive control patients were treated with two adjacent implant-supported single crowns. A total of 48 implants (31 Astra Tech, and 17 Straumann implants) were placed, and all implant procedures were performed at the Department of Oral & Maxillofacial Surgery, University of Copenhagen, Denmark. The prosthetic rehabilitation was performed at Department of Oral Rehabilitation, School of Dentistry, University of Copenhagen, Denmark. Nineteen test patients (20 implants) and 7 control patients (14 implants) with a mean observation time of 37 months (SD: 25.7, range 11-63) showed up for clinical and radiographical examination and could be included in this study. At the baseline and recall examinations clinical photographs, and periapical radiographs using the long-cone paralleling-technique, were taken. Measurements of marginal bone level (MBL) and assessment of marginal adaptation score (MAS) were performed at the radiographs. MBL was calculated as the mm reduction in peri-implant bone height per year per implant. The following clinical parameters were also included: modified plaque index score (mPI), peri-implant probing pocket depth (PPD). The esthetic results were evaluated using the Copenhagen Index Score including: anatomic form score (AFS), color match score (CMS), mucosal discoloration score (MDS), symmetry score (SC) and marginal adaptation score (MAS). Finally, the papilla height was examined. Due to the limited sample size no p-values were calculated and only descriptive statistics was applied.

Results: MBL was stable throughout the observation period in both groups, and no trends towards differences in periodontal parameters were observed. Pleasing aesthetic results could be obtained with both treatment modalities. The only complication observed was that one implant in the control group was lost due to peri-implantitis. The overall implant survival rate was 100% in the test group and 93% in the control one.

Conclusions: Within the limitations of the present retrospective case study, the use of implant-supported cantilevers in the anterior area seems to be a reliable treatment alternative compared to placing two adjacent implant supporting single crowns.

095. 6 mm long implants loaded with fiber-reinforced composite resinbonded fixed prosthesis (FRCRBFDPs). A 5-year prospective study

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Aim: To evaluate the clinical and radiographic outcomes and the survival rates of resin fixed dental prosthesis (FDP) placed in the posterior area supported by two short (6 mm) implants.

Material and methods: 20 consecutive patients received 40 SLActive 6 mm long implants with a diameter of 4.1 mm (n=29) or 4.8 mm (n=11). Insertion torques and RFA (Resonance Frequency Analysis) were measured at implant installation. The prosthetic rehabilitation was performed after 8 weeks from insertion with a screw- retained 2- or 3-unit fixed dental prosthesis (FDP) fabricated of glass fiber-reinforced resin composite. Implant survival rates and marginal bone levels were evaluated at various time intervals until 5 years after loading.

Results: Two out of 20 FDPs were lost between the second and the third year of follow up (cumulative survival rate: 90% after 5 years). Four patients suffered a fracture of the prosthetic reconstruction, and the success rate of the rehabilitation was 70% after 5years. A mean marginal bone loss of 0.30 mm Ð} 0.34 mm was found after 5 years of function.

Conclusion: While implant stability for short implants was high and bone loss minimal over a 5-year observation period, the survival of short implants was 90% owing to two FDP losses in the maxilla. However, the success rate of resin FDPs over 5 years was only at 7

096. Improving the fitting accuracy of dental prostheses reduces the incidence of peri-implant disease

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Objectives: Since dental implants are required to function for a long time, appropriate maintenance and management are needed. To achieve this, a high-precision connection between the fixture and superstructure and appropriate maintenance are necessary. A fully-splinted design might be employed for superstructures in the upper jaw, but the success rate of such implants has been reported to fall as the length of the superstructure increases, suggesting that maintaining the precision of the connected structure is difficult. In this study, we prepared directly adhered prostheses (DAP), in which the frame of the prosthesis was adhered to the outer cap of the implant abutment intra-orally, using the intra-oral adhesive technique (IAT). Frictional fixation is applied to the superstructure so operators can easily remove it, enabling efficient maintenance when patients visit a clinic. We report the statistics and long-term course of cases involving implants with this superstructure.

Subjects and Methods: DAP prepared using IAT were used to replace 693 teeth in 79 upper edentulous patients between September 2001 and June 2009, and these implants were surveyed. The follow-up period was defined as the period from the application of the DAP to the final visit for maintenance, and it ranged in duration from 1,125 to 3,950 days (mean: 2,283 days (6 years and 2 months). The surveyed items included age, sex, the number of implants inserted per patient, the distribution of the implants across the front teeth and molar regions, the implant survival rate, and the incidences of peri-implant mucositis and peri-implantitis.

Results: The age of the patients ranged from 31 to 82 years old, and the 50-59 age group contained the most patients. Thirty-two and 47 patients were male and female, respectively. The number of implants inserted per patient ranged from 4 to 12 (mean: 8.7). The numbers of implants inserted in the incisor and molar regions were 286 and 402, respectively. The implant survival rate in the follow-up period was 99.3%. Inflammatory findings were noted in the peri-implant region in 22% of patients during visits for maintenance, but the incidence of peri-implantitis was 1.88%. Implants that replaced the rearmost teeth were affected by peri-implantitis in many cases, accounting for 61% of implants that caused peri-implantitis. Peri-implantitis in the incisor region only developed in one tooth, accounting for 0.14% of all cases.

Conclusions and Discussion: Zitsmann NU reported that peri-implantitis affected 28% of oral implants. Our result was much lower than that. We consider that improving the fitting accuracy of prostheses might reduce the opportunity for peri-implantitis.

However, attention should be paid to the rearmost implants because loading is likely to be concentrated on these implants, and self-care is difficult in these regions.

097. Clinical outcomes of implant-supported single crowns made by interaoral scanner and chairside CAD/CAM

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Background: Chairside CAD/CAM restorations have become popular in dentistry including implant dentistry, but the evidence about clinical outcomes of these restorations is limited.

Purpose: The aim of this study was to assess the five year clinical outcomes of implant-supported single crowns made by intraoral scanner and chairside CAD/CAM equipment.

Materials and methods: Sixty six patients with 96 single crowns supported by implants were examined during five year follow up. The restorations were made using CEREC AC (Sirona, Dental system) with emax CAD blocks (IvoclareVivadent). California Dental Association (CDA) quality evaluation system was used to evaluate the restorations. Soft tissue status was assessed using plaque and gingival index scores, bleeding on probing, and pocket depth. Patient and professional satisfaction were evaluated by visual analogue scale (VAS).

Results: The Kaplan-Meier survival probability after 5-year survival rate was 97.8% (95% CI: 96.3-99.3%) for implant-supported single crowns made by chairside CAD/CAM systems. Regards to CDA rating most of the crowns were ranked as either excellent or acceptable (97.9%). The recorded failures were replacement of the crown due to color mismatch (2 cases). Soft tissue parameters were not affected by the restorations compare to control teeth. The patients satisfaction VAS was high (9.42±0.9).

Conclusion: Implant-supported single crowns made by intraoral scanner and chairside CAD/CAM equipment showed good clinical performance over the 5 year follow up.

098. Prosthetic approach with different abutments in aesthetic zone

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Objectives: The management of oral rehabilitation with implants in the aesthetic zone is one of the most significant prosthetic challenges. Manage of soft and hard tissues within the first surgical phase, interim prosthesis and final restoration are parts that articulate the complete result. To take a decision about of definitive abutment, type of material and prosthesis design, is fundamental for the clinical results expected by the patient and the clinician. Taking into account the variety of prosthetic abutments trademarks, is important the use of appropriate abutment for each case. The purpose of this clinical case is to envisage the outcome of different types of abutments for anterior implant tooth replacement.

Methods: A 40 year old woman patient, who came to the Scholarship Center in Mexico City with root resorption in maxillary centrals and laterals incisors with lack of periodontal support. After clinical and radiographic evaluation, she decided to take implant treatment. The implant surgery Type 1 was made using Straumann SLActive Roxolid implants, with low reabsorbed graft, collagen membrane and connective

tissue graft, as well as immediate provisionalization. After fourteen weeks, final restoration was made with different types of abutments (Anatomical abutment, CEM abutment, IPS e.max abutment, Variobase abutment, Gold abutment for bridge and Gold abutment for crown), radiographs were taken to evaluate the placement of each prostheses and aesthetic aspects.

Results: It was observed the settlement of the six different prostheses at radiographic level. Aesthetic parameters such as, papillary filling, color, transition zone with different prostheses and different prosthetic abutments were observed. These parameters showed acceptable aesthetic clinical results in all the cases.

Conclusion: The six different types of prosthetic abutments showed good adaptation and satisfactory clinical results showing that it is possible to use different types of prosthetic abutments especially in the aesthetic area, and not to limit ourselves to the manufacturer's instructions or lab technician, allowing the prosthodontist to leave the comfort zone, obtaining satisfactory clinical results.

099. Clinical effectiveness and failure cases study of implant-supported overdentures retained with locator attachments

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Objective: The aim of the study was to observe the clinical effects of endentulous patients who have undergone implant-supported overdentures retained with locator attachments and discuss reasons of the failure cases.

Methods: 58 cases under the treatment of implant-supported overdentures retained with locator attachments (222 dental implants totally) were gathered from January 2009 to December 2013 in this retrospective study. The patients were followed up for 1-6 years. There were a total of 6 failure cases which associated with 7 dental implants. 4 implants luxation, 2 implants fracture and 1 implant abutment fracture were recorded and basicanalyses were made for the failure cases.

Results: There were a total of 6 failure samples in the retrospective study, 4 males and 2 females. Among the 7 associated dental implants, 85.71%(6/7) were maxilla implants and 14.29% were mandibular implants; 14.29%(1/7) failure occurred in the mesial site and 85.71%(6/7) failure occurred in the distal site. It could be observed and concluded that the natural teeth and overdenturesas the opposite teeth led to higher failure rate, which caused 8.33%Ð5.00% failure rate, respectively.

Conclusion: Implant-supported overdenture retained with locator attachment is a long-term successful method for edentulous patients, especially for the mandibular edentulous patients. As for the maxilla edentulous patients with alveolar bone deficiency of posterior region, some assistant methods like more implants for fixation, or choose rigid connection like bar-clip attachments and “All-on-4(x)” half-fixation bridge for short dental arch are recommended.

100. Monolithic zirconia implant-supported fixed dental prostheses: A 2-year prospective study

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Purpose: The purpose of this prospective clinical trial was to investigate the clinical outcomes of implant-supported monolithic zirconia single crowns (SCs) and short-span FDPs with modified design after a follow-up of 2 years.

Material and methods: A total of 27 patients with 56 monolithic zirconia prostheses (44 SCs and twelve 3-unit FDPs) were included in this study. All patients were followed up at 6 months, 12 moths, 18 months and 2 years after placement of the definitive SCs and FDPs in the posterior maxilla or mandible. During the follow-up period, all monolithic prostheses were evaluated upon clinical and radiographic examinations.

Results: One out of 14 FDPs failed because of framework fracture. The overall survival rate was 98.2% after 2 years of clinical service. During the following period, 4 complications were observed in 3 SCs and one FDP, including one chip-off fracture of veneering porcelain, 2 events of screw loosening, and prosthetic dislodgement and opposing tooth fracture in the same FDP. Therefore, the complication-free rate of prostheses was 91.1%.

Conclusion: The modified monolithic zirconia design can result in a favorable short-term outcome for posterior implant-supported SCs and 3-unit FDPs, yielding a 98.2% survival rate after 2 years.

Keywords: Monolithic zirconia, implant, fixed dental prostheses, screw-retained, cement-retained

101. Two different design concepts of anterior bar used for retaining mandibular implant assisted overdenture: Peri-implant bone height changes

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Objectives: 1- Minimizing rotational movements of implant assisted mandibular complete overdenture and load transfer to the surrounding bone depends mainly on the design of attachment and manner of loading by overdenture. 2- This study was conducted to evaluate radiographically, the effect of two different design concepts of anterior bars retaining implant assisted mandibular complete overdenture.

Materials and methods: Ten healthy completely edentulous male patients with average 50-60 years old and U shaped mandibular arch were selected for this study. All patients were classified randomly according to the design concept of the anterior bar retaining the implant assisted mandibular complete overdenture as follow: Group (I): where their implant assisted overdentures were constructed to be retained by anterior cantilvered bar with bilateral balls, Group (II): where their implant assisted overdentures were constructed to be retained by anterior standard bar and two ball-implant attachments in the first molar areas. Immediately, six (T6) and twelve months (T12) after definitive loading, peri-implant marginal bone height changes were evaluated by periapical digital radiograph using a long cone parallel technique and customized film holder.

Results: The results of this study revealed a significant difference in vertical alveolar bone loss around canine implants between the six months intervals and twelve months interval after mandibular overdenture insertion in both groups. In spite of a non-significant difference in vertical alveolar bone loss was found between the two groups during the first 6 months, group (I) had a higher significant bone loss around canine implants than group (II) after the second six months of overdenture insertion. At the end of twelve months after overdenture insertion the peri-implant bone loss in group (I) was significantly higher than vertical alveolar bone loss in group (II) around canine implants.

Conclusions: Regarding the preservation of peri-implant alveolar bone height the design concept utilizing anterior standard bar and bilateral posterior implant-ball attachments can be considered better than the anterior bar cantilevered with ball attachments used for retaining the implant assisted mandibular complete overdenture.

102. The effect of pre-cementing or crown venting on the marginal cement excess of lithium disilicate and zirconia all-ceramic crowns: An in-vitro study using Y-TZP implants

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Objectives: The aim of this in-vitro study was to analyse the relative amount of marginal cement excess of lithium disilicate and zirconia all-ceramic crowns cemented on Y-TZP implants using adhesive cement or resin modified glass ionomer cement. Three different cementation techniques were investigated: palatal venting, pre-cementation on a custom analogue and "conventional" cementation.

Methods: A total of seventy-two one-piece yttria-stabilized tetragonal zirconia polycrystalline (Y-TZP) ceramic implants (Straumann PURE Ceramic Implant) were embedded in clear acrylic resin. Thirty-six crowns of each material, lithium disilicate (LS2, IPS e.max CAD) and zirconium dioxide (ZrO2, Lava Plus High Translucency Zirconia) were designed with CAD/CAM technologies. 12 experimental groups (n=6) were constituted depending on the i) material of restoration: lithium disilicate "L" or zirconium dioxide "Z", ii) type of cement: dual-cure adhesive composite cement "A" (Multilink Automix) or resin modified glass ionomer cement "B" (GC FujiCem 2), and iii) cementation technique: palatal venting "PV", custom analogue "CA" or non-venting "NV". The palatal venting holes of the PV groups were produced pre-sintering / pre-crystallization. An implant analogue was used to create a size reduced pre-cementation device that was amplified in 24 polyurethane custom analogues for single-use application of each crown in the CA group. All crowns were conditioned and cemented according to the instructor's guidelines. During the cementation procedure several weight measurements were performed using a high precision analytical balance to assess the marginal excess cement. The relative amount of marginal excess cement was calculated for each sample, expressed in %, and statistically analysed by linear regression model for all subgroups.

Results: The relative amounts of marginal excess cement ranged from 5.09% (±2.26%) in L-B-PV and 68.67% (±8.97%) in Z-B-NV. These relative amounts of excess cement differed significantly among the cementation techniques with least marginal excess cement in vented crowns PV (1.4 mg; 6.2%), followed by the group using custom analogue CA (8.6 mg; 33.6%), while most excess cement was found with conventional cementation NV (17.4 mg, 65.7%). The type of cement (A, B) did not affect the relative amount of marginal excess cement ($p = 0.68$), whereas the crown material ZrO2 showed higher levels of marginal excess cement compared to LS2 ($p = 0.02$)

Conclusion: Both investigated cementation techniques, palatal venting and pre-cementation, led to significantly less marginal excess cement compared to conventional cementation of CAD/CAM designed lithium disilicate and zirconium dioxide crowns cemented on Y-TZP implants. Overall, best results in matters of marginal excess cement reduction were achieved by the venting technique, which was implemented successfully within the workflow of the CAD/CAM procedure.

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103. A split-mouth controlled clinical trial comparing immediately functional loaded and delayed loaded implants supporting fixed partial dentures in the posterior mandible

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Objectives: This controlled split-mouth trial is performed to evaluate the clinical outcomes of immediately loaded and delayed loaded implant supporting fixed partial dentures in the posterior mandible.

Methods: A total of 58 Straumann, Osstem or Ankylos implants were placed in 12 bilateral partially edentulous patients' posterior mandible. For each patient, same implant system is used for both sides. Before surgery, there is no significant difference in residual alveolar bone level (BL) between every patient's test side and control side. In the test group, 31 implants were immediately loaded with temporary abutments and fixed bridges within 24 hours after placement; 27 implants in control group were loaded with permanent abutments and fixed bridges at least 3 months later. Via a paired t test, changes of BL were assessed using panoramic radiograph at baseline, 3 months, 9 months and 18months after surgery.

Results: Comparing to the 100% success rate in control group, 5 implants of test group were lost in the follow-up period and the success rate is 83.9% ($P > 0.05$). Moreover, the mean resorption of BL in successful cases of the test group and control group are 0.38 ± 0.43mm and 0.28 ± 0.36mm in the 3rd month respectively, and 0.43 ± 0.44mm and 0.15 ± 0.25 in the 9th month respectively (Both $P > 0.05$). Notably, in the 18th month, the mean resorption of BL is significantly lower in test group compared with controls (0.76 ± 1.01mm vs. 1.18 ± 0.87mm, respectively).

Conclusions: Within follow-up period, similar success rate was found in immediately loaded and delayed loaded implants. As for the BL change, immediately loaded implants show non-inferiority at the early healing stage and superiority in the long-term follow-up comparing with the delayed loaded ones.

104. Histological analysis and clinical resolution of an allograft block failure: A case report

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Objectives: This case report describes a biological complication related to guided bone regeneration with a block allograft after 4 months of healing and the solution of the case. The study considers the histological aspect of the removed grafted material in order to focus to the etiology and the pathogenesis of such an undesirable event.

Materials and methods: An healthy 50-year-old patient complained of a persistent disconfort of the left posterior mandible due to a large edentulous area that compromised any correct mastication. From the clinical and CBCT exam a severe bone atrophy has been pointed out. With the consensus of the patient it was decided to regenerate the bone defect by the use of an allograft preformed to the shape of the residual alveolar crest in order to reduce the post-operatory disconfort and the time of surgery. No complication occurred during surgery nor during the early healing phases. The patient underwent an antibiotic therapy for 1 week from the bone regeneration (3 grams of amoxicillin per day), anti-inflammatory for 3 days and 3 rinses of chlorhexidine per day for 15 days. From a clinical point of view no dehiscences where revealed during the healing phases. After 2 months from surgery an inflammation area in correspondence of the graft were detected with a contemporary flare of pain. Another antibiotic therapy was given to the patient in order to avoid a possible super-infection of the graft. After another month pain and swelling reappeared. This time an openflap had been performed. Part of the graft had to be removed because of a initial connective tissue infiltration. The fragment harvested was collected in a solution in buffered formalin 10%. Histologic specimens were obtained and analysed with haematoxylin-eosin staining and Brawn and Bern technique with light microscope.

Results: Histopathologic evaluations revealed a scene compatible with an osteomyelitis due to the intense inflammatory infiltration and the presence of gram-positive bacterias. The presence of osteocytes forming new bone showed a partial integration of the block. In the peripheral parts of the specimen, areas of intense inflammatory infiltrate, fibroblasts and connective tissue matrix were detected. No macroscopic dehiscences were noticed during wound healing and therefore it wasn't possible to determine a certain cause for bacterial presence in the allograft. The partial integration of the grafted material consented to sacrifice only a part of the regeneration. This made possible to insert the planned implants due to an adjunctive small guided bone regeneration. After six moths from the implants insertion a final fixed restoration was delivered. The six month follow-up visit showed a good soft and hard tissue integration and stable bone level around implants.

Conclusion: The infection of grafted material allowed only partial formation of new bone as showed by histology. Anyway, after one year the patient had been successfully rehabilitated with a fixed partial implant restoration. Apparently no cause of bacterial infiltration where founded. Especially if compared to autologous bone, allograft blocks should be treated more carefully due to the ease to be infected or resorbed, even when there weren't any notable soft tissue dehiscences.

105. Surgical and prosthetic treatment of multiple fractured implants in a complete mouth rehabilitation: A clinical case report

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Objectives: Biological and mechanical implant complications can lead to challenging clinical scenarios. For example: peri-implant mucosistis, peri-implantitis, malpositioned implants, implant fractures, screw loosening or screw fractures. One of the very rare mechanical complications is implant fractures. Prevalence in the literature is estimated to be around 1%. Osseointegrated fractured implants can be difficult to remove. In such cases the extraction of the implant can lead to significant loss of bone preventing new implant placement. This case report describes the complete mouth reconstruction of a patient transitioning from a failing dentition, with misplaced, fractured and failing implants, to functioning implant supported complete dentures.

Methods: A 66-year old partially edentulous Caucasian male presented with failing dentition, peri-implantitis, recurrent decay and multiple fractured implants. The chief complaint of the patient was his inability to chew well and unpleasant aesthetic appearance. A comprehensive examination was completed indicating that his medical history was non-contributory. Intra-oral examination presented non-restorable teeth due to recurrent decay on #3-x-x-6, malpositioned implant #8, fractured implants #9,10 and bone loss on implants #11,12,13. The mandibular arch presented with retained root tips of #18,21, recurrent decay on #22, incisal attrition on teeth #23-26. A CBCT was taken to evaluate and plan for the final implant placement. Diagnostically the CBCT indicated implant #9,10 perforated the floor of the nasal fossa, implants #11,12,13 had significant loss of buccal and palatal bone. Possible causes of implant fracture include defect in the manufacturing of the fixture, parafunctional habit, inadequate implant position, length and/or diameter, and peri-implant bone loss. An interdepartmental examination was completed; the treatment option decided was 4 implant-supported maxillary overdenture retaining implant #14, and 2 implant-supported mandibular overdenture.

Results: Teeth #2,3,6,15 and implants #11,12,13 were extracted. Fractured implant #9 and implant fragments #10,11 were removed and GBR was performed. A maxillary immediate complete denture was fabricated and implants #8,14 were directly picked-up with locator abutments to provide a fixed-removable temporary prosthesis. Due to the patient's desire not to under go lateral sinus augmentation bone-level fixtures at #4,6,12 were placed with simultaneous internal sinus lift. The remaining mandibular teeth were extracted and immediate complete denture was delivered. After 6 months of healing, bone-level fixtures were placed at sites #22,27 with the aid of a surgical template. At the completion of osseointegration, both maxillary and mandibular implants were uncovered and healing abutments were placed. Once hard and soft tissue healing was completed, a 4-implant supported maxillary overdenture and 2-implant supported mandibular overdenture was fabricated.

Conclusion: With the wide spread of Implantology, implant complications, such as incorrect prosthetic placement, fractured implant, crestal bone loss around implants, peri-implantitis, fracture of implant component and connection are more prevalent within the clinical setting. The clinician of today needs to be prepared to diagnose and treat complications to restore patients back to a functional and healthy dentition.

106. Surgical soft tissue improvement in the course of implant therapy

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Objectives: Soft tissue management has become a crucial part of implant therapy in the aesthetic zone, as implant placement nowadays does not only require functional success, but also pleasing aesthetic outcomes.

Methods: In order to be successful, new surgical techniques and materials give clinicians helpful tools at hand. Even more important, sophisticated clinical concepts are required to achieve the best possible result despite varying starting circumstances.

Results: During therapy, different points in time are possible to improve the soft tissue conditions: at tooth extraction, together with implant placement or at uncovering. In case of tissue deficits, augmentations using autologous soft tissue can be performed in different ways, such as the socket seal surgery, the modified roll flap procedure or incision-free tunneling techniques. Often not only one of them, but also a combination also has to be used subsequently at the different treatment steps. Once the desired soft tissue shape is created, it needs to be transferred from the provisional to the final restoration in the prosthetic part of the treatment.

Conclusion: This poster gives an overview of a strategic approach from tooth extraction to implant impression.

107. Periodontal and implant treatment in a case of severe and generalized periodontal disease: 10-year follow-up

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Objectives: This case concerns a 36-year-old male patient who was not aware of how serious his oral situation was before his first visit. The patient history showed that he was in good general health, he smoked less than 5 cigarettes a day, and he had a family history of periodontitis. The aim of the therapy was to restore the patient's periodontal health so that the patient could recover his full masticatory function through the use of osteointegrated implants considering the age of the patient.

Materials and methods: Intraoral examination revealed that mainly the upper maxillary premolars and molars presented third-degree mobility. The orthopantomograph showed marked interproximal bone loss on all premolars and molars. In particular tooth number 1.4 was detached at the time of the visit. High values were found both for FMPS and FMBS. Treatment started with scaling and root planing and hopeless teeth were extracted: 1.5 1.6 1.7 1.8 2.4 2.5 2.7 2.8. For endodontic and periodontal reasons also 3.5 3.6 3.8 4.7 4.8. were removed at different stages of the therapy. The teeth of the upper and lower front group were treated with periodontal non-surgical therapy with scaling and root planing sessions. 4.4 was endodontically treated and, as a result of this, symptoms improved dramatically. After a periodontal revaluation, which showed that the patient's health had been restored and FMBS was < 15%, Straumann SLA tissue level implants were used. Where necessary, bone regenerative procedures were performed using autologous bone, deproteinized bovine bone and resorbable collagen membranes. Tooth 3.6, which had a 13mm probing depth with an angular mesial defect, was treated with a regenerative approach, using amelogenins and deproteinized bovine bone, after thorough root planing and detoxification with EDTA at 2%. The implants were restored with metal ceramic crowns and the patient started a customized follow-up program.

Results: All placed implants reached and maintained osteointegration; 10 years have passed since the end of the treatment and the patient has undergone regular visits, he has practiced excellent dental hygiene and plaque and bleeding indices are now under 10%. No tooth mobility has been detected. The radiographic examination shows absolute stability of peri-implant bone levels, without any signs of mucositis or peri-implantitis. For aesthetic reasons it was necessary to cover 1.2 with a ceramic facet, which had been previously endodontically treated. The mesial probing performed on 3.6 appears to be physiological without any signs of infection.

Discussion: Data from literature show that peri-implant problems mainly affect periodontal patients (Ong et al. 2008) with increased bone loss and a greater number of lost implants. An adequate Supportive Periodontal Therapy, the absence of smoking, and a good patient compliance result in better outcomes (Roccuzzo et al.2010) (Chambrone et al. 2015). It has been shown that a periodontal treatment, with elimination of pockets and bleeding, can have an effect over a long period, if patients regularly check their teeth for plaque and they follow a strict program of regular check-ups. (Trombelli L. et all 2015)

Conclusion: Proper therapy by means of tissue level SLA implants offers predictable long-term results, in PCP. Patients with a history of periodontitis should be treated for the disease, before implant placement. Excellent values of long-term survival rate can be obtained even in PCP, if these are placed on an individually tailored maintenance program.

108. A Modified ridge split technique with delayed implant placement in maxillary severe horizontal defect

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Objective: Dental implants, as a method to replace the natural teeth, have gained favorable public acceptance over the years. The success of dental implants depends primarily on the bone quantity and quality. However, due to the high risk of labial bone plate absorption in the esthetic area, implant placement is often accompanied by horizontal bone augmentation, such as ridge splitting, bone condensing, guided bone regeneration (GBR), and onlay grafting. Nevertheless, GBR is not suitable for extremely narrow ridges, while onlay grafts require a second, traumatic operation. The ridge splitting technique has some disadvantages as well, including fracture of the buccal bone plate, improper implant position, and the absorption of buccal bone lamella due to poor blood supply. Therefore, in cases of continuous anterior tooth loss, it is critical to increase the bone quantity and quality in a minimally invasive manner to achieve the best possible esthetic results. With this consideration, we used a modified ridge splitting technique combined with delayed implant placement in case of severe horizontal defect.

Methods: A 48-year-old woman with no medical complications presented to our clinic for replacement of a loose ceramic bridge in the maxillary anterior region. Clinical examination showed that tooth 12 had been extracted for a week. The ceramic bridge between tooth 11 and 23 was loose and a typical percussion pain was found in tooth 11. Cone beam CT (CBCT) showed a decreased bone density at the apical area of tooth 11 and the ridge width between teeth 21 and 22 was barely 2-3 mm. In such conditions, we decided to use the modified ridge splitting technique combined with delayed implant placement for optimal restoration. Under local anesthesia, a minimal flap was raised on top of the ridge, and then a linear groove parallel to the palatal side was prepared with rotating burs. Subsequently, an osteotome chisel with a small blade was used to deepen the linear slit. Once the ridge had been split, the gap was filled with bone substitute particles (Bio-oss®) to preserve the additional buccolingual width that had been gained in a manner similar to a sandwich bone graft. Subsequently, the surgical site was carefully sutured. Four months later, 4 Straumann® bone level implants were placed into the anterior region, and GBR was applied to further increase the bone quantity. Six months after implant placement, the secondary operation was performed and the provisional restorations were given to the patient for further soft tissue management. The final restoration was completed when the gingival contour showed a typical scalloped architecture in approximately 3 months.

Results: Four months after the modified ridge splitting procedure, the ridge width around the teeth 21 and 22 had been increased to 6 mm, and only a slight absorption was evident in the split area. One year after implantation, the implants were stable with no sign of inflammation of the gingiva. CBCT showed that the buccal bone plate thickness was more than 2 mm. The patient expressed satisfaction with the final results.

Conclusion: In terms of esthetics zone, the modified ridge splitting technique may be a viable option in cases of continuous severe horizontal bone defects, especially for those with a narrow basal bone. This technique is minimal invasive, which requires minimal surgical skills and may reduce the absorption of buccal bone lamella as well as present an improved implant axis.

109. Straumann guided surgery

Author: **Camacho, Pedro[1] | Spain**

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Objectives: The objective is to introduce professionals in the Dental field to this new and exciting approach for implant Dentistry. From showing the hardware and software needed, the way to use it, and the results from several successfull clinical cases step by step. The poster would be intended as a short lesson on how to treat a patient digitally. Taking the professional throughout the process: From the intraoral scanning obtaining the DICOM files, their conversion to STL files for virtual treatment planing using the software “CoDiagnostiX”; to describing the production of the surgical stents for implant placing, and the digital workflow for production of prosthodontics.

Methods: The methods include all the information given by a recent Straumann course taken in Valencia, Spain. Where the participants had their own clinical casesto work on and in which I personally took part. Pictures of the surgery using the personalized stents, captures of the TACs and X-rays before and after treatment would be placed showing the end results. Also screen captures of the treatment planning using DICON and STL computer files; and in addition a scientific review of over ten very recent articles describing the advantages and possibilities of this new technique.

Results: The results are the success of three clinical cases including: a full edentuolus patient, a partially edentulous patient, and a case with several unitary crows. All done with implant placement using a surgical

stent produced from digital information for each case, and with the treatment planing also done digitally. With the inmediate charge of the implants in the last mentioned clinical case describing the necesary situation in order to do it.

Conclusions: To conclude the professional will realized how this technique offers the most precise planning for the implant treatment, together with the best results in the reconstruction phase. Which leaves almost no margin for imperfections in our treatments, no place for human error during surgery, and all with the strong comercial support of Straumann from beginning to end.

110. Vertical distraction of the mandibular periosteum and placement of dental implants: Case report

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Co-authors: Cardona Gómez N.[1], Becerra Herrera O.C.[2]

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Objective: The objective of this research was to increase the vertical and transverse dimension of the edentulous alveolar ridge on the rear lower left sector for placement of dental implants by means of the osteogenic distraction technique of the periosteum. (ODP). A 63 year old female patient, non-smoker, with no significant medical history, with severe transverse and vertical alveolar atrophy from 35 to 37 areas. Cone Beam Tomography examination revealed a 10 mm alveolar height at the 35 level with transverse plane deficiency and a height of 3.2 mm at the 36 level.

Materials and methods: Different treatment plans were offered according to what the patient required, but she accepted the ODP procedure that had only been performed on experimental animals, indicating the risks and benefits of this technique , formalizing the treatment through informed consent. The mandibular tomography was reproduced in 3D to design the traction device: TRACPER 3. A Walter Lorenz alveolar osteogenic distractor was used, which was fitted with a titanium mesh 0.1 mm thick, cut to a size of approximately 20 x 30 mm and joined by means of an orthodontic ligature wire, leaving the mesh free to adjust and adapt to the edentulous bone surface. In an oral surgery room, anesthesia was placed the rear lower left sector, a mucoperiosteal incision was made at the groove level in zone 35 to 38, subperiosteal dissection until the basilar border of the mandible and the complete alveolar ridge were visualized. Multiple perforations of the alveolar bone surface with frustoconical drill 701 were performed and with the help of the guiding plate for the positioning of the central rod, the covering mucoperiosteal was perforated. Once the position of the device was defined, it was fixed with four titanium screws of the system 1.5mm x 6 and 8mm length to suture the wound in two planes. Four days after, the activation of the ODP device at the rate of 0.25mm twice daily. Prior to the activation of TRACPER 3, a mouthwash was performed with 0.12% chlorhexidine digluconate for one minute. The process of distraction of the mucoperiosteal was carried out during 15 days for a total of 30 activations equivalent to an increase in the alveolar height of 7.5mm. After the activation phase of TRACPER 3 was concluded, 12 daily sessions of soft laser application were started (according to the literature previously studied) Gallium Arsenide Laser Diode (GaAs), 905nm, with a total of 20J / cm2 applying 5 J / cm2 for five minutes intra oral in the area of ODP.

Results: As a result, a suitable osteogenesis and osteoid material was successfully clinically, histologically and tomographically confirmed to support the insertion of osseointegration implants of the Strauman mark, which were placed four months after the distraction phase in the 35 (BL 3.3 x 8mm) and 36 (BL 4.8 x 10mm) areas with adequate primary stability. The final rehabilitation was carried out at three months with crowns of 35 and 36.

Conclusion: It can be concluded that the PERIOSTEUM DISTRACTION technique is adequate to promote vertical and transverse osteogenesis of edentulous alveolar ridges. The application of diode laser favors the process of bone maturation prior to the placement of implants on neoformed bone. It is necessary to conduct more studies on humans to know the clinical behavior of distracted tissues and to optimize the design of TRACPER 3 for the various clinical situations that require it.

111. Autopsy report of micro-computed tomography and histology in maxillary sinuses augmented by 'HYBRID TECHNIQUE'

Author: **Cha, Jae-Kook[1] | Republic of Korea**

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Objective: Recently introduced 'hybrid technique' of sinus augmentation is based on bone-added osteotome sinus floor elevation procedure with the combination of detaching sinus membrane via minimally induced lateral access slot on lateral wall of maxillary sinus, aiming to reduce surgical invasiveness and to overcome surgical blindness. This autopsy case report presents histologic and micro-computed tomographic results of entire sinus area augmented by hybrid technique in human.

Materials and methods: The present report was based on the honorable whole body donation of a 62-year-old, male patient who died from bladder cancer. Hybrid technique of sinus augmentation with implant placement (Straumann Tissue Level®) was performed on both maxillary sinuses. Hybrid technique was performed by the protocols described previously. In brief, minimally-sized straight slot osteotomy was induced at the level of sinus floor, and sinus membrane was elevated from the bony sinus floor at the implant site and the surrounding area. Implant site preparation and penetrating sinus floor was performed using sequential drilling with the protection of sinus membrane by periosteal elevator or membrane elevating instruments. Mixture of bone substitute (biphasic calcium phosphate) and autogenous bone from maxillary tuberosity was transcrestally grafted into the spaces between the elevated sinus and bony floor via implant preparation holes. Prosthesis was finally connected after 4 or 5 months since hybrid technique, and both augmented sites maintained without any complications of inflammation or pathologic bone resorption for 6 years. Maxillary sinus areas containing implants were gently removed from donated cadaver, and scanned with a high-resolution microcomputed tomography. Samples were sectioned and prepared for undecalcified histologic slide, and observed with the staining of hematoxylin-eosin.

Results: After sectioning, augmented area could be clinically observed with several visible particles encapsulated sinus membrane. In cross-sectional views of micro-computed tomography, radiopaque bone tissues with scattered bone substitute particles were seen around the implants. Histologic slides also showed lamellated mature bone and marrow spaces around dental implants, as well as scattered bone substitute particles. However, residual bone particles were not evenly spread out within the augmented area, and several particles were encapsulated within the membrane. There was no histologic bone loss around implant.

Conclusion: This autopsy report in micro-computed tomography and histology proved substantial bone formation and its maturation, and it can provide scientific evidences for hybrid technique of sinus augmentation.

112. Immediate dental implant placement in esthetic zone guided by digital surgical template and restoration using CAD/CAM technique - A case report

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This 37-year-old male patient, complained about 5 days of anterior teeth injury and required implant restoration. Medical history of the patient was not remarkable. The clinical inspection of the oral cavity revealed a crown fracture of tooth #21 and a root fracture of tooth #11 with slight swelling of mucous memebranes. There was casual space in teeth #12~#22 and no obvious abnormality in occlusal relationship. Esthetic risk evaluation revealed a medium lip line and a thick gingival biotype. CBCT examination revealed that tooth #21 crown fracture to crest of ridge and tooth #11 root fracture about 2mm below crest of ridge. The labial plate have no abnormalities and no fracture was found.

Objectives: To describe a case of immediate dental implant placement in esthetic zone guided by digital surgical template.

Methods: Teeth #11 and #21 were carefully and gently extracted then immediately implant placement (Straumann, 4.1*12 RC, BL, SLActive) guided by digital surgical template and GBR procedure were taken. Vacumm-formed simple partial denture was therefore fabricated to serve as an interim restoration during 8 weeks healing period. In accordance with an early loading protocol, Er:YAG laser technique was applied to expose implants 2 months after surgery. Provisional restorations were made by digital impression and adjustment was taken every 3 weeks. Castable ceramic laminate veneers of teeth #12 and #22 were produced digitally to close the casual space 2 month after implant exposure. After 3months of Provisional restorations ,digital impression was taken again and Ti-base zirconia ceramic crowns were made with screw-retained.

Results: The patient was satisfied with color and shape of maxillary anterior restorations with no black triangle when smiling. There was no marginal gingival recession around dental implants #11 and #21. Gingival papilla index was 3 (GI=3). Pink esthetic score was evaluated 12 (PES=12). CBCT examination 6 months after restoration showed that no alveolar bone resorption occurred around dental implants. The thickness of labial plate was almost 2 mm.

Conclusion: Dental implant could obtain good initial stability guided by digital surgical template on condition that indications were strictly controlled and treatment effect could be expected ideally. Flap surgery with GBR guide technique could ensure early healing of soft tissue. Satisfactory final restoration effect could be obtained by digital surgical templateÐdigital scanning and digital restoration design.

113. A 13-year case report on esthetic outcomes of soft tissue augmentation by a modified vascularized interpositional periosteal-connective tissue technique around Straumann tissue-level implant

Author: **Choe, Sun-Ho[1] | Republic of Korea**

Co-authors: Cha J.-K.[1], Lee J.-S.[1], Jung U.-W.[1], Kim C.-S.[1]

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Objective: To report on long-term results of soft tissue augmentation by a modified vascularized interpositional periosteal-connective tissue technique around Straumann implant on the maxillary central incisor.

Materials and methods: The present case was published previously (Kim et al, J Oral Maxillofac Sug 2012;70: 484-491) and this is the continuous results of follow up thereafter. The patient visited the department of periodontology, Yonsei university dental hospital with vertical root fracture on the maxillary right central incisor. At 8 weeks after tooth extraction, hard and soft tissue augmentation was primarily performed; guided bone regeneration using a titatnium-reinforced e-PTFE membrane and autogenous bone from symphysis, and modified vascularized interpositional periosteal-connective tissue graft. After 5 months, a Straumann Tissue-level standard-plus implant was placed. Pink esthetic score and marginal bone level around the implant was measured clinically and radiographically in each periodic follow-up visit.

Results: Desirable esthetic result was shown (Pink esthetic score=11) at a visit 13 years after hard/soft tissue augmentation. Dental papilla, gingival margin, integrity of labial contour, and soft tissue color and texture remained harmonious and comparable with the adjacent tooth. The patient was esthetically satisfied without any discomfort. And there was no specific signs of inflammation or infection. Periodic periapical radiographs showed limited marginal bone loss less than 0.5mm around the implant over a 13-year follow up period.

Conclusion: The present case of soft tissue augmentation by a modified vascularized interpositional periosteal-connective tissue technique described desirable esthetic results for 13 years, and it could be promising procedure that contributes to long-term esthetic stability.

114. A modified technique for maxillary molar intrusion with sinus floor elevation by temporary anchorage devices: Case series

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Objectives: Reposition of the supra-erupted maxillary molars (SEMM) by orthodontic treatment is a common noninvasive method to overcome limited inter-occlusal space and to achieve ideal occlusal scheme of the prosthesis. However, in cases of SEMM combined with low sinus floor (SF), the attempts to achieve remodeling of cortical bone of the SF and to intrude the roots of the molars are still extremely tough tasks. The case series presented 4 cases with SEMM combined with low SF by utilizing a modified technique for maxillary molar intrusion with SF elevation using temporary anchorage devices (TAD).

Methods: The modified technique used TAD. Two miniscrews (2.0mm in diameter; 10mm in length; Bio-Ray; Syntec Scientific Corporation, Chang Hua, Taiwan) were placed approximately 5mm apically to the roots of the SEMM directly into the buccal and palatal bone plates. The miniscrews were immediately loaded with modified NiTi close coil springs which attached to the splinting of wire and resin between the SEMM. The flowable resin was used to cover sharp edges, protecting mucosae from abrasion. After treatment, adequate inter-occlusal space was regained for the implant placement.

Results: After an average treatment period of 5 months, within 4 appointments, the modified technique using TAD succeeded in elevating and remodeling the SF and created adequate inter-occlusal space for the mandibular implants thus final prosthesis could be achieved favorably. In the presented cases, repeatable parallel periapical radiographs before and after treatment revealed that the SF was elevated and remodeled. Postoperative cone beam computed tomography image also showed intact SF above the maxillary roots and the bone tissue could be noted between the SF and the roots of the intruded maxillary molars.

Conclusions: Within the limit of our cases, by using this modified method, it may solve the limited inter-occlusal space caused by SEMM for the implantation over the mandibular edentulous ridge in a short period of time with fewer chair time consumed. In addition, it could also elevate and remodel the cortical bone of SF successfully.

115. A modified split thickness pedicle flap to correct a soft tissue defect simultaneous with implant placement in a complex aesthetically demanding case

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Dentoalveolar trauma presents a major challenge when planning implant supported replacement of teeth, particularly in the aesthetic zone. The resultant hard and soft tissue deficiencies are often far more unfavourable than the normal pattern of tissue loss following routine loss of teeth. These complex cases often require initial hard tissue grafting to allow for implant placement and this necessitates surgical adaptation of the soft tissues which further compromises the aesthetic outcome.

The aim of this report is to present a novel technique using a modified split thickness pedicle flap to allow soft tissue augmentation simultaneous with implant placement.

A 22 year old female was referred to Glasgow Dental Hospital for replacement of missing upper anterior teeth. She had previously sustained a facial injury, resulting in dentoalveolar fracture of the anterior maxilla with subsequent loss of the upper left central and lateral incisor teeth. Significant bony and soft tissue deficits were observed with added complications of a high smile line and thin gingival biotype. Cone beam computed tomography revealed inadequate bone volume for implant placement and therefore autogenous onlay grafting was carried

out to address this deficit prior to implant placement. An implant supported bridge was subsequently planned with implant placement into the upper left central incisor region and a distal cantilever to replace the upper left lateral incisor. The significant soft tissue defect in the pontic site was planned for simultaneous soft tissue grafting at the time of implant placement.

A three sided mucoperiosteal flap was raised with a split thickness element in the palatal aspect to allow palatal connective tissue to be harvested as a pedicle attachment to the labial flap. The osteotomy site was prepared using a surgical guide and the implant placed into the upper left central incisor region with good primary stability. The connective tissue pedicle flap was rolled under the labial flap in the pontic site to augment the soft tissue deficit in this region whilst maintaining its blood supply from the labial full thickness flap. This technique eliminated the need for a further soft tissue augmentation procedure thereby reducing morbidity, surgical time and potential anxiety for the patient, whilst providing a favourable aesthetic outcome.

This case resulted in a pleasing aesthetic and functional result in a challenging defect of two adjacent missing teeth lost due to trauma. In such anatomically challenging circumstances, with a high smile line in the aesthetic zone, the use of this technique has circumvented the need for pink porcelain for two adjacent missing teeth and instead provided a superior aesthetic outcome.

116. Alveolar ridge augmentation in organ transplant patients - still a contraindication?

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Objectives: Dental implants after organ transplantation are still discussed controversially because of the immunocompromised condition of such patients and the corresponding risk for infections. Few studies have reported high success rate of dental implants in transplanted. Nevertheless there is no evidence about alveolar ridge augmentation prior to implantology, since organ transplantation and consequent life-long immunosuppression have been discussed as contraindication for such procedures. The aim of this clinical report was the evaluation of the outcome of dental implants placed after bilateral sinus lift and horizontal maxillary ridge augmentation in a liver transplanted patient after more than 4 years in function. From a second point of view, the mandibular rehabilitation of the same patient with an implant-supported overdenture after more than 2 years in function is presented.

Methods: In October 2011, 8 years after a first liver transplantation and 2 years after retransplantation because of transplant failure, bilateral sinus lift and horizontal ridge augmentation with an iliac crest block graft combined to a xenogenous bone substitute have been performed in a transplanted patient. The augmented areas reached from the maxillary canine to the molar region. The surgical procedure was conducted under perioperative antibiotic prophylaxis. After the first postoperative week, the existing upper denture was reduced in order to prevent pressure sores and inserted again. 6 months after an uneventful healing period 6 maxillary implants have been placed. After 4 months of submerged healing, uncovering of the implants was conducted by apically positioned flaps in order to achieve a band of keratinized tissue around all implants. Finally, after another 2 weeks, an implant-supported fixed hybrid prosthesis has been inserted. Because of the immunocompromised condition of the patient, 3-monthly recalls have been conducted since the insertion. 26 months after the insertion of the maxillary restoration, 4 implants have been inserted in the mandible without any augmentation procedure. After 3 months of uneventful transgingival healing, 4 Locator-abutments and an implant-supported overdenture have been inserted.

Results: The augmented areas as well as the implants in the upper and lower jaw showed an uneventful healing. The xenogenous bone graft and the transplanted iliac crest block showed clinically a good incorporation at the time of implant insertion, ensuring a good primary stability of all implants. After 3 years in function no signs for infection or periimplantitis are detectable. No bleeding on probing or pathological probing depth could be noticed at any time. No pathological crestal bone loss was detectable in the control radiographs, neither in the maxilla nor in the mandible. The patient himself is free of complaints.

Conclusions: The described case, comprising a complex oral rehabilitation with augmentation and implantologic procedures in a high-risk patient, confirms that transplanted patients can benefit from bone augmentation and dental implants despite their immuno-compromised condition. Therefore, organ transplantation as contraindication for such interventions may be questioned. Nevertheless, measures of infection prevention during and after surgery, not least in terms of a strict maintenance program, are crucial in the treatment of such patients.

117. Computer-guided implant surgery with immediate load in the aesthetic zone

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Objectives: Implantoprosthetic substitution of tooth n. 1.2 with endodontic and periodontal compromission.

Materials and Methods: Atraumatic extraction of tooth 1.2. Exclusive collagen socket preservation in order to optimize soft tissues of the healing process. Temporary prosthesis placement. Implant placement after 4 months with the aid of a preoperative surgical guiding system and simulation software for severely restricted mesiodistal spaces (only 5 mm in mesiodistal width resulting in surgical and prosthetic/restorative complexity according SAC classification). Surgical flap lengthening was performed in order to facilitate the wound healing process. Concomitant GBR (with Geistlich Bio-Oss® plus collagen membrane Geistlich Bio-Gide®) was added in order to fill the vestibular space. Digital preoperative surgical planning allows the application of a temporary prosthesis obtained by rapid virtual wax-up. Prosthesis placement on STRAUMANN VARIOBASE® stump with dual-cured cement. Definitive metal-ceramic screwed ceramic prosthesis placement 5 months after implant surgery (the estimated time needed for complete maturation of soft tissues).

Results: Successful and immediate load implantoprosthetic substitution of tooth n. 1.2 with a preoperative surgical guiding system and simulation software for severely restricted mesiodistal space.

Conclusions: Advances in digital preoperative surgical guiding systems and simulation software permit a shorter treatment time with optimal aesthetic results (temporary screwed prosthesis placement obtained by fast virtual wax-up) even in complex clinical cases (according to SAC classification). Patient selection, operator skills, careful preoperative evaluation of implant features and the need for adjunctive adequate bone regeneration techniques are important factors in the successful restorative treatment and optimization of aesthetic outcome.

118. Dentigerous cyst excision with concomitant implant placement on site 2.2

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Objectives: Implantoprosthetic substitution of tooth n. 2.2 in a 60-year-old female patient with concomitant excision of dentigerous cyst.

Materials and methods: Atraumatic extraction of tooth 2.2 due to endodontic compromission and contextual temporary removable dental prosthesis placement. Excisional surgery of the dentigerous cyst (diameter 10×10 mm) draining purulent content through a vestibular fistula (20 days after dental extraction) and concomitant placement of a STRAUMANN BLT® implant on the same site with a Guided Bone Regeneration (GBR with Geistlich Bio-Oss® plus collagen membrane Geistlich Bio-Gide®) for osteosynthesis of the perimplantar osteal gap. Non-functional immediate loading with temporary screwed prosthesis placement. Definitive ceramic prosthesis placement 4 months after implant surgery.

Results: Successful and immediate load implantoprosthetic substitution of tooth n. 2.2 after excision of dentigerous cyst.

Conclusions: Advances in implant design and proven efficiency of GBR technical solutions enables a shorter treatment period with optimal aesthetic results, even in complex clinical cases. Patient selection, operator skills, careful preoperative evaluation of implant features and the need for adequate bone regeneration techniques are significant factors involved in the successful restorative treatment and optimization of aesthetic outcome.

119. Immediate implant placement in a high demanding esthetic case using the "Socket Shield" technique

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Introduction: A 28-years old female patient in good health condition presented in the clinic requiring implant-prosthetic treatment for the fractured upper right central incisor. The patient has an important gum exposure in relaxed upper lip position and in smiling and also a thin gingival biotype. All these factors are increasing the esthetic risk in implant-prosthetic replacement of the tooth 11.

Objectives: We planned to use in this case the partial extraction therapy by applying the "socket shield" technique in order to keep the very thin buccal bone plate and the architecture of the gingiva in the upper right central incisor. This technique should keep a thin part of the dental root attached to the buccal plate in order to avoid the resorption of the "bundle bone" and to keep the gingival level in place. The palatal part of the root is extracted and a dental implant is immediately placed in a palatal position related to the "socket shield", in a correct 3D position. If a good insertion torque and a good ISQ value can be achieved at the implant placement, the impression can be done and immediate loading with a provisional screw retained crown can be obtained to keep the peri-implant soft tissues in place. After 3-12 months of gingival shaping and contouring by adding and removing composite on the provisional crown, the final crown can be delivered.

To achieve a good primary stability to be able to immediately load the implant and to obtain a good esthetic result we planned to use an Any Ridge implant from MegaGen , Korea.

Material and methods: The diagnostic of root fracture at 11 caused by internal root resorption is completed on CBCT. Under local anesthesia, the coronal part of the tooth was gently extracted. The remaining part of the root was split in two parts, one attached to the buccal bone wall and one to the palatal bone. The palatal part of the root was extracted without touching the buccal part.

The buccal part of the root was thinned with round diamond burs without any pressure that can lead to the mobilization of the root. The implant bed was prepared using the Any Ridge MegaGen Kit without touching the buccal root. The ideal 3D position of the implant was obtained. The final insertion torque reached 45 Ncm and the ISQ value was 78 ideal for immediate loading.

The socket was preserved with a mixture of human allograft (Maxgraft, Botiss) and xenograft (Cerabone, Botiss). The impression was taken immediately after implantation and in 24 hours the patient received a screw retained provisional crown on 11. After provisional crown installation begins the shaping and contouring of the gingival zenith and papillae by adding and removing composite.

Result: The final crown should copy perfectly the emergence profile of the provisional one and to offer support to the already shaped soft tissues around the implant. The correct implant position and the "socket shield" can be observed on the post implant placement CBCT. The patient is happy with the final esthetic result. In this particular case, due to the esthetic risk factors, the provisional crown is kept 12 months for tissue maturation.

Conclusion: The socket shield technique have the advantage of keeping in place the buccal bundle bone and the buccal gingival level and to avoid the recession that can happen on the implants especially in cases of high lip line, gingival exposure and thin gingival phenotype like in the clinical case presented.

120. The clinical application of platelet-rich fibrin (PRF) on implants placed immediate into fresh extraction sites of anterior teeth

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Objectives: To investigate the clinical results of platelet-rich fibrin(PRF) on implants placed immediate into fresh extraction sites of anterior teeth.

Methods: A patient was referred for immediate implant placement, suffered from the fracture in residual root of anterior teeth with the average residual bone height 15 mm and horizontal width about 5mm by cone-beam computed tomography (CBCT) before operation. After anterior tooth extraction, one implant(3.3mm×12mm, SLA®Ðbone level implant) was placed into the fresh extraction site, which could repair the alveolar ridge through guided bone regeneration (GBR) technique. The PRF clotÐas biological membrane materials were covers the alveolar ridge crests over the Bio-oss with loose stitched. After the formation of osseointegration, fixed restorations were employed to complete the therapy.

Results: During the surgery, there was no any free soft tissue. 12 days after operation, there was no infection, and reactivated gum accreted well. After 6 months healing, the osseointegration was formed well. No obvious bone resorption was observed. Preferable function and aesthetic effect were achieved with the fixed restorations.

Conclusions: PRF could serve as a viable option for both bone and soft tissue regeneration around immediate implants in the anterior regions.

Keywords: platelet-rich fibrin (PRF); immediate implantation; maxillary anterior region; bone and soft tissue defect.

121. Bilateral inferior alveolar nerve lateralization for dental implant placement with the application of 3D printing and concentrated growth factor: A case report

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Objectives: Inferior alveolar nerve (IAN) lateralization is a feasible treatment option for managing severely atrophic posterior mandibles with dental implants. However, this approach is frequently accompanied by postoperative neurosensory disturbance (NSD). We herein firstly report a case of bilateral IAN lateralization for dental implant placement combined with the application of 3D printing and concentrated growth factor (CGF). The surgery efficacy and nerve function was assessed.

Methods: A 60-year-old female suffered from bilateral molars loss of mandible more than 20 years, and the cone beam computed tomography (CBCT) exhibited insufficient bone height above the IAN. A 3D printing model was built via CBCT data with a 3D printer for preoperative planning and practicing. Furthermore, the surgery was rehearsed on the 3D printing model with a finding of an unexpected discrepancy of inferior alveolar canal between the radiographic image and 3D model. The canal width was considerably wider on 3D model than on CBCT measurement in posterior segments. The appropriate positions of buccal/lateral bone windows were re-planned on the 3D printing model. IAN lateralization and implants placement were performed on the patient followed this preoperative planning. The CGF clot, a slow release system of growth factors, was wrapped around the neurovascular bundle, and the bone defect was treated by guided bone regeneration (GBR) technique. Afterwards, the nerve function was evaluated with both subjective and objective test weekly postsurgery until full recovery.

Result: The 3D printing model could reflect the anatomic position of the inferior alveolar canal accurately and directly compared with the radiographic image. There was no direct mechanical damage of neurovascular bundle following the 3D-model-dependent preoperative planning. The nerve exhibited a short-term disturbance, and approximately recovered at 8 weeks postoperatively. Conclusion: The 3D printing model could help to determine the safest surgical corridor and

decrease the risk of nerve damage. In this case, CGF could accelerate the recovery of neural function. More patients are needed for a definitive clinical validation of this procedure.

Key words: inferior alveolar nerve; dental implant; 3D printing; concentrated growth factor.

122. Facially generated 3D digital design for computer guided flapless implant surgery and CAD-CAM interim dental prosthesis: A clinical report

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Objective: To report the use of a digital approach to rehabilitate an edentulous maxilla with computer-guided surgery and immediate CAD-CAM provisionalization.

Methods: A 60-year-old man was referred to the Department of Prosthodontics School of Dentistry, University of Sao Paulo, for implant rehabilitation. A treatment with computer-guided implant surgery and maxillary immediately prosthesis was proposed to the patient. A set of digital photography was used to obtain the patient's face and smile references. A scanning template was fabricated using acrylic and gutta-percha points, and this template was an exact replica of the patient's prosthesis. Using the double scan technique, a computer tomography (CBCT) of patient and template were performed. A conventional impression technique of the maxilla and mandible were performed with and without the prosthesis. The laboratory casts were mounted on a semiadjustable articulator to be digitalized by mean of a laboratory scanner. The photographs files (Jpeg) with the facial references were overlapped with the 3D scanned casts files (STL) in the Nemo DSD software. The approved diagnostic waxing up was merged with the data of the CT (DICOM files) by the Nemo DSD software for virtual implant planning. Four implants, two implants in the anterior region and two tilted implants in the posterior region were planned (Straumann Pro Arch technique). Then, the computer aided manufacturing of the surgical templates and interim prosthesis was carried out. The two guides (tooth and mucosa supported guides) and provisional prosthesis have the sleeves for anchor guide pins in the predetermined position. Surgery was performed under local anesthesia. The osteotomy for the three anchor pins were performed when the tooth supported guide was seated in the two remaining canines, thus the position for the mucosa supported guide, already without support of the teeth, and the dental prostheses have the same positional references given by these pins. The implants osteotomy was completed according to the drill sequence of the Straumann guided surgery. The four implants (Bone level-Straumann) were inserted through the guide via a torque-controlled handpiece. The primary stability of the implants was more than 35 N/cm2. The interim prosthesis was inserted and indexed to the temporary cylinders with auto-curing acrylic resin. The prosthesis was adjusted, polished and secured to the abutments according to the torque recommended by the manufacturer. The patient was instructed to eat semisolid diet and was given instructions for correct buccal hygiene.

Results: This technique was able to achieve a great adaptation of the prosthesis, decreased the incidence of potential surgical errors and provided faster soft tissue healing.

Conclusion: This clinical report described how the combination of digital photographs ,3D cast scans and CBCT files for virtual planning can be used for flapless computer-guided implant placement and subsequent esthetic and functional CAD-CAM rehabilitation in a predictable manner and integrated with the patient's face.

123. A novel guide used in harvesting autogenous bone from the symphysis

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Objective: This case report describes the management of a young female patient presenting with an anterior maxillary defect. Harvesting from the external oblique was not possible due to a lack of available bone as confirmed on CBCT. Harvesting from the mandibular symphysis was possible but limited to specific sites. In addition, new safety margins were suggested by Pommer (Pommer et al., 2008), stating that the osteotomy should be made at least 8 mm below the tooth apices with a maximum harvest depth of 4 mm (to ensure no vital structures would be hit in 90% of patients) whilst keeping the inferior mandibular margin intact. These guidelines, along with minimum available bone volume in this case made successful harvesting of bone from the symphysis technically challenging. Furthermore, patients are not averages and each case presents with its own limitations. It was decided to engineer a novel surgical guide that would assist in harvesting bone from the symphysis and thereby minimizing the chances of unwanted complications as suggested by Misch in 1997.

Methods: The multidisciplinary treatment plan included the retention of teeth 12 and 21 and placement of single implant in site 11. CBCT analysis of residual bone at site 11 suggested a hard tissue defect of approximately 205.45 mm3. A bone graft was required to reestablish bucco-palatal width sufficient to support a narrow diameter implant and satisfy aesthetic concerns synonymous with a high smile line. Based on the bone volume required and the available bone present intra-orally, it was decided to select the mandibular symphysis as the donor site. The safety guidelines proposed by Pommer (Pommer et al., 2008) were followed and optimal sites were chosen and measured off land marks from the CBCT. The guide was constructed on a model by Mr Renier Greyling (TTH Creative Ceramics Dental laboratory).

Results: The harvesting of bone cores from the symphysis were uneventful in a technically challenging case with anatomical constraints. The surgical guide assisted in determining the size of the incision to be made at the donor site prior to cutting, this ensures that the smallest incision possible was made. The surgical guide proved to be a reliable and time efficient tool in surgery since it was easily seated on the anterior mandibular incisors and was held steadfast by allowing the patient to bite together gently. This in conjunction with the rigid structure allowed reproducibility regardless of how many times the guide was removed and replaced. The metal rings were designed with an internal diameter of 6mm allowing the trephine to only pass if inserted at the correct angle which was set at right angles to the bone. This ensured cores of uniform thickness and shape were harvested. Most importantly the guide provided the operator with piece of mind during an already complex harvesting procedure and considerably reduced the risk of violation of anatomical vital structures.

Conclusion: The novel surgical guide is a successful means to accurately and efficiently locate the optimal pre-decided site for harvesting of autogenous bone from the symphysis. This is especially useful in challenging cases where bone volume is limited and harvesting from an exact site is critical.

124. Lateral Sinus lift and augmentation by aljipore and collagen membrane and implantation of 2xive implants in one session

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Objective: The Objective is to show in pictures the clinical steps of Lateral Sinus Membrane lift and Augmentation by Aljipore by Dentsply-Friadent and simultaneously Implantation of Xive 9.5 L/3.8 Implant into the sinus to restore the upper first molar and Xive 11L/3.0 in front of the sinus to replace the upper second premolar.

Methods: A 55 years old lady was having missing upper left second premolar and firt molar with resorbed residual ridge. On Periapical radiograph only a 5mm height of bone was available beneath the floor of the sinus.in the upper first molar region. A 3 sided flap was raised and a window was done in the lateral bony wall just above the first molar region by using a large round bur with water irrigation. The membrane was pushed gently upward and inward using sinus lift kit by DIO. A peice of resorbable collagen membrane by Dentium was put beneath the elevated sinus membrane and a mixture of Aljipore and patient blood was put beneath the membrane. An Xive implant of 9.5 mmL and 3.8 mm dia.was implanted in the 5mm height of natural alveolar in the first molar region successfully with good primary stability with its apical one third protruding into the sinus space .the apex was surrounded with

Algipore .Another peice of collagen membrane was put over lateral opening of the sinus covering the Algipore wich filled the space around an above the implant apix. Another Xive Implant of 3.0mm Indiana 11mmL was implanted successfully in front the sinus in the residual ridge due to availability of vertical bone. The flap was returned into position and sutured carefully. Prophylactic antibiotic of Rodogyl for 3days followed by Amoxiclave for another 4days was given. Olfen of 100mg was given once daily for pain. No infection in the sinus happened .and only small swelling happen and disappeared. The sutures was removed after 10 days and good healing happened.

Results: After 4 months period the Gingival formers were fixed and after 2 weeks Impression was taken by Major/Italy Heavy and light body. 2 fused zirconium crowns were fabricated of 2M2 color and fixed successfully on 2 GH3 and GH1 angled titanium abutments on 3.0 and 3.8 Implants respectively. The Implants were stable and fixed in the bone like the Alps mountains. The patient was very happy.

Conclusion: 1- Lateral sinus lift needs careful handling and manipulation of the membrane to avoid its rupture. 2- Its essential to have good primary stability of the implanted implant in the available bone beneath the floor of sinus to avoid its migration into the sinus during healing period. 3- Enough time should be given for the healing and good osseointegration of the implants before loading .4- A cooperative understanding patient should be chosen for complex sinus lift and implantation operations.

125. Osteotome sinus floor elevation with bone grafts in severe atrophic residual bone: A case report

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Objective: To evaluate the clinical and radiographic outcomes of dental implant placed using osteotome sinus floor elevation (OSFE) with bone grafts in severe atrophic residual bone(RBH=2.5mm).

Material and methods: A 45-year-old male presented for implant consultation for replacement of the maxillary left first molar. His medical history was noncontributory. cone-beam computed tomograph (CBCT) revealed bone height of approximately 2.5 mm at the implant site. The surgical procedure followed a modification of Summers' technique, which was described in detail in previous studies (Si et al. 2013). In brief, implant site was prepared to the depth approximately 1 mm away from the sinus floor boundary. Osteotomes (Straumann Osteotome Kit) was used to elevate sinus floor by light malleting to create a “greenstick” fracture. Then, osteotomes with increased diameters were used to develop the implant site until the final depth. The sinus membrane was checked for any possible perforation by nose blowing test. bone substitutes(Bio-oss) were used. Implants (4.8x10 WN S Straumann AG) was placed in the prepared sites without tapping. After a healing period of 8 months, the patient was recalled for restoration. Implant supported single crown was fabricated and delivered to the patient.

Results: Postoperative response of the patient was well without membrane tear, bleeding, infection, sinus obstruction and considerable patient discomfort and swelling. After 8 months, The Radiographic assessment was found to be positively correlated to implant protrusion length.

Conclusion: With limitations, the results of the present study demonstrated that OSFE with grafts is a predictable treatment modality in severe atrophic residual bone(RBH< 5mm). But it should be used with caution and by experienced doctors. Although the case is very successful.

126. Maxillary central incisor implant with guided bone regeneration and connective tissue graft: A 2-4 year clinical evaluation with pink and white esthetic scores

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Objectives: It is so challenging to restore a maxillary anterior tooth with a single implant. Guided bone regeneration (GBR) is required if labial bone is too thin or there is a bony defect in order to avoid labial bone loss. In addition, connective tissue graft will help harmonize marginal gingival level with adjacent teeth and avoid gingival recession. The aim of this study was to evaluate clinically using GBR and connective tissue graft on a single implant placement of central incisor using pink esthetic score(PES), white esthetic score(WES) and radiographic examination.

Methods: Four patients were included in these case reports which was conducted at the Department of Periodontics, Chonnam National University Dental Hospital. Case 1: A 28-year-old female visited for endodontic problem of #21. At 6 months after extraction, implant placement(3i®,Ø4X11.5mm) with GBR using Bio-oss® and Bio-gide® was done. After 4 months, second stage surgery with connective tissue graft was done. At 6 months after surgery, crown lengthening was performed for #11 to adjust margin gingival level to #21. Case 2: A 65-year-old female visited for root fracture of #11. After extraction, immediately implant placement(3i®,Ø4X11.5mm) with GBR using Bio-oss® and Bio-gide® was done. At 6 months after surgery, second stage surgery with connective tissue graft was done. Case 3: A 24-year-old male visited for external root resorption of #21. At 3 months after extraction, implant placement was done. But fibrous integration was occurred and implant was removed. After 3 months, re-placement (Osstem®,Ø4X10mm) with GBR using Bio-collagen® and Bio-gide® was done. After 6 months, second stage surgery with connective tissue graft was done. Case 4: A 28-year-old male visited for external root resorption of #11. At 2 months after extraction, implant placement (Astra®, Ø4X11mm) with autogenous chip bone, Bio-oss® and Bio-gide® was done. After 4 months, second stage surgery with connective tissue graft was done. Follow-up period range was 2 year to 4 year. The present study was to evaluate the stability of margin mucosa of maxillary central incisor at pre-surgery(T0). PES, WES and stability of gingival mucosa were evaluated at the last follow-up appointment(T2). It was taken periapical radiograph at the provisional or final crown setting(T1), and the last follow up appointment(T2), was measured the marginal bone loss (MBL) on mesial and distal side.

Results: Above case reports fulfilled the success criteria defined by Buser et al. Two cases were thin gingival biotype and the other two cases were moderate gingival biotype. All cases of the gingival thickness were improved at post-operation. Furthermore, the stability of marginal mucosa was almost same at the last follow-up. The mean PES was 8.75 and the mean WES was 9.25. The mean total PES/WES was 18. The mean differences of MBL at the mesial aspect was -0.21mm and the distal aspect was -0.16mm.

Conclusions: Gingival thickness increased in all cases and the level of marginal gingiva remained stable. The mean total PES/WES was 18, which is relatively high score compared to 12, the threshold of clinical acceptability. The mean differences in radiographic MBL satisfied the criteria by Buser et al. and alveolar crest level remained stable. In conclusion, GBR and connective tissue graft showed esthetic and stable results when labial bone was thin and there was dehiscence on maxillary anterior teeth area.

127. The results of alveolar splitting/ condensing technique with simultaneous implant placement in narrow alveolar ridge: A case report with 3.5 years follow up

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Tooth extraction usually results in significant loss of hard and soft tissue volume especially in the buccal-lingual of the anterior region. Narrow alveolar ridges remain a serious challenge for the successful placement of implants. However, ridge splitting is a minimally invasive technique indicated for alveolar ridges with adequate height, which enables immediate implant placement. This report presents a case using bone splitting bone condensing and guided bone regeneration in narrow alveolar ridge of the left maxillary lateral incisor, with simultaneous implant placement. The patient was a 20-year-old woman with a missing left maxillary central incisor more than one year. Clinical examination revealed the alveolar ridge was narrow and Cone-beam CT confirmed the

thickness of the buccal-lingual wall was only 3.55mm, while the height was acceptable comparing with the adjacent teeth. After clinical and radiographic examination, a taper implant (Straumann Bone Level) with a 3.3 mm width and a 12 mm length was selected for replacement of left maxillary central incisor. Using local anesthesia, bone splitting and bone condensing technology was performed with triangular shape flap, following that, The implant was inserted and the outside of facial bone wall was grafted with Bio-oss, covering with an absorbable collagen membrane. After 5 months' healing, the two-stage surgery was performed and then implant impression was taken, the porcelain restoration was delivered. The patient returned for follow-up appointments 6 ,14 months and 3.5 years after prosthetic loading. The clinical and Cone-beam CT examination were performed at every follow-up. The results of the examination revealed that the gingival papilla was completely filled with the interproximate space while the facial bone maintained in a very stable state. This clinical case clearly demonstrates that alveolar splitting/ condensing technique with simultaneous implant placement can achieve desired aesthetic results of soft and hard tissue when the buccal-lingual alveolar was serious defected and vertical was normal.However, the predictability of the clinical and aesthetic outcomes is based on strict and detailed inclusion criteria.

128. Tomographic control of rehabilitation with fixed protheses supported by Straumann Narrow Roxolid Implants in Maxilla - report of two clinical cases

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The rehabilitation of edentulous atrophic maxillas with implant-supported prostheses is one of the most challenging clinical situations. The pattern of maxillary bone reabsorption, which is more pronounced in the anteroposterior direction, might prevent the placement of standard diameter implants, making bone grafting necessary. Considering the morbidity of these procedures and the trend of minimally invasive surgeries, other resources have been used to avoid grafting, among them, the use of narrow diameter implants. The purpose of this poster is to report two clinical cases of rehabilitation of severely resorbed maxillas with Straumann® narrow diameter implants.

In the first case, a female patient, 67 years old, leucoderm, ASA I, with limited maxillary bone width, recieved six Straumann Bone Level SLActive Roxolid® 3.3 x 8mm, for fixed dental prostheses, according to a two-stage protocol. After 8 weeks of submerged healing, fixed metal acrylic implant-supported prosthesis was delivered to the patient. The 35-month clinical and tomographic follow-up showed aesthetic and functional success.

The second case consisted of a female patient, 65 years old, leucoderm, ASA I, presenting knife-edge maxilla resorption. Six Straumann Roxolid® Bone Level SLActive 3.3 X 8mm were inserted and submerged for 8 weeks. Then, a fixed metal acrylic implant-supported prosthesis was made using conventional prosthetic procedures. The case has been followed for 14 month, with good clinical behavior.

The main limitation of the present technique is the inability to correct major intermaxillary discrepancies due to atrophy. In some cases, loss of supportive hard and soft tissue contraindicates fixed prosthesis, requiring reconstructive procedures or an overdenture prosthesis.

According to the clinical outcomes, placement of narrow implants might be an alternative to grafting surgeries in resorbed maxillas, providing advantages such as reduced morbidity and decreased treatment time and costs, increasing patients acceptance to treatment.

129. Implant restoration in patient with dentition defect with digital design

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Objectives: Combined with the implant design software (Simplant) and simple surgery guide, we tried to select the implant sites more accurately, at the same time to simplify the operation process in the patient with dentition defect. Using the temporary restoration, we could ensure that the result would be satisfied in occlusion and esthetics.

Methods: In this case, a 54-year-old female patient with most of her maxillary teeth lost. The patient used to have a removable partial denture, but she was not satisfied with it. Before surgery, the patient had to take CBCT scan with a simple surgery guide to determine the implant sites. According to the design in simplant software,7 implants (straumann) were inserted in the upper jaw. Guided bone regeneration technique (Bio-oss and Bio-gide) was applied in the maxillary esthetic zone. 5 months later, the secondary surgery (except for #13 teeth) was taken, while making the temporary implant-supported prosthesis. 11 months after first surgery, the last implant was exposed. Finally, the patient got permanent protocol with zirconia personalized abutments and zirconia all ceramic bridge.

Results: After finishing the final restoration, the patients reached 24 months' follow-up, the cumulative survival rate was 100%. The patient appeared to be very satisfied with the the aesthetic and function of prosthetic protocol. No other complications, biological or mechanical, were recorded.

Conclusions: Through the computer software design and simple surgical guide, the predictability of successful surgery could be improved. Our data seemed to validate this surgical and prosthetic protocol with valid functional and aesthetic results.

130. Ridge preservation in molar region. To do or not to do?

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Objectives: To develop criteria for ridge preservation at the time of extraction in molar region according to the morphology of extraction socket.

Materials and methods: 7 patients with 8 molars were extracted with or without ridge preservation. Four alveolar sockets (test) were filled with grafting materials (Bio-Oss or OraGraft) and covered with collagen membrane (BioGide or EZcure), while 4 sockets (control) were allowed to heal without any filling material or membrane. Both the test group and control group were further differentiated into subgroup A and B respectively according to the completeness of the septum and the remaining walls of the socket. Subgroup A (2 teeth, 2 patients) included teeth with intact inter-radicular septum, while subgroup B (6 teeth, 5 patients) included teeth without intact septum and socket walls. After about 6 months, reentry surgery was done to evaluate the ridge condition and, at the same time, implants were placed. The results of the socket healing were compared and discussed.

Result: In Subgroup A, although severe bony destruction was noted around the palatal roots, septums of both extraction sockets remained intact. The test socket received ridge preservation but the control one did not. No obvious difference was noted in these two sites after the sockets healed. In Subgroup B, septums of the extraction sockets were not intact. The result of the test sockets reveals that vertical ridge resorption was limited. One of the test sites in subgroup B received implant with transcrestal sinus floor elevation(SFE); another received implant with lateral window SFE; and the other received implant without any necessity of guided bone regeneration. The result of the control sockets reveals that ridge resorption was obvious either horizontally or vertically. One of the control sites in subgroup B received implant after a staged approach with lateral window SFE first; another site received implant with transcrestal SFE; and the other site received implant with narrow diameter due to narrow ridge.

Conclusion: In the molar region, it seems that there is no need to perform ridge preservation at an extracted socket with intact septum. But if neither septum nor socket walls remain intact after tooth extraction, ridge preservation may be considered especially when vertical ridge height is critical.

131. Classification of maxillary central incisors-implications for immediate implant and its outcomes: 2-year follow-ups

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Objectives: The aim of the research was to observe the labial and palatal bone volume changes around dental implant and explore the relationships between the sagittal root position and the implant placement in esthetic zone.

Methods: Retrospective study was done in two incisor implant cases (Figure 1 and Figure 2), which were chosen as for the similar sagittal root position in maxillary central incisor classified Type B1 according to the classification method by Lau et al[i], but different direction of implant placement (Type B1 in Case 1 and Type M1 in Case 2) and the direction of implant placement was classified according to the classification method of the maxillary central incisor. The sagittal bone volume around implant were measured post-surgery and 2 years after restoration by means of cone-beam computed tomography (CBCT) at 6 points: A, the labial point of the implant platform; B, the middle point of the labial surface of implant; C, the apical point of the labial surface of implant; D, the palatal point of the implant platform; E, the middle point of the palatal surface of implant; F, the apical point of the palatal surface of implant. The distances perpendicular to the long axis of implant between the labial or palatal bone surface to each point were measured. Intra-oral pictures were taken to observe the soft tissue regeneration. The difference between the 2 cases was that in Case 1,the patient have the implants in both the right central incisor and lateral incisor; however, in Case 2, the patient have the implant in the right central incisor and crown restoration in the left central incisor.

Results: 1. The two cases both had the labial bone resorption and the resorption was no more than 2mm (Table1 and Table 2); 2. The palatal bone had less resorption; 3. The gingival recession were unobvious.

Conclusion: In the 2 cases, the implant placements both followed the ITI Consensus, but in different direction. The stability of soft tissue implied that different directions of implant placements may have the same esthetic results as long as to comply with the ITI Consensus. However, long-term outcomes need to be observed in the future follow-ups.

[i] Lau S L, Chow J, Li W, et al. Classification of maxillary central incisors-implications for immediate implant in the esthetic zone[J]. J Oral Maxillofac Surg, 2011, 69(1): 142-153.

132. The application of concentrated growth factor (CGF) and a modified Maryland bridge for implant and prosthodontic treatment in the infected esthetic area: A case report

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Objectives: Chronic periapical infection leads to a severe bone defect that creates challenges for immediate implantation and restoration, particularly in the esthetic zone. The aim of this article was to investigate the esthetic effect of immediate implantation and restoration using concentrated growth factor (CGF) and an improved Maryland bridge in the infected esthetic area.

Methods: A 31-year-old Asian male with residual root at a left central incisor site and a severe periapical bone defect was treated. The root had erupted in a minimally invasive manner. An implant was inserted, CGF was applied, and guided bone regeneration (GBR) was used to fill the infected area. However, the implant exhibited poor primary stability. One month later, the improved Maryland bridge was applied to stabilize the implant. Six months later, the implant had become stable, and soft and hard tissues around the implant had regenerated extremely well. The final ceramic crown was placed 7 months later. The achieved therapeutic effects satisfied the patient's functional and esthetic expectations.

Results: Soft and hard tissues around the implant were preserved; in particular, periapical bone regeneration was observed. The implant and the right central incisor were consistent with respect to crown shape and gingiva edge. The mesial and distal gingival papilla nearly occupied the interproximal spaces and were greatly improved relative to before the operation. CBCT six months after the operation indicated that bone tissue around the implant was stable.

Conclusion: CGF may induce anti-inflammatory effects and promote the restoration of bone defects. When mixed with bone graft materials, CGF may accelerate bone healing and regeneration. The improved Maryland bridge helps to steady implants and provides temporary esthetic effects.

133. Prosthetically driven functional reconstruction of mandible defects

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Objectives: The present case report represents a patient who was diagnosed as ameloblastoma and underwent mandibular partial osteotomy, followed by prosthetically driven individualized reconstruction using vascularized folded fibular flap as well as digital surgery technique.

Methods: Firstly, a three-dimensional mandible model of the patient was printed according to cone-beam computed tomography data. The titanium reconstruction plate was pre-made accordingly and vascularized folded fibular flap was transplanted. There was no tumor recurrence within the 1.5 years follow-up. Therefore, restoration started and due to the limited financial conditions of the patient, a removable partial prosthesis was worn for a long time. Dental implantation surgery was performed in the transplantation area 9.5 years after the mandible osteotomy.

Results: The regular follow-up after transplantation indicated that the transplanted bone remained stable without obvious absorption. The height, horse-shoe shape of the mandible as well as the occlusion relationship was finely restored. The vestibular groove, lingual groove and the attached gingival was well restored. Imaging examination displayed sound implantation direction and osseointegration. The patient was satisfied with facial contour and functions such as chewing and speech.

Conclusion: Prosthetically driven functional reconstruction of mandible defects using vascularized folded fibular flap could be achieved.

Keywords: Folded fibular flap, Mandible defects, Dental implantation, Functional reconstruction

134. Total rehabilitation of a patient with facial asymmetry and requirements of bilateral maxilar sinus lift for implant therapy - a case report

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Objectives: The objective of this treatment was to completely recover the masticatory function in a 60 years old female patient, wich requires a multidisciplinary aproach, that covers endodontics, periodontics, prosthodontic and implantologic treatment. Another important objective is to recover vertical dimension by increasing 5 mm vertical length. This was performed by a diagnostic wax up. Inside the implantologic treatment plan, maxillar zone requires a bilateral sinus lift for implant placement to guarantee success of rehabilitation and preserve bone around them. The crestal core elevation (CCE) technique is reportedly a less invasive procedure than the lateral window elevation technique.

Methods: Sinus lift were developed by a crestal core elevation technique wich was proposed by Tatum in 1970 and published by Misch in 1987. The original technique consist in a sinus elevation of 2 mm developed by osteotomes. In this case, implant drill were established to the sinus floor, and an augmentation of 2 mm was performed with osteotomes for inmediately 10 mm length implant placement. Xenograft was used. It was planned implant placement in the upper and lower second molar sites based on relevant scientific evidence that shows increasement of masticatory function. The implants used were nine Straumann Bone Level Titanium SLActive and one Roxolid Bone Level SLActive, wich benefits of their surface treatment acelerate and improve osseointegration. Implant sites with crestal core elevation technique was: 4, 13, 14, 15. Implant sites was: 6, 7, 8, 18, 19, 31.

Results: Two months after implant placement, the provisionalization fase was performed. Every implant was loaded, and soft tissue was managed to create an adecuated emergence profile. It was placed Telio Cad-Cam provisionals, then, a VarioBase abutment was used with zirconia core and lithium disilicate crown in each implant.

Single teeth was restored with monolithic lithium disilicate crowns and ceramic restorations. Conclussion: It is important to take into consideration the key factor for long-term success in each situation and work with the benefits of the materials used to achieve favorable predictability for the offered treatment. SLActive surface improves osseointegration and makes it faster and more stable thanks to its hydrophilicity and cellular attraction. It is recomended in critical protocols. Literature shows that the second molar implant rehabilitation improves masticatory function in comparation with first molar occlussion.

135. Cortical tenting grafting technique in combination with titanium mesh to augment severely atrophic alveolar ridge for implant site preparation

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Alveolar ridge augmentation using intraoral autogenous block grafts to augment alveolar ridge defects before implant placement is a predictable method. However, large severely atrophic edentulous segments may require extraoral donor sites. The purpose of this case report was to demonstrate the effectiveness of using intraoral cortical block grafts in combination with titanium mesh, in a “tenting” fashion, to augment large atrophic alveolar ridge defect for implant placement.

A young man with lost teeth 15, 14, 13, 12, 11, 21 and 22 half year earlier due to trauma was referred to our hospital. Presurgical cone bean computed technology showed that horizontal bone width was only around 3 mm. Under local anaesthesia, a cortical bone graft was harvested from right mandibular ramus, and cut into three segments. After subperiosteal exposure of the planned augmented site, two segments were fixed by titanium screws at 12 and 21 sites respectively, the third one was smashed into particulates and mixed with bone substitutes (Bio-Oss, Wolhusen, Switzerland). The mixed ones were installed between cortical blocks and in mesial and distal defects. Three titantium meshes, which were curved and tented by cortical blocks, were fixed by titanium screws to tent out the soft tissue matrix and periosteum for the the mixed particulates. After covering the augmented cite with collagen membrane (Bio-Gide, Wolhusen, Switzerland), passive wound closure was achieved with released incisions.

Five months after the original graft date, cone bean computed technology showed that the bone width of the augmented sites increased to over 6 mm. Four implants of 4 mm diameter and 10 mm length (Osstem, Seoul, Korea) were successfully placed at 15, 13,12, 22 sites and submerged for healing. Four months after implantation, partial roll envelope technique was adopted to uncover the implants. Interim restoration was adjusted three times to optimize esthetics in the next three months. Then definitive prosthesis were installed.

Tenting of the periosteum and titantium mesh using cortical bone blocks maintains space and minimizes resorption of the particulate volume. In addition, bridging the cortical blocks with bone substitutes avoids extensive amounts of autogenous bone. The titantium mesh, with its rigid space-maintaining property, avoids unaesthetic particulate collapse between cortical block grafts. The result was a more uniform and esthetic alveolar ridge, capable of maintaining an implant-supported prosthesis. The technique offers functional and esthetic reconstruction of large volume defects without extensive amounts of autogenous bone.

136. Alternative treatment modalities to compensate for a missing central incisor: A report of two clinical cases

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Methods: Two patients presented with an identical problem, associated with a central incisor that had to be extracted, due to endodontic reasons. Clinical and radiographic evaluation confirmed the initial decision to replace the teeth with dental implants instead.

Utilizing a proposed treatment plan methodology referring to aesthetic risk assessment and SAC classification, the treatment for the first patient, a 33-year old female, initially included extraction of tooth #11. The extraction socket was managed with a free gingival graft, partly de-epithelialized and harvested from the premolar area of the palate. After a two-month soft tissue healing period, a laser-assisted frenectomy followed in order to deepen the anterior vestibule. One month later, a planned bone augmentation procedure was executed, using a titanium-reinforced PTFE membrane, stabilized with titanium pins in conjunction with a combination of an allograft and a xenograft. Six months later, a 4.1 Straumann bone level implant was placed, uneventfully. The second stage implant exposure surgery, two months after implant insertion, included a roll palatal flap to further improve the contour of the ridge and a temporary screw retained acrylic crown was placed at the same time. At the end of a three-month soft tissue maturation period, the final customized hybrid abutment and crown were placed, made of lithium disilicate ceramic.

For the second patient, a 28-year old male, after atraumatic extraction of tooth #11, a 4.1 Straumann bone level implant was inserted in the extraction socket. Allograft and xenograft particles were simultaneously applied to fill the space between the implant and the buccal plate covered by a cross-linked collagen membrane. In addition, a connective tissue graft was harvested from the premolar area of the palate, with the purpose of covering the entrance of the socket and the membrane. Six months later, the second stage procedure followed and a buccally rotated palatal flap further enhanced the ridge profile.

Finally, three months later a customized impression was taken and a final customized hybrid abutment was constructed. The final abutment and crown was made of lithium disilicate.

Results: The use of predictable and evidence-based surgical techniques is mandatory when we need to treat patients with a high aesthetic risk profile. Both clinical cases were surgically managed and prosthetically controlled, in all clinical stages, leading to a biologically, aesthetically and prosthetically acceptable result.

Conclusions: An accurate and individual treatment plan for each patient was fundamental for the final result of both clinical cases. The management of aesthetically demanding cases with dental implants, especially in the anterior area requires careful diagnosis, proper treatment plan and adequate clinical experience.

137. An implant-supported overdenture with two implants and Novaloc® retentive system - a perio-prosthetic approach

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Objectives: The purpose of this case report is to describe a surgical technique that can be used to augment the keratinized soft tissue around dental implants, before or after dental implant placement.

Methods: A 69 years-old female, fully edentulous for more than 30 years, presented to the University Dental Clinic (Oral Rehabilitation Unit) of Universidade Católica Portuguesa to replace her lower denture, complaining of discomfort. Clinical examination of the edentulous mandible showed severe bone resorption, shallow or nonexistent vestibule and lack of keratinized tissue, compromising the denture bearing area.

Diagnosis: Lack of support, stability and retention of lower denture. Class IV complete edentulism (American College of Prosthodontics classification).

Treatment plan: Free gingival graft in the lower anterior mandible followed by an implant-supported overdenture with two dental implants.

Treatment notes: In the first phase of the treatment plan, a free gingival graft was done to increase the width of keratinized tissue and the depth of the vestibule. A partial thickness flap was raised and recipient bed prepared in the anterior region. Then, a free gingival graft was obtained from the palate, being the excess trimmed to achieve the appropriate thickness. The stabilization over the recipient bed was achieved with a cyanoacrylate tissue adhesive (PeriAcryl®, Glustitch, Canada).

Eight weeks after the periodontal plastic surgery, two tissue-level implants (NNC, Straumann®) were placed in the anterior lower mandible (area of teeth 42 and 32), being careful enough to divide the keratinized soft-tissue in equal parts buccal and lingually. After osseointegration, the steps to do an overdenture were initiated. Due to to the lack of a bearing area with sufficient dimensions to achieve stability and retention, and considering patient's motor skills, the Novaloc® retention system for overdentures was selected, with a medium retention value (yellow).

Results: The periodontal plastic surgery is stable, in a 12-months follow-up. The overdenture retention, provided by the Novaloc® retentive system with its medium retention is performing well, contributing for patient's satisfaction during function. 6 months after the overdenture placement, no change was performed on the retention insert. Patient is satisfied with the oral rehabilitation.

Conclusions: Patient's complains with full dentures must be carefully analyzed. The lack of the retention, and the lack of keratinized soft-tissue are two major causes of discomfort while using a mandibular denture. Preprosthetic periodontal surgery is a valuable treatment in the oral rehabilitation process, to improve soft-tissue conditions to support and stabilize a prosthetic rehabilitation. An adequate area of attached tissues with intimate adaptation to the emerging implant structures is critical for long-term success of an implant restoration in fully edentulous patients.

138. Maxillary canine agenesis 6 years follow up

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Objectives: The aim of this clinical case report is to present a rehabilitation of a congenitally missing permanent maxillary canine with an implant-supported single crown with a 6-years follow-up.

Methods: Anmensis: 39 years-old healthy female patient reported to the private clinic complaining about tooth 63 mobility. Clinical examination revealed retained deciduous maxillary canine showing signs of attrition on the right side with mobility. No other relevant data was gathered in the anamnesis (familiar, medical and dental).

Complementary exams: Radiographic dental examination confirmed congenital absence of the permanent maxillary canine radiographs.

Diagnosis: Mobility of tooth 63. Absence of permanent tooth 23.

Treatment plan: Extraction of tooth 63 and rehabilitation of the edentulous areas with an implant-supported single crown.

Treatment description: The extraction was made and immediate implant placement of a titanium 3,3 NC Bone Level implant with 12 mm was done, a provisional acrylic crown was fabricated in the same day. The edentulous space was 5,5 mm in the mesial distal width having a crest with more than 6 mm in width. After two months, soft tissue was conditioned by customizing the shape and contour of the emergence profile. After 4 months of tissue conditioning a cemented zirconia crown was made over a straight titanium abutment.

Results: An implant supported crown was made. In the cementation appointment, the crown was in harmony with the adjacent teeth. After 6 months 4 clinicians evaluated the rehabilitation using the WES and PES scores being the values obtained 8, 9, 9, 10 for PES respectively and 8,8,8,9 for WES respectively.

Functionally the patients are satisfied with her masticatory performance being the crown in group function with the premolars in that quadrant.

After 6-years the patient is satisfied and happy with the aesthetics and function of the implant supported crown not showing any signs of inflammation or pathology. The mean values of the WES and PES are stable over time showing the success of treatment.

Conclusions: Permanent maxillary canines are known to be one of the most variably positioned teeth in the oral cavity with palatal or facial displacement or ectopically eruption from the dental arch. Congenital canine agenesis is a rare condition.

Many factors should be considered whenever a deciduous tooth is present, and its corresponding permanent tooth is absent: the condition of the deciduous teeth, the patient's occlusion (crowding versus spacing and midline deviations of the arch), facial growth pattern, and patient's preferences. Treatment options may include the extraction of primary teeth to facilitate spontaneous or orthodontic space closure, or retaining the deciduous teeth as long as possible to preserve the alveolar bone quality to provide maximum potential for implant replacement without the need of bone grafting.

In this particular case, the implant-prosthetic approach has proved to be a reliable and predictable treatment for both re-establishment of function and aesthetics. Satisfactory values of marginal bone resorption over time and optimal conditions of peri-implant tissue around narrow cross fit Bone-level ITI implant were found.

139. Narrow-diameter dental implants: A clinical case

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Objectives: With this clinical case we intend to show the usability and effectiveness of narrow-diameter implants (≤ 3,5mm) in daily dentistry practice. Limited dimension of alveolar bone crest could exclude the placement of regular dimension implants (> 3,5mm to 4,5mm) or might be necessary bone augmentation. The narrow platform implants (NP) provides a solution to these space-related problems and might broaden the treatment spectrum.

Methods: A male patient, 61 years old, healthy and a non-smoker appear in the routine consultation with third degree of mobility of the tooth 41 which had indication of extraction. After preparing the case, we did the extraction of the tooth and wait for alveolar healing. Meanwhile the natural tooth was bonded to the adjacent teeth for temporary replacement. After 3 months of healing we place a Straumann Roxolid (titanium-zirconium alloy) BLT (bone level tapered) 2.9 diameter implant, with an open flap. After three months of healing we placed the final screwed crown. At the time of this report we do a one-month control consultation.

Results: The osseointegration of the implant was successfully achieved. The marginal alveolar bone was stable one month after loading, the placement of the crown has a satisfactory appearance and we see the absence of implant mobility and peri-implant radiolucency. The patient has no sign of pain, discomfort or infection.

Conclusions: The 2.9 narrow-diameter implant from Straumann is a good choice when there are small interdental gaps like in inferiors incisors region and low buccal-lingual bone volume. The use of small-diameter implants can avoid bone augmentation, which decrease the monetary value of the treatment and improves the patient´s post-operative period since they reduce surgical invasiveness. The results suggest that small-diameter implants can be successfully included in implant dentistry and they may be preferable in cases where space is limited.

140. One-year follow-up of a complex treated patient with severe atrophic jaws after nerve lateralization and bone block grafting

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Objective: Complex rehabilitation of edentulous patient with severe atrophic mandible and maxilla with evaluation of implant success in time.

Methods: Patient PG came into private dental clinic motivated to change aesthetical appearance and restore the lost masticatory function. She had been partial denture wearer for many years and was willing a fixed rehabilitation. Local status: teeth 17, 11, 21, 22, 23, 26, 43 previously endodontically treated, other teeth were missing. Three failing 30mm length implants of unknown system were present at teeth site 13, 24, 25. The implants were removed. The patient came after one year to continue the treatment. Several fixed rehabilitation options were offered describing their advantages and disadvantages to the patient: All-on four, GBR with extra-oral donor sites and nerve lateralization with simultaneous implant placement. The last option was chosen. Bilateral lateralization was done with nerve enrollment into PRF and synthetic grafting material placement (collagen and hydroxyapatite). Eight morse tapered implants were inserted at the same time. The second stage surgery was done 5 months later and their loading began after 1 year. The jaw relationship allowed us to manufacture a screwed retained prosthesis divided in two separate parts to avoid interference with mandible deformation during function. After prostheses delivery, lateral sinus lift with two implant placement and autologous block grafting in anterior part were performed for right maxilla. Patient received a modified partial denture for esthetical purposes. Four months later, 3 more implants were inserted in the maxilla at the level of bone blocks (graft). After 6 months a cemented retained prosthesis was delivered for the right upper segment. The implants stability was evaluated by Periotest measurement and bone changes via CT performed at different stages of treatment. Patient was provided with a soft splint after lower jaw rehabilitation for night time use. She was visiting the hygienist every 3 months for cleaning procedures. Due to insufficient keratinized mucosa at the implant 43, a soft tissue grafting was offered to the patient. Patient wore different provisional prostheses through the whole treatment period due to her job which required permanent public speaking.

Results: After one year of functional loading there was no evident resorption around implants. However, the implant/crown ratio were approximately 2/1. The gingiva after lower prosthesis removal was without signs of inflammation. Periotest values of lower implants varied between -1 to -7 with average -5.25. The sensitivity of the lower lip was not fully recovered even at 1 year after rehabilitation.

Conclusions: The usage of GBR and lateralization of inferior alveolar nerve may be considered a good option for implant-prosthetic rehabilitation of patients with severe atrophy of the jaws. However, an increased implant/crown ratio, as well as risk of complications and paraestesia of the lower lip may affect both aesthetic result and the quality of patients' life. The patient's expectations regarding number of surgeries and final result that could be obtained with these techniques, as well as the risk of complications plays an important role in determination of type of rehabilitation.

141. A case of a post-extractive single implant restoration with an immediate temporary crown using a tapered narrow diameter implant (NDI)

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Objectives: A case is presented to demonstrate that the 2.9 mm diameter Bone Level Tapered Implant (BLT) is feasible to be used in a single implant immediate post-extractive placement with an immediate temporary crown combined with the technique to preserve the buccal plate width known as the Buccal Plate Preservation, a procedure previously published.

Methods: A healthy 56-year old male, non-smoker, presented to our dental clinic with an unrestorable right inferior central incisor. After careful examination, a decision was made to immediately place a 2.9 mm diameter BLT implant with an immediate temporary crown. At the same time a surgically created subperiostaeal buccal pouch was filled with a xenograft (Cerabone, Botiss, Germany) to counteract the possible buccal plate resorption expected after a tooth extraction

Result: The stability of the Narrow Diameter Implant was documented at the 6-month follow-up, furthermore the soft tissue appearance around the implant had achieved an excellent esthetic result

Conclusion: According to this case report the new NDI is feasible to be used in a single implant post-extractive case with an immediate temporary placement. The technique termed Buccal Plate Preservation seems to help in maintaining the soft tissue contour around the implant. Further studies with greater numbers are needed to confirm this hypothesis.

142. Three computer-guided template options for the rehabilitation of the fully-edentulous arch: Pros and cons of design and use

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Objectives: Patients that desire to transition from a hopeless dentition into an implant-supported fixed prosthesis or implant-supported overdenture has increased over the past decade. These complex rehabilitations require extensive treatment planning, both in the surgical and restorative phases of treatmen. Modern technological advances (CBCT, digital planning, guided surgery CAD/CAM) have contributed to streamlining and shortening the treatment process. In addition, they also allow the surgeon to perform the treatment in ways which were not readily possible before. These technologies have significantly influenced the approach of the treatment.

The use of cone-beam computed tomography (CBCT) and computerized planning have lead to efficient incorporation of restoration-driven implant surgery in reference to surrounding anatomical structures. Correct implant positioning improves the dentist's ability to enhance esthetic and prosthetic outcomes and maximize the potential to ensure optimal occlusion and implant loading. These factors can contribute to the long-term success of treatment.

In combination with the CBCT, implant planning software has made it possible to virtually plan the optimal implant positions in relation to surrounding vital anatomical structures and future prosthetic needs. This information can then be transfered to the surgical phase by using either static or dynamic surgical template systems. The static system, allows for the communication of implant positions through the use of rigid surgical templates generated from a CBCT and software plan often fabricated through an additive manufacturing process. One drawback of the static guide is that they do not allow for intraoperative modification of the implant positioning. In contrast, the dynamic system, often referred to as computer-navigated surgery, allow the surgeon to alter the surgical procedure and implant position in real-time using available clinical information.

The ability to visualize bone volume in relation to a restorative plan preoperatively with the use of CBCTs and planning software can be beneficial to both the patient and surgeon to reduce treatment phases and time, and in many situations minimize morbidity. Dentists should be aware of the advantages, disadvantages and limitations of the different approaches to execute proper computer-guided surgical template designs to maximize patient outcome.

Methods: This poster presentation will demonstrate three different examples that utilized computer-guided static surgical templates to assist in bone reduction and implant placement for implant-supported fixed prostheses.

Results: Table summary of advantages, disadvantages, indications, contraindications, and limitation of each design.

Conclusion: Computer-guided surgery may optimize treatment processes with appropriate training, experience, and pre-surgical planning. It can be successfully incorporated in situations with complex anatomy and surgery, and when minimally invasive surgery is desired.

143. The possibility based on the long-term prognosis of short implants

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Objectives: Recently short implants feasibility has been confirmed by many reports. The long-term prognosis, however, has not yet cleared its concern over the vulnerability of infection risk and overloading. And the presenter believes that the long-term clinical appreciation should be repeatedly evaluated. This report will relate single standing prostheses of short implants of size 6mm over evaluation of radiographic and CB-CT images through the period of 9 ~ 17 years for confirming the long-term prognostic stability. Additionally, single standing prosthetic cases of short implants of size 4mm will be mentioned.

Methods: (Clinical cases): As for the 6 different clinical cases (1 male case and 5 female cases) of single standing prostheses using Straumann standard Implant RN Ð4.1Ð x 6ÐTPS and SLA, changes of radiographic images surrounding implants of final prostheses through about 9 ~ 17 years as well as CB-CT images taken from follow-ups were evaluated. Outlines of those patients of 6 cases were as follows; Case 1 of female age 53, Region 14, Surface texture TPS, Case 2 of female age 26, Region 15, Surface texture SLA, Case 3 of female age 73, Region 26, Surface texture TPS, Case 4 of male age 55, Region 37, Surface texture SLA, Case 5 of female age 22, Region 24, Surface texture SLA and Case 6 of female age 44, Region 47. Superstructures were cemented with metal ceramic crowns or gold alloy cast crowns. Opposing arches were of natural teeth or restored with fixed prostheses throughout the cases and their situations are not changed to the present. As for the case of size 4mm implants is seated over the period of 1 year and 10 months; that is, Case 7 of male age 74, Region 16.

Results: Consecutive changes of radiographic images showed bone resorption around the implant cervical areas for Cases 3 and 4, but no clinical signs were confirmed. And for Cases 1 and 2, the bone density progress surrounding the implants was recognized over time changes. CB-CT images will be reported on three dimensional changes of bone conditions and density.

Conclusion: Short implants with minimal invasion and high stability will demonstrate excellent and less burdened clinical procedures to both patients and operators. Their reports are getting more frequent in recent years regarding the long-term prognosis. But their implant forms are various in bodies including size length and their studies of long-term prognosis may not be sufficient. Our study this time was limited to the size 6mm standard implants within single standing prosthetic cases for evaluation. As a result, although some cases confirmed bone resorption around the cervical areas, all cases exhibited favorable clinical prognosis. The bone quality of implant placed regions did not include Type IV bone porosity, and HU values of implant surrounding bone of clinical prognostic changes were impressive from CB-CT images. Thanks to these favorable results, we are going into clinical trials about shorter size 4mm implants presently. Viewing phases of highly aging populated society together with advanced diseased people, feasibility of those implants will be significantly great, but their application will certainly need careful consideration. The presenter believes that issues should be establishment of proper implant conditions including bone quality determination.

144. Immediate restoration of immediately placed implants in anterior maxilla

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Objective: Sixty-nine years old male patient came to our clinic with complain of severe mobility in anterior teeth in September 2015. After intraoral examination and obtaining medical history of the patient, case has been evaluated as 'Complex' level in ITI SAC classification in surgical case assessment. Main objective was immediate provisional restoration with a transitional prosthesis of the case after tooth extractions and implant placements within the same appointment.

Method: Careful evaluation of panoramic x-ray, model analysis and cone-beam computerized tomography was made respectively. Combination of diagnostic data and discussing patient's expectations, extraction of teeth #12-11-21-22 were planned. Immediate implant placement in teeth #11 and #22 was planned after evaluating of thick buccal bone, palatal bone to provide primary stability of the implant and thick soft tissue phenotype were in favor of Type I placement protocol. Surgical template was produced to define implant locations and provide screw hole accesses on palatal area for screw-retained restoration in advance. In October 2015, following extraction of teeth, tissue level 4.1mm in diameter and 14mm in length one-piece SLActive surface implants were placed in areas #11,22. For minimizing soft and hard tissue changes buccal gaps of placed implants were grafted with small particle bone substitute. In combination with type-I placement protocol immediate provisional screw retained restoration was made for stabilization of bone substitute and soft tissue contours. In combination with patient instructions and protective guard, provisional restorations were designed without any centric or eccentric contacts in static or dynamic occlusion. Weekly check-up calls were planned to closely follow the postoperative healing of the site and oral hygiene improvement of the patient. Healing phase progress uneventfully in all stages both in terms of intra-oral and radiographic aspects.

Results: Healing in both soft tissue and hard tissue were uneventful at the end of 12 weeks period. Result could have been improved by grafting the extraction site on tooth #12 during implant placement, which was resulted in small soft tissue contour deficiency in the area. Other than this issue the treatment outcome was satisfactory both from clinical and patients perspective. Provisional restoration provided successful stabilization of bone graft underneath and soft tissues in pontic and implant regions. Some of the bone graft particles were seen within the matured and healthy soft tissues when the provisional restoration screwed out to start the restorative procedures. Individualized impression copings were used to take impression and restoration stage was completed with porcelain fused to CAD/CAM milled Zirconium oxide framework on variobase (Ti-base) abutment as a screw retained four-unit bridge restoration.

Conclusion: When favorable clinical parameters are present type-I implant placement protocol in combination with type-I loading protocol provides many benefits to the patient. Immediate provisionalization of implants not only stabilizes soft tissue contours but also provide coverage of graft material around the implant shoulder. When planned and performed in sensitive way, this type of treatment approach can reduce patient morbidity, number of surgical procedures, comfort during healing and better soft tissue contours if well supported with bone grafting.

145. Individualized functional reconstruction of mandibular defect under the guidance of digital surgical technique

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Objects: One patient with block-shaped mandibular defect after mandibular tumor operation was reported in this study, using digital surgical technique and multidisciplinary cooperation to perform individualized repair and reconstruction.

Methods: The patient's mandibular model was obtained by CBCT scanning and three dimensional printing. The surgical repair template of the defect was made on the model, by which the non-vascularized iliac bone graft was guided. The implants (4.1mm×10mm, BL, Straumann SLA-active) were implanted in lower-left second premolar, first premolar, canine and lower-right central incisor under the guidance of the implantation surgical template 6 months after bone graft augmentation surgery and 4 months later, palatal mucosal graft and attached gingival and vestibular groove reconstruction were performed. The second-phase implant exposure surgery was performed under the guidance of 3D printing template 2 months after attached gingival reconstruction and the superstructure restoration of the implant denture was finished at last.

Results: No significant absorption was observed in the transplanted bone blocks in the reviews at 6 months, 12 months, 18 months and 24 months after iliac bone graft. During the removal of titanium plate in implantation surgery, a histological section of the bone fragments was made and the result showed that the non-vascularized bone graft was carrying on regeneration the same as normal bone at 6 months, and bone cells and blood vessels could be observed. After implantation, the imaging confirmed that the implants were in good orientation and formed a good osseointegration with the bone around. The function of mastication rehabilitated well and the patient was satisfied with the aesthetic appearance after the implant superstructure restoration.

Conclusion: The reconstruction of mandibular defects should be oriented by denture restoration with multidisciplinary cooperation to provide individualized and precise treatment for patients, obtaining a satisfactory facial aesthetics and maximizing the mastication rehabilitation.

146. Oral sarcoidosis and dental implant treatment: A case report

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Objectives: Sarcoidosis is a systematic, granulomatous, non-necrotizing disease of unknown aetiology, which can affect multiple organs. Proposed causative factors include genetic predisposition, infections, and environmental factors. In the UK, the reported incidence is 20 cases per 100,000. Most of the patients suffering from sarcoidosis present pulmonary findings and skin manifestations. The head and neck lesions are present in less than 15% of the patients: Poe (1943) presented the first confirmed case of sarcoidosis affecting the oral cavity, and since then eighty cases have been reported. Oral lesions can appear as part of a generalized disease or even as a first manifestation. The clinical findings can be localized swelling, ulceration, or recession. If the bone is affected, loose teeth, pain, or more severe swelling can be expected. Radiographically, the lesions appear as ill-defined radiolucencies.

There has been little, if any, scientific discussion around the rehabilitation of oral sarcoidosis-affected patients with dental implants. This case report presents rehabilitation of the anterior maxilla with a staged grafting approach and restoration with dental implants.

Methods: A 31-year old female patient was referred to the Royal London Dental Hospital for replacing the missing #21 and investigation of the mobile #22. The patient was previously diagnosed with pulmonary sarcoidosis but was not under any treatment. #21 had been extracted when she was 14 years old due to root resorption. Clinical and radiographic examination revealed severe bone loss in the #21, #22 area. An ill-defined radiolucency was evident and the #22 had almost no bone support, rendering its prognosis poor. The medical history, clinical and radiographic examinations, and bone biopsy confirmed the diagnosis of oral sarcoidosis. The agreed treatment plan was extraction of the #22 and rehabilitation of the area with staged bone grafting for vertical and horizontal augmentation and two dental implants to replace #21 and #22.

Following extraction, two cortico-cancellous bone allograft blocks, soaked in rhPDGF growth factor were stabilized with bone fixation screws to achieve vertical and horizontal bone volume. Porcine soft tissue matrix and porcine collagen membrane were placed before flap closure. Six months after augmentation, two implants were placed with simultaneous GBR using deproteinized bovine bone and porcine collagen membrane. Three months after placement, sulcus deepening was deemed necessary and was achieved with a split-thickness, apically repositioned flap and soft tissue allograft. Implant exposure and impressions followed. The implant-supported provisional crowns were modified to shape the soft tissue architecture. Their final form was transferred for the definitive screw-retained metal-ceramic linked crowns.

Results: Four-year follow-up confirmed the success of the treatment: Bone levels were stable, peri-implant tissues healthy with no biological or technical complications, and the patient was satisfied with the outcome.

Conclusions: This case report showcases the successful restoration of an area affected by oral sarcoidosis with hard and soft tissue grafting and dental implants. There is no clear evidence whether the disease itself can hinder grafting procedures or osseointegration. Further research is required in order to set standards for implant treatment and maintenance in patients with oral sarcoidosis.

147. Transposition of inferior alveolar nerve and interpositional graft combined with soft tissue management for mandibular severe defect rehabilitation after gingival tumor resection

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Objectives: This article presents one case with severe tissue defect after gingival tumor resection, was treated with multiple complicated techniques.

Methods: A 22-year-old woman who had suffered from gingival tumor resection 7 years ago was referred for bone augmentation and implant therapy. She had been treated with braces to get her dentition ready for implant restorations. The patient expressed a desire for implant-supported fixed restorations and esthetic improvement. The patient was healthy and did not smoke. The extraoral examination revealed collapse of right low lip due to the lack of support. The intraoral examination revealed severe bone defect of partial edentulous sites from 31 to 45, and the lack of keratinized tissue. A preliminary panoramic radiograph revealed large bone defect area and the proximity of mental foramen. A computed tomography scan confirmed the presence of severe vertical bone defect and distance from alveolar ridge to inferior alveolar nerve. The classification of alveolar bone defects by Terheyden(2010) for this case is complete height reduction of the ridge(4/4). The surgical SAC classification is Complex.

After discussing the procedure and grafting options, the patient elected to proceed with the treatment plan which comprises the following procedures: transposition of inferior alveolar nerve; interpositional graft; simultaneous implant placement; allogeneic acelluar dermal matrix soft tissue management; implant provisionalization and soft-tissue contouring; delivery of final restoration.

The procedure was performed under local anesthesia on an outpatient basis. After a midcrestal incision was performed and a full-thickness flap was reflected, the buccal bone of inferior alveolar nerve was removed with piezo surgery, and the nerve was transposed from the nerve canal very gently and was protected from injury. After the osteotomy, the crestal bone segment remained attached to the lingual soft tissue pedicle. The segment was elevated to the anticipated level equal with adjacent teeth, and rigidly fixed with titanium plate. The gap space was filled with bone substitute, and collagen membranes were applied over the buccal interpositional gap. The flap was sutured and obtained primary closure without tension.

4 months later, the second procedure was conducted under local anesthesia. The flap was elevated and titanium plates were removed. The vestibular extension surgery was performed with the exposed alveolar ridge covered under acelluar dermal matrix. The impant-supported fixed provisional restoration with base was fabricated to maintain the acelluar dermal matrix in place and the depth of vestibular groove. After around 7 months, a new splinted open-tray impression was taken and definitive implant-supported zirconia bridge with pink ceramic was delivered.

Results: After the procedure of interpositional bone graft, the healing process progressed uneventfully and complete remodeling of the grafted bone block was noticed during the second access of surgery area. The symptom of paresthesia after the surgery of transposition of inferior alveolar nerve was recovered completely several months postoperatively. The patient was perfectly satisfied with the function and esthetics of her rehabilitation.

Conclusions: With interpositional bone graft procedure combined with soft tissue management, the severe defect of partial edentulous dentition and surrounding tissue in this case was maximumly reconstructed.

148. Treatment of a recession on an implant in the frontal area

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Immediate implant placement after tooth extraction is a procedure that ensure the conservation of the alveolar buccal plate. In these cases, in order to obtain an esthetic result, it is very important to create an implant socket, that has a different axis that the one of the tooth. If we keep the axis of the tooth for the future implant we will obtain a gingival margin situated more apically that the ones of the adjacent teeth, compromising the final result.

This paper aims to report a case where a connective tissue graft was used to cover a recession on an implant replacing a left maxillary lateral incisor.

A 52-year old female addressed our office due to esthetically reasons. She had an implant supported restoration at the level of 2.2 with a apically positioned gingival margin compared to the adjacent

teeth. In this case the high position of the implant's gingival margin was masked by prosthetic means. She reported the implant placement immediate after the tooth extraction.

We decided to correct the discrepancy in the gingival alignment in the frontal area by covering the recession on the implant using a connective tissue graft. Prior to the surgical intervention, the abutment's shape was modified and the existing prosthetic restoration was replace with a new provisional one.

The recession was covered using the bilaminar technique as described by Professor Giovani Zucchelli. A split thickness trapezoidal flap was elevated at the recession site creating a vascular bed for the connective tissue graft. The connective tissue graft was harvested from the palate as a free gingival graft, which was deepitheliased. We preferred

this method that provides a connective tissue graft that has a greater stability due to a lower shrinkage rate.

After the deepithelialisation of the medial and distal papillae the graft was fixed using a 7.0 resorbable suture. Consequently, it was covered by the coronally advanced flap, which was fixed using a sling suture. This ensured a tight contact of the surgical and anatomical papillae. The vertical releasing incisions were closed by interrupted sutures.

A full coverage of the recession was obtained with an esthetic leveling of the free gingival margins in the frontal area. The stability of the results is confirmed by the various recalls.

The coverage of a recession on implants is a very sensitive technique that can be used to correct the esthetic outcome of a malpositioned implant in the frontal area.

149. SFE with a composite graft and a staged approach: A case report

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Objectives: A 40-year-old woman presented for implant replace treatment of her maxillary left teeth 22 to 27 which were extracted 10 years ago. A clinical examination showed the residual dentition in the maxilla and mandible presented with old fillers or restorations. Interarch distance was acceptable. The CBCT scans showed incomplete lateral wall of maxillary left sinus and severe alveolar atrophy in maxillary posterior segment. Her desire for treatment had led her to undergo sinus floor elevation surgery and bone grafting from the iliac crest a second time.

Methods: Under local anesthesia, corticocancellous bone was harvested from the anterior iliac crest in the form of two blocks. In the meantime, the left maxilla was exposed by extending a palatally shifted crestal incision from sites 22 to tuberosity and a vertical releasing incision. The flap was reflected and we made a mucoperiosteum flap around the window which had been made by her last surgery. a larger window was made by piezo surgery technique (mectron PiezoSurgrey®, Silfradent, Italy). The membrane had already been perforated and the remaining porting was carefully released and elevated on the vestibular aspects to open the site for the new graft. One small part of corticocancellous particulate graft from the iliac crest was prepared and placed laterally on the site tooth 23 stabilized by a titanium screw. A resorbable membrane (Bio-Gide®, Geistlich, Switzerland) was placed in the maxillary sinus cavity to cover the perforation zone. Another big block of corticocancellous particulate was prepared and placed into the maxillary sinus cavity by two titanium screws through the alveolar crest. Also, a large mount of DBBM (Bio-Oss®, Gestlich, Switzerland) was used. Two layers of resorbable membrane were used to cover the graft apically and palatally. Closure of the wound was achieved with 4-0 polypropylene for interrupted sutures, also using a periosteal releasing incision.

After 6 months. A new CT scan showed excellent bone healing and 3D volume.

Surgery of implant placement was conducted with local anesthesia. The fixation titanium screws were all removed. Implants were placed at sites 23/25/26 by the standard protocols with good primary to allow rehabilitation by a fixed dental prosthesis with a mesial cantilever. A resorbable membrane was placed on the alveolar crest. Complete clousure of the implants was performed.

4 months later, the implants were exposed under local anesthesia. This was followed by taking impressions (2 weeks later) and delivering a final screw retained metal-resine restoration(another 10 days later). Oral health instruction was emphasized. And the patient was referred to every 3 month's follow up.

Results: A CBCT scan was obtained 2.5 years after loading. A small vertical bone loss was found without clinical significance. The patient was very pleased and satisfied with the implant prosthesis.

Conclusion: In discussing the out come achieved, we suggest that a number of factors may influence the out come of large bone grafts in severe bone atrophy. we need well experienced surgeon to achieved the surgery approach for a “second time” lateral window sinus floor elevation. correct design of incision and flap management were also important. Perfect adaptation of the block graft is needed. Reliable implant systerm and bone augmentation materials must be used.

150. Frontal linear scleroderma “En Coup de Sabre” and oral rehabilitation with dental implants

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Objective: The purpose of this poster is to present a clinical case of frontal linear scleroderma “en coup de sabre”, rehabilitated using an implant supported maxillary fixed partial restoration, through a minimally invasive approach with reduced diameter and short implants.

Methods: A 65-year-old female presented with functional and esthetic complaints. Intra-oral clinical examination showed upper right missing teeth (13, 14, 15, 16), and presence of a removable partial denture. A large vertical defect was noted. CBCT analysis showed a vertical bone deficiency, with adequate bone width. At the facial analysis a deformity/scar, present as linear sclerotic lesions with skin discoloration in the frontoparietal area was observed. Medical history confirmed that it was compatible with pathological condition classified as “Facial Linear Scleroderma En Coup de Sabre”. The risks and benefits of each alternative of dental treatment were evaluated (staged grafts vs short implants) and the chosen option recommended to correct the functional and esthetic patient complaints was the placement of short implants in the posterior region, aiming at the restoration with a fixed partial prosthesis.

Results: After medical evaluation with laboratory exams, treatment planning included CBCT analysis, digital planning, facial and dental cast analysis. The surgical plan defined the placement of one reduced diameter Roxolid SLACtive implant on tooth 13 (3.3 mm x 10) and two Straumann SLActive Standard Plus implants: 4.1x8 (14) and 4.1 x 6 mm

(15). Healing was uneventful for both hard and soft tissues. After an osseointegration period of 12 weeks, the restoration was performed, delivering a fixed partial restoration with splinted implants and a pink prosthesis to compensate the vertical defect.

Conclusions: En coup de sabre is a type of linear scleroderma characterized by a linear band of atrophy and a furrow in the skin that occurs in the frontal or frontoparietal scalp. Multiple lesions of en coup de sabre may coexist in a single patient. Mucosal and / or bone alterations may occur, and the healing response may differ from patient to patient. Clinicians should be familiar with the wide spectrum of presentations of scleroderma. As shown in the presented case, the oral rehabilitation can be performed with a minimally invasive surgery, but the risks and benefits should be carefully evaluated. The prompt recognition of the disease, careful management, and close follow-up are important factors to obtain long-term success in this complex and unusual cases.

151. Flapless short implant placement in an atrophic site using dynamic navigation: A case report

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Objectives: To present a clinical case of a short implant placed in an atrophic site with a flapless approach using a dynamic navigation system and to determine the accuracy of the final implant position compared to the preoperative plan.

Methods: A 42-year old female with a missing left first molar was treated at the Oral and Maxillofacial Division of Bologna University. The orthopantomography showed a vertical bone atrophy in the edentulous site. Adjacent teeth were vital and free from any restorations. Since the patient denied a tooth-supported fixed bridge and refused to undergo any bone augmentation procedures, an implant-prosthetic rehabilitation with a short implant was programmed. A virtual planning and a navigated implant placement were planned to achieve a prosthetically correct position and to place the implant safely and in the most accurate way. A CBCT was taken and DICOM data were imported into the coDiagnostiX planning software. The 3D implant-prosthetic planning was performed: a 4,8 x 4 mm implant (Standard Plus 4mm Short Implant, Straumann) was selected according to bone crest morphology (4,30 mm high and 6,8 mm thick). The dynamic navigation system (ImplaNav, BresMedical) was used in both site preparation and implant placement. A flapless implant site preparation was performed. A transmucosal 4,8 x 4 mm implant (Standard Plus 4mm Short Implant WN, Straumann) was placed with 15 Ncm insertion torque. The patient underwent a post-operative radiograph and the final implant position was compared with the planned-one with a dedicated software. After 6 weeks, impressions were taken and a single screw-retained crown was delivered. Clinical examination at 1, 3 and 6 months from prosthetic loading were performed. Peri-implant clinical parameters were recorded and the peri-implant bone crest level was determined on the 6-month follow-up periapical radiograph.

Results: No surgical or prosthetic complications occurred. The postoperative pain was described as mild by the patient. The final implant position was comparable with the planned-one. At 6-month follow-up clinical and radiological findings show no peri-implant bone loss and good peri-implant soft tissues condition.

Conclusions: The navigated placement of a short implant may be considered a reliable method to perform a safe and minimally invasive surgery and can be useful for the management of vertical bone atrophy.

152. Implant site augmentation using a novel biomaterial: MPM

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In this case, we aimed to achieve bone augmentation around implants in the compromised mandibular posterior region using a new biomaterial, MPM.

MPM (Mineralized Plasmatic Matrix) is a combination of platelets, fibrin concentrate and Beta-TCP to repair alveolar defects. MPM has been developed on the scientific knowledge based on the experience with PRP and PRF. To optimize the regenerative potential of the Beta-TCP, autologous blood products high in platelet concentrations are facilitated. During MPM preparation, and extra PRF type membrane is also generated.

Case: 44-year old systemically healthy female patient applied to our clinic complaining of tooth loss and loose teeth. The patient had severe periodontal condition on existing dentition and a number of missing teeth. After detailed clinical and radiographic evaluation SRP was performed. Oral hygiene instructions were reinforced and prosthetic consultation was performed. Implant placement on teeth number 44 and 46 was planned. CT evaluation revealed compromised bone volume in the mandibular posterior area. Implant placement and bone augmentation procedures using MPM were planned. After LA, full thickness mucoperiosteal flap was reflected. Implant osteotomies were prepared. Straumann SP implants were placed on the 44 and 46 regions. Since the bone volume was insufficient regarding the bucco-lingual direction; augmentation procedures using MPM were performed. 40 ml blood was obtained from the patient. MPM was prepared according to the manifacturer's advice. Alveolar crest was augmented using the1 cc biomaterial on the buccal and lingual aspects. Primary closure was achieved. Suttures were removed 7 days later. Healing was uneventful. 6 months later radiographic evaluation revealed bone apposition on the both augmented sites.

Conclusion: MPM procedure is a simple, non-invasive and succesful method for bone augmentation. Compromised alveolar crest sites could be augmented without an extra graft donor site before or during dental implant procedures.

153. Computer guided surgery of edentulous patient using coDiagnostiX software

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Objectives: To highlight the potential of computer-guided implant placement in the event of total upper and lower edentulism. Accurate digital planning allowed us to perform a minimally invasive procedure and to reduce post-operative pain.

Methods: Post-extractive implants were applied to an edentulous patient in order to rehabilitate him both functionally and aesthetically, following a remediation procedure of remaining dental elements. Diagnostic prosthetic dentures allowed the patient to regain a correct occlusion and function in the months following the intervention. The patient requested a fixed-type rehabilitation supported by implants. It was therefore decided to apply a computer guided surgery supported by coDiagnostiX Dental Wings software. This software performs a direct match with the patient's digital model (Dicom-STL). The temporary prosthetic dentures were re-based with polysulfide and implants were duplicated based on the master model in order to use them as a radiological template with reference elements that were optically and radiologically detectable. Subsequently, STL digital file were generated both on the master and on the radiological template and placed on the master model by using a CAD laboratory scanner. A CAD scan was then performed on the patient wearing the radiological template. DICOM files, were uploaded and matched with the STL of the radiological template, highlighting the correspondence between the radiopaque CAD elements and the same areas on the STL model of the prosthetic dentures. At this point, the STL

model of the mucosa was also uploaded to the software, exploiting the previously matched STL positions. In the inferior position, five Straumann Standard Plus Roxolid Slactive implants (Ø 3.3) were planned to be placed in positions 4.5, 4.3, 4.1, 3.3 and 3.5. In the upper denture, 3 Straumann Standard Plus Roxolid Slactive implants (Ø 3.3) were planned to be put in position 2.3, 1.1 and 1.3. Moreover, three stabilization pins were programmed in order to the radiological template stable during the surgical procedure. The position of the implants was performed in compliance with prosthetic (STL of the radiological template) and anatomical (CT DICOM) aspects of the patient. The surgical template was then designed to support on the STL model of the patient's mucosa. The surgical template was prototyped by 3D printing. The planning results of made it possible to perform a flapless type of surgery. The implant bed was prepared following software indications, which included the use of dedicated cutters in combination with the diameter educers under copious additional irrigation. Implants were inserted using a guided surgery mounter through the sleeve. Once the templates were removed, the implants were individually tested by Osstell, resulting in ISQ values >75.

Results: From a clinical point of view, there was no evidence of bleeding or post-operative edema of the soft tissues. The implants were observed to be perfectly osseointegrated.

Conclusion: The use of computer-guided surgery provides the clinician with a wider range of choices to rehabilitate edentulous patient from an implantology point of view and it allowed, in this specific case, to place the implants in a prosthetic guided manner, to perform a minimally invasive surgery and reduce post-operative discomfort.

154. Immediate implant placement and delayed restoration in esthetic area, a case report

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Objectives: Nowadays immediate implant placement and immediate rehabilitation is widely used in esthetic area, and predictable results have been reported. In some cases, the implant primary stability is not sufficient for immediate loading, and it must be healed submucosally. Whether delayed rehabilitation will have negative effect on the esthetic result, evidence is still not sufficient for this question. The objective of present case report is to observe the esthetic result for a patient who accepted immediate implant placement and delayed restoration.

Methods: A 35-year-old female patient visited our clinic and complained of trauma on her left upper central incisor 3 days before. Intraoral examination showed intact but mobilized crown on tooth 21. Periapical radiograph indicated a fracture at the medal one third of the root, no periapical translucent lesion was observed. Thin but intact buccal bone wall was confirmed by Cone beam CT. The other teeth were healthy with no periodontal attachment loss. Treatment plan were as following:
1) Extraction of tooth 21 and immediate implant placemen;
2) immediate provisional rehabilitation to maintain buccal soft tissue contour;
3) Soft tissue augmentation if indicated;
4) Final prosthesis delivery. Tooth 21 was atraumatically extracted, and a 4.1*10mm Straumann bone level implant was inserted in a proper 3 dimensional position according to company suggested process. The insertion torque was about 15-20 Ncm, and immediate rehabilitation was contraindicated. Bone substitute material (demineralized bovine bone matrix, DBBM) was placed into the gap between implant and buccal bone wall. Subepithelial connective tissue graft was harvested at the palatal area, and was used to close the extraction socket. The root of the extracted tooth was removed, and the crown was cemented on the adjacent teeth as a provisional restoration. Second stage surgery was performed 5 months later, and implant supported provisional restoration was fabricated for soft tissue conditioning. Final impression was obtained using individualized impression coping 3 months after, and a screw retained final prosthesis was delivered.

Results: The pink esthetic score of the implant supported crown was 13, and the patient is satisfied with the esthetic results. After 1-year maintenance and follow up, the soft tissue is healthy with stable marginal level.

Conclusion: Acceptable esthetic result can be obtained by immediate implant placement and delayed rehabilitation. Appropriate surgical and prosthetic process is critical for the final result. This case is still under further observation for long-term outcome.

155. Aesthetic restoration of an upper front tooth lost from periodontits, a case report

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Objectives: It is often difficult to get good aesthetic results when implant supported prosthesis is used to rehabilitate teeth lost from periodontitis induced severe bone loss. A 32-year-old male patient with chronic periodontitis asked for implant therapy because of spontaneous tooth loss of upper left central incisor one week ago. This patient was treated by periodontal and dental implant therapy, and was followed up for 2 years to evaluate the biologic and aesthetic results.

Methods: The patient was a systemically healthy non-smoker, and was diagnosed as severe generalized chronic periodontitis. Initial periodontal therapy was performed to control severe periodontal infection. Residual pockets were eliminated by open flap surgery consequently. Implant surgery was planned when no 5mm or deeper periodontal pockets could be detected. Horizontal and vertical bone defect can be observed at the upper left central incisor area by cone-beam CT. The available bone width was only 2-3mm at the alveolar bone crest level. Treatment plan were as following:

1) Implant placement and simultaneous guided bone regeneration;

2) Soft tissue augmentation surgery if indicated;

3) Soft tissue condition by implant supported provisional crown;

4) Final prosthesis delivery.

A 4.1*10mm Straumann bone level implant was inserted in a proper 3 dimensional position according to company suggested process. Favorable primary stability was obtained and 3-4mm of implant surface was exposed in bone defect. Simultaneous guided bone regeneration was conducted with demineralized bovine bone matrix (DBBM) and collagen membrane. Second stage surgery was performed 5 months later, and complete osseointegration was confirmed. Implant supported provisional restoration was used for soft tissue conditioning. Final impression was obtained using individualized impression coping 3 months after, and a screw retained final prosthesis was delivered.

Results: The pink esthetic score of the implant supported crown was 13, and the patient is satisfied with the esthetic results. After 2 years, maintenance and follow up, the soft tissue is healthy with stable marginal level.

Conclusion: Guided bone regeneration is a predictable bone augmentation technique in implant dentistry. Soft tissue esthetic appearance can be improved through appropriate surgical and prosthetic process.

156. Minimally invasive technique for preservation of stabile periimplant soft tissues after immediate implantation - guidelines and principles for successful implanto-prosthetic rehaliblitation - a clinical study

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Objectives: The aim of this clinical study was to investigate clinical success of the socket shield technique and to evalute its outcome on the esthetics of the final prosthetic rehabilitation.

Material and methods: This clinical study constited of 30 patients at Department of Oral Surgery with strong indication for tooth extraction in the frontal part of the maxilla.

Patients were divided due to their clinical indications:

1. Postendodontic horizontal tooth fracture where the fracture line is prosper enough to preserve buccal tooth root and imediate implant placement

2. Postendodontic submarginal fracture when patient rejects ortodonthic tooth extrusion.

3. Crown fracture of vital tooth beyond the marginal bone surface, but patient is not willing to acess ortodontic therapy or conservative treatment.

Each group consisted of 10 patients. Partial resection of palatal root was performed in each patient with a view to preserve buccal root as well as buccal bone wall. After resection alveolar bed for implant, located more palatal regarding on buccal root left in alveola, was prepared. Before implant was inserted a buccal root was smeared with Emdogain gel (Straumann, Basel, Switzerland). After all immediate crown was maid following non-functional loading concept.

Patients were threated with antibiotic therapy during 7 days after surgery. After 4 - 6 months a permanent implatoprostethic substitute was made, while x-ray analysis was made after 6 months.

Results: Patients did not have any kind of complications after surgery. Immediate crowns were replaced with permanent tooth crowns after 4 - 6 months. Two patiens experienced screw loosening after 1 month. Soft tissue contours were preserved in all cases, also buccal bone wall was preserved. In a period of following 6 months there was no any biological or mehanical complications.

Conclusion: With buccal bone wall preservation as well as a preservation of gingival tissue using tehnique of immediate implant placement, very good esthetic results were achieved. By deciding which patients are candidates for this surgery indications and guidelines written above need to be followed.

157. Guided autotransplantation of teeth: A novel method using virtually planned 3-dimensional templates

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Objectives: The aim of this study was to introduce an innovative method for autotransplantation of teeth using 3-dimensional (3D) surgical templates for guided osteotomy preparation and donor tooth placement.

Methods: This report describes autotransplantation of immature premolars as treatment of an 11-year-old boy having suffered severe trauma with avulsion of permanent maxillary incisors. This approach uses modified methods from guided implant surgery by superimposition of Digital Imaging and Communications in Medicine files and 3D data sets of the jaws in order to predesign 3D printed templates with the aid of a fully digital workflow.

Results: The intervention in this complex case could successfully be accomplished by performing pre-planned virtual transplantations with guided osteotomies to prevent bone loss and ensure accurate donor teeth placement in new recipient sites. Functional and esthetic restoration could be achieved by modifying methods used in guided implant surgery and prosthodontic rehabilitation. The 1-year follow-up showed vital natural teeth with physiological clinical and radiologic parameters.

Conclusions: This innovative approach uses the latest diagnostic methods and techniques of guided implant surgery, enabling the planning and production of 3D printed surgical templates. These accurate virtually predesigned surgical templates could facilitate autotransplantation in the future by full implementation of recommended guidelines, ensuring an atraumatic surgical protocol.

158. Guided modern endodontic surgery: A novel approach for guided osteotomy and root resection

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Objectives: Continuous improvements in techniques, instruments and materials have established modern endodontic microsurgery as a state-of-the-art treatment method. The purpose of this approach was to introduce a new surgical endodontic technique using a 3D printed template for guided osteotomy and root resection.

Methods: A 38-year-old patient was diagnosed with periapical lesions of teeth #3 and #4 and an extruded gutta-percha material. 3D radiographic and optical scan files were imported into a surgical planning software designed for guided implant surgery. Within the adapted software program the periapical lesions and the extruded gutta-percha were visualized and marked. With the aid of virtually positioned surgical pins and piezoelectric instruments the osteotomy size, the apical resection level and the bevel angle were defined pre-treatment. 3D surgical templates for each tooth were designed within the software program for a guided treatment approach.

Results: This approach comprised the treatment of periapical lesions of teeth #3 and #4 with root-end fillings and the detection and complete removal of the extruded gutta-percha material without perforation of sinus membrane. There were no post-operative complications and clinical and radiological assessments verified complete healing of the teeth.

Conclusions: The guided microsurgical endodontic treatment presented appears to be a viable technique allowing for predefined osteotomies and root resections.

159. The use of Enamel Matrix Derivatives in mucogingival defects

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Objectives: The objective of this study is to present a case series of 9 patients treated with a combination of mucogingival plastic surgeries and enamel matrix derivatives (EMD) for root coverage.

Methods: 9 systemically and periodontally healthy patients, with multiple or single gingival recessions were enrolled in the study. Miller class I, II and III recessions were treated. All patients were treated with different mucogingival plastic surgery approaches for root coverage with connective tissue grafts (Zuhr et al. 2007, Zabalegui et al. 1999, Bruno et al. 1994, Zucchelli 2004, Zucchelli 2000 and Allen 1994) and, in addition, enamel matrix derivatives (EMD). The Clinical reevaluation was performed at a mean of 6months.

Results: A total of 20 recessions were treated in 9 patients. 4 Patients had the surgeries performed on the upper maxilla and 5 in the mandible. 7 recessions were Miller Class I, 7 class II and 6 class III. At the final evaluation, on average, a 96.9% of the root surfaces were covered by gingiva. Complete root coverage was seen in 15 of the gingival recessions. The Root coverage esthetic score (Cairo et al. 2009) was of 8.7.

Conclusions: The use of EMD + Coronally advanced flap shows better results than CAF alone. The use of EMD in mucogingival plastic surgery is justified with the objective of obtaining periodontal regeneration. Randomized Controlled Clinical Trials are needed to evaluate the added effect of EMD.

160. Application of digital planning and stereolithographic 3D printing technology for computer-assisted external sinus lift and implant surgery - a clinical case report

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Introduction: Implant dentistry has evolved over the past 40 years and the application of three-dimensional imaging modalities have been developed to achieve more accurate and precise treatment outcome. In our clinical case, a computer guided external sinus lift surgery was performed utilizing a sinus lift guide made on stereolithographic 3D printing solid model converted from a virtual computer-generated three-dimensional image and the in vivo planning was successfully replicated during a complicated external sinus lift procedure.

Method: A patient with no systemic disease presented with generalized moderate periodontitis and edentulous area at tooth number #4. Implant surgery and sinus lift procedure were planned to restore the right second premolar. The CBCT datasets were imported into interactive treatment planning software (ITK-snap) and 3D simulation image was constructed and transformed into a solid model based on rapid-prototype process of steriolithography (STL)(Form 2). This real-size STL model further helped us to fabricate a sinus lift guide precisely outline the sinus window and utilized during the surgical procedure. Due to the limited space and unique sinus floor morphology, an external sinus lift approach (Caldwell- Luc technique, Boyne el.) was planned with possible one-stage implant placement.

Results: The STL model (Form 2) generated from CT Digital Imaging and Communications in Medicine (DICOM) data was precise and transparent, identification of the sinus configuration was completed and design of the outline of the external sinus lift was made based on the anatomy of the maxillary and the location of the dental implant. On the model, we precisely identified the best position. A surgical stent was carefully made on the STL model to future assist the external sinus lift surgery. One stage external sinus lift procedure with simultaneous implant placement was performed successfully without complication.

Conclusion: By utilizing a sinus lift guide fabricated based on the CBCT, pre-surgical treatment planning software, three-dimensional simulation and 3D printing stereolithography technology, complicated one-stage external sinus lift procedure was performed more precisely, less invasive and less time consuming compared to conventional approach. Chance of complication such as sinus membrane perforation was also reduced.

161. Implant site development using intraoral autogenous bone block for vertical ridge augmentation - case series

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Problem Statement: Staged approach ridge augmentation was conducted for optimized implant placement and allowed for ideal implant restoration. Autogenous block graft has been used for lateral ridge augmentation. However, clinical research about vertical ridge augmentation with block graft is scarce and limited to case reports and case series.

Objective: We reported four cases which diagnosed as severe periodontitis or periimplantitis, which resulted in a severely mandibular atrophy.

Methods: Intraoral autogenous bone block and resorbable membrane were used for vertical augmentation.

Results: The postoperative courses went uneventfully. Post-functional loading 3-year follow-up showed stable marginal bone heights and healthy peri-implant mucosa with good chewing function

Conclusions: 4 cases showed vertical gain greater than 5 mm. Onlay block graft with resorbabale collagen membrane for vertical alveolar ridge augmentation could yield predictable results under proper case selection and careful surgical management.

162. Alveolar ridge preservation with autologous particulated dentin - a case report

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Objectives: Socket preservation is a reliable method for prevention of the atrophy of the alveolar ridge after tooth loss. The augmentation of the extraction socket can be performed with autologous bone, alloplastic bone substitute material or a combination of booth. Dentin is similar to bone in its chemical composition. In its use as bone substitute material it undergoes a remodelling process and transforms to bone. Recent studies have focused on dentin as a potential bone substitute in different models of alveolar defects. The presented case report introduces a technique in which the extraction socket is augmented with autologous, particulated dentin.

Methods: The fractured, non-savable mesial incisor of the upper jaw was carefully extracted in axial direction. After the extraction, the tooth was cleared from remaining periodontal tissue. The vital pulp tissue or a root canal filling, enamel and cementum were also removed. Following the particulation of the remaining dentin in a bone-mill, the dentin particles were immediately filled orthotope into the alveolar socket. The soft-tissue closure was performed with a free gingiva graft of the palate.

Results: After an observation period of four months an implant was placed in the augmented area, which osseointegrated successfully and could be restored prosthodontically in the following. The results of this method showed a functional and esthetic success.

Conclusions: The präimplantological, autologous socket preservation with dentin could be performed successfully. For the establishment of dentin as augmentation material for jaw augmentation procedures a prospective, clinical trial is now necessary.

163. Oral rehabilitation in patients with temporomandibular disorders involving short implants and viscosupplementation in the multidisciplinary treatment - a case report

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In oral rehabilitation in patients with temporomandibular disorders (TMD) it is essential to identify the etiology that led the patient to such disorder. In the present clinical case, the patient D.L.S. 58, attended the clinic with chronic neuropathic pain.

After anamnesis and Magnetic Resonance Imaging (MRI) evaluation, it was diagnosed disc displacement without reduction and right condylar bone degeneration. In the intraoral examination, it was observed inferior bilateral posterior edentulism as a triggering factor for TMD, due to loss of vertical dimension.

Based on these data, it was developed a complex multidisciplinary treatment plan, reporting TMD, prosthesis and implants, involving posterior atrophic mandible rehabilitation with bilateral branch block displacement and installation of Roxolid® short Straumann implants. In the treatment of TMD it was indicated viscosupplementation and application of botulin toxin type A.

The correct planning, indication and execution of multidisciplinary therapy were fundamental for the rehabilitation of the patient, reestablishing the OVD, and consequently extinguished the pain symptomatology.

164. Correction of esthetic complications due to facial implant malposition in the upper central incisor sites: A case report

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The increased use of dental implants has resulted in a rise in the number and severity of implant-related complications. You may face such cases in which, despite osseointegration, the restoration presents unsatisfactory conditions due to implant malposition. This work presents a clinical case and the sequence of treatment for the correction of esthetic complications due to facial implant malpositon in the upper central incisor sites.

This work presents a disaster case in the upper central incisor sites with two facial malposition implants. No restorations were existed due to the malpositon. CBCT scan shows the facial implant malpositon clearly. The facial bone deficit is clearly visible in the CBCT scan result. The removal of all two implants is required. The extent of the facial bone deficit is clearly visible following elevation of a mucoperiosteal flap. A careful removal surgery is carried out without causing additional bone loss during the removal process. After the explantation procedure, a bone augmentation procedure is simultaneous carried out with the methods of vertical bone-separating technique and guided bone regeneration(GBR) technique. CBCT scan after 6 months shows that the bone augmentation surgery is very successful and we re-establish a satisfactory facial bone wall in the implant sites. Two Straumann implants are placed in the surgical sites with the aid of implant surgical guide. CBCT scan after 4 months shows that the two implants are both placed in correct three-dimensional (3D) position and the width of the facial bone surrounding the two implants are more than 2 mm.

The implant-supported crowns are placed in the upper central incisors. It shows a satisfactory aesthetic effect and a very stable radiograpg result. Re-examination after 1 year and 2 yearsÐit shows a more satisfactory aesthetic effect, the bone and the tissues were stable and healthy.

Every clinician should recognize the importance of a correct three-dimensional (3D) implant placement. And all the placement of implants must follow biological principles.

165. Immediate placement and provisionalization of maxillary two anterior adjacent implants with bone grafting and flapless protocol: A case report

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Objectives: A lot of clinical studies have been published suggesting the advantages of using immediate post-extraction single implant under a flapless protocol, followed by the simultaneous placement of an implant-supported provisional restoration. The objective of this case report was to evaluate the clinical and aesthetic outcomes of immediate implant and provisionalization for maxillary two anterior adjacent implants.

Methods: In this case report, a 35-year-old female presented with a useless root in tooth 8(11) and tooth 9(21) was assessed for implant restoration treatment. Pre-surgical clinical examination indicated that there was no infection of soft tissue with thick gingival biotype and gingival margins of tooth 8(11) and tooth 9(21) were harmonious. CBCT assessment indicated that the buccal alveolar bone walls were intact and there was no obvious radio translucency around roots. After a careful tooth extraction for tooth 8(11) and tooth 9(21), exploring the integrity of the alveolar walls and the buccal marginal bone position through bone probing was performed. Then the implant sites were prepared without a flap elevation, and the implants (BL 4.1×12, SLA, Straumann) were placed, with an angulation compatible with a screw-retained restoration). The most coronal level of implant shoulder was 2-4mm apical to the planned buccal margin of the future restorations and the gap between the implant and buccal bone wall was systematically filled with bovine bone particles (Bio-Oss 0.25-1mm, Geistlich Pharma AG, Wolhusen, Switzerland). Once these 2 implants were placed and primary stability was confirmed, two provisional implant-supported, screw-retained restorations without any occlusal contact were produced and delivered through an intra-oral direct procedure. Permanent restorations consisted with Ti-Base and zirconia-ceramic crown were installed at 6 mons. Follow-up clinical and aesthetic results and radiographic examinations were performed at 3-month, 6-month, 12-month and 18-month.

Results: No implant was lost. No obvious mesial and distal marginal alveolar bone loss was detected at 18-month respectively. Gingival margin was stable and no midfacial recession was observed. Mesial and distal papilla were filled in the gingival embrassure. No black triangle between two maxillary central incisors and lateral incisors was observed. There was no midfacial contour deficiency for implant 8(11), whereas a little bit contour deficiency was observed for implant 9(21).

Conclusion: Based on this short-term clinical follow-up, this case report presents a predictable treatment option for restoring continuous two maxillary anterior teeth with immediate implant placement, immediate provisionalization and bone grafting under flapless protocol. This is mainly dependent on careful pre-treatment examination, atraumatic teeth extracation, correct implant position, a flapless approach, the use of immediate implant-supported provisional restorations, and filling the osseous gap with low substitute rate bone grafts.

166. Early implantation and immediate restoration of an anterior maxillary teeth complete dislocation

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Objectives: In order to explore the clinical effect of early implantation and immediate restoration of an anterior maxillary teeth complete dislocation

Methods: Using the dislocation natural tooth as temporary restoration for a week before the implantation. Make the operation plan and design the implant surgical guide. Implantation of anterior teeth was done after 1 weeks of complete dislocation and immediate restoration was supported by teeth. Monthly visit to modify the temporary teeth. After 3 months, the final restoration was completed.

Results: Obtain the satisfactory aesthetic effect and the patient was satisfied with it.

Conclusion: After comprehensive preoperative assessment, under the guidance of implant surgical guide, the early implantation and immediate restoration of an anterior maxillary teeth complete dislocation can gain satisfactory aesthetic effect.

167. Multidisciplinary management for the rehabilitation ofskeletal malocclusion with dental implants: A clinical report

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Purpose: To present a clinical report of multidisciplinary treatment combined with orthodontic, orthognathic and dental implants for a young partially edentulous adult with skeletal malocclusion.

Methods: This clinical report illustrates the team cooperation and an optimal outcome of a multidisciplinary management for a young partially edentulous patient with skeletal class iii malocclusion. The edentulous regions were in the maxilla with severe alveolar atrophy. The treatment was performed by a sequential procedure as the followings: Firstly, the patient was treated with orthodontic appliance and orthognathic surgery; and then, guided bone regeneration with bone materials was performed in the edentulous regions; 6 months after

healing, two implants were successfully placed and subsequent restoration was performed. This case description was based on review of the patient records and assessment of orofacial function.

Results: The whole rehabilitation for this patient was completed after two years. No complications were observed during or after treatment. The final interdisciplinary treatment outcome presented an excellent occlusal function as well as smile and facial esthetics. Regular follow-ups also provided a significant improvement in function and both dental and facial esthetics.

Conclusion: The interdisciplinary treatment of orthodontics-orthognathia and implant dentistry is very important because these three complement each other in search of the best for the patient. This case demonstrates very well that orthodontics and orthognathic surgery provided the best occlusion situation prior to implant placement and restorations.

168. Horizontal guided bone regeneration of a severe atrophic ridge in the anterior maxilla: A case report

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This case report describes the treatment performed on a patient who had undergone horizontal ridge augmentation in the anterior maxilla due to an extraction of an ankylosed upper left central incisor.

Upon flap elevation, a buccal fenestration was noted. The tooth was removed using a small round bur, until bleeding bone was visible. The socket was curetted, packed with deproteinized bovine bone mineral (DBBM) granulesμ and covered with a bovine tendon collagen membrane¶. The soft tissues healed without adverse complications.

The implant placement was performed 7 months after the extraction. Pre-operatively, the ridge width measured 4mm. A bone level implant with a chemically modified, sand-blasted and acid etched surface in the endosseous region§, a platform diameter of 4.1mm and length of 10mm, was placed with primary stability. A buccal fenestration was noted apically and the coronal third of the buccal bone was intact. A cover screw was attached. Autogenous bone was harvested from the anterior nasal spine within the same flap and placed over the exposed threads on the apical third of the implant, followed by a superficial layer of DBBM granules. The augmentation material was covered with a bovine tendon type 1 collagen membraneø. A horizontal releasing incision was done to release tension in the periosteum and the flap achieved primary closure.

A second stage surgery was done 6 months after placement and the implant was provisionalised to contour the soft tissues.

This case illustrates the usage of DBBM granules and collagen membranes, for predictable guided bone regeneration of severe horizontal defects, with a satisfactory aesthetic outcome.

μGeistlich BioOss, Geistlich Pharma, Wolhusen, Switzerland.

¶ Zimmer Biomet Biomend, Zimmer Biomet, Warsaw, Poland.

§ Straumann Bone Level Implants, Institute Straumann, Basel, Switzerland.

ø Zimmer Biomet Osseoguard, Zimmer Biomet, Warsaw, Poland.

169. Maxillary anterior single-implant restoration using orthodontic treatment for esthetically compromised patients : 2 case reports

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Objectives: It is very difficult to resolve the esthetic and functional problems at maxillary incisors. This study presented to the cases of orthodontic treatment for the patient with hopeless in the esthetic zone.

Methods: Two patients were included in these case reports which was conducted at the Department of Periodontics, Chonnam National University Dental Hospital.

Case 1: A 20-year-old female visited for mobility of left maxillary central incisor and complained of non-esthetic appearance. Complete avulsion occurred due to trauma and the root canal therapy was performed but the gingival recession and external root resorption occurred. Because the patient was younger, implant space was needed in the left maxillary central incisor after orthodontic treatment rather than implant prosthesis or crown bridge prosthesis. After orthodontic treatment, the marginal gingival level was adjusted with the adjacent teeth and the alveolar bone augmentation effect was obtained using forced eruption. Implant placement (Astra®, Ø3.5 X 11mm) with autogenous chip bone, xenogenic bone graft (Bio-Oss®) and collagen membrane (Bio-Gide®). At 4 months after surgery, second stage surgery with connective tissue graft was done. A zirconia abutment and crown was used for the esthetic prosthesis.

Case 2: A 56-year-old female visited for mobility of maxillary incisors and complained of discomfort. A diastema was presented with pathologic tooth migration in both maxillary incisors. Left mandibular 1st molar and right maxillary 1st molar were missing and both mandibular 2nd molar were tilting at mesial aspect. Root fracture on left mandibular lateral incisor was seen and apical radiolucency lesions on right mandibular lateral incisor were confirmed. After initial periodontal therapy, extraction of right maxillary central incisor and orthodontic treatment was done. After orthodontic treatment, implant placement (3i®, Ø4.0 X 10mm) with guided bone regeneration using Bio-Oss® and Gore-Tex® membrane on right maxillary incisor area. At 5 months after surgery, second stage surgery with connective tissue graft was done. Also, implant placement (3i®, Ø4.0 X 10mm) on left mandibular 1st molar area and right mandibular 1st area (3i, Ø5.0 X 10mm) with guided bone regeneration using autogenous bone graft, Bio-Oss®, Bio-Gide®.

Results: At case 1, appropriate prosthodontic space could be obtained for orthodontic treatment and improvement of the gingival margins and bone augmentation on left maxillary central incisor. Also, it made its gingival margins were similar with adjacent teeth. At case 2, it could be resolved the pathologic tooth migration in both maxillary, mandibular incisors and made esthetic implant prosthesis on right maxillary central incisor possible.

Conclusions: In these 2 cases, the use of orthodontic treatment was effective for soft tissue and bone augmentation and it could restoration of esthetic implant prosthesis.

170. Treatment of congenitally missing maxillary lateral incisors with novel small diameter Implants (Straumann® Bone-level tapered 2.9mm): A case report

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Objectives: Small diameter implants (< 3mm) were primarily designed for sites with either reduced mesio-distal distance or sites with very thin bone which would otherwise require advanced bone augmentation procedures. Traditionally they were made as one-piece in order to avoid complications due to reduced strength of the implant-abutment connection. However, the one-piece design implant is surgically and prosthetically challenging, which might potentially cause complications in the esthetic zone.

Development of new materials has made two-piece design implant of a very small diameter possible. In this case report, two-piece implants with a 2.9mm diameter made from a titanium-zirconium alloy (Roxolid, Straumann®) which reportedly has higher strength in comparison to grade IV commercially pure titanium were used to replace congenitally missing maxillary lateral incisors.

Methodolgy: A 21-year old female was referred to the Royal London Dental Hospital to assess the possibility of replacement of two congenitally missing maxillary lateral incisors, which were previously replaced by cantilever resin-bonded fixed dental prostheses (RFDP), with dental implants. The RFDP replacing #22 had repeatedly debonded and patient was keen on dental implants as a predictable long term option.

Clinically mesio-distal spaces for both the missing lateral incisors measured 6mm.

Cone beam CT revealed significant horizontal bone defects in #12 and 22 sites with alveolar thickness of 2-3 mm. Buccal concavities in both sites apically, and a palatal concavity in coronal two thirds of #12 were noted.

2.9mm reduced diameter implants with simultaneous guided bone regeneration (sGBR) to replace missing #12 and 22 were planned.

Osteotomies in #12 and 22 sites were prepared and 2.9mm diameter implants (Straumann®, Bone level tapered) were placed in optimal three-dimensional position. As anticipated, buccal fenestration in both sites and a palatal dehiscence in #12 were encountered.

GBR was carried out with deproteinized bovine bone mineral (Bio-Oss, Geistlich®) and porcine collagen membrane (Bio-Gide, Geistlich®) buccally in #12 and 22 and palatally in #12.

10 weeks after implant placement, abutment connection surgery was carried out with a punch technique. Impression was taken for provisional crowns delivered three weeks later. Soft tissue manipulation was carried out by modifying provisional crowns over the next two visits. Definitive impression was taken after customizing impression copings by injecting fast-setting silicone bite registration material into emergence space between peri-implant tissue cuff and prefabricated impression copings.

Cement-retained crowns on Variobase abutments were used for definitive prostheses.

Results: Pink esthetic score of 10 and white esthetic score of 14 was recorded after delivery of the definitive crowns. Radiographic bone levels were stable after 6 months.

Conclusion: This case report demonstrates successful esthetic and functional outcomes achieved in the treatment of congenitally missing maxillary lateral incisors with 2.9mm diameter two-piece implants.

There is currently no evidence on the successful use of 2.9mm two-piece implant manufactured as a titanium-zirconium alloy. Further research is required to establish survival and success rates, and mechanical and technical complications.

171. Esthetic analysis of lip support and overcoming the challenge of "Split Philtrum" in restoring failed dentition with implant supported fixed prosthesis: A clinical case report of idiopathic gingival hyperplasia

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Introduction: Gingival Hyperplasia is an enlargement of fibrous gingival tissue. Managing gingival enlargement is a complicated challenge, but it becomes more complex when it presents in combination with generalized aggressive periodontitis. In such cases, providing esthetically pleasing fixed prosthesis for patients can be challenging to accomplish. The feasibility of providing fixed prosthesis instead of dentures must be assessed through the evaluation of many important factors one of which is lip support. This case report describes some techniques to analyze lip support and provides a plan to solve the problem of "split Philtrum".

Materials and methods: A 28-year old healthy Caucasian female presented with gingival hyperplasia in combination with generalized aggressive periodontitis. She presented with enlarged fibrous gingiva and generalized aggressive bone loss with mobile teeth. The patient's chief complaint was not being able to eat well and that the teeth had shifted. After excisional biopsies of the enlarged gingiva and removal of failed dentition, the diagnosis of idiopathic gingival hyperplasia was reached. The patient was provided with immediate dentures as transitional appliances. She explicitly stated that wearing dentures at this young age should be avoided at all cost and demanded fixed implant supported prosthesis. Prior to promising fixed prosthesis instead of removable options, restorative dentists must go through careful esthetic analysis of lip support. Duplicates of new final set up with and without flanges were tried in the mouth to analyze the lip support at rest and smile. The distance between the front of the alveolar ridge and facial surface of anterior incisal teeth was measured to determine the room to fabricate adequate emergence profile. A CBCT scan was taken to evaluate the bone condition and aid in planning of implants final positions.

Results: During evaluation of lip support, both duplicates of final teeth set up with and without anterior flanges showed adequate upper lip support during rest. However, the patient developed a horizontal groove in the upper lip or "split philtrum". The duplicate without flanges showed an abrupt horizontal offset of the maxillary anterior teeth in relation to the alveolar ridge with a distance of 8mm. The CBCT scan showed the ability to place anterior implants more apically in order to provide room for a smooth transition of the emergence profile for the implant supported fixed prosthesis. Apical anterior implant placement with simultaneous guided bone regeneration (GBR) provided an esthetically pleasing solution to overcome the challenge of inadequate lip support for the requested implant supported fixed prosthesis.

Conclusion: Before promising maxillary fixed prosthesis instead of removable treatment, the dental provider must evaluate the esthetics and lip support in order not to face unforeseen complications. With the help of CBCT, apical implant placement and anterior GBR provided a solution to overcome the "split philtrum" and provided an adequate emergence profile. This careful planning and evaluation made implant supported fixed prosthesis possible and aid in changing toward a better patient's life style.

172. Restoration of function and esthetics for a patient with dual-arch failing implant prostheses using CAD/CAM technology

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Purpose: To illustrate the various stages in treatment planning, and CAD/CAM fabrication of fixed implant prostheses, with improved design which will reduce various technical complications.

Materials and methods: A 36-year old male presented to the clinic with failing fixed metal acrylic prostheses delivered 5 years ago. In the maxilla, the patient presented with 3 Zygomatic, 1 Pterygoid, and 1 regular implant, while in the mandible with 6 regular implants. Since the implants were in healthy condition, the decision was made to restore the patient with new maxillary and mandibular hybrid prostheses. CAD/CAM milled titanium frameworks with individual abutment preparations were fabricated. Lithium Disilicate single crowns were bonded on the framework abutment preparations, while gingiva-colored resin was added on the cervical area. The prostheses were screw-retained at the abutment level.

Results: The new prostheses had an immediate impact on the patient's perception, function and satisfaction. No further technical complications have occurred up to the 1-year follow-up. Patient expressed his increased satisfaction with the esthetic and functional outcome of his implant rehabilitation.

Conclusion: Digital technology enhanced the quality of the prosthesis as well as the fabrication process in this complicated clinical situation. The new prostheses were designed with a hygienic contour to enhance cleansability. The use of Lithium Disilicate crowns instead of acrylic resin enhanced the wear resistance of the prostheses and thus, allowed for long-term occlusal stability. In the case of fracture of any Lithium Disilicate crown, a remake of the crown can be completed easily without removing the prosthesis.

173. Reconstruction of mandible: A fully digital workflow from visualized iliac bone grafting to implant restoration

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Objectives: While digital aids can help surgeons perform mandibular reconstructions more precisely and effectively, the usage of these digital techniques has often been inconsistent. Moreover, the mandibular reconstruction after jaw defect is always compromised by surgery-oriented treatment, unpredictable bone graft resorption, and malpositioned dental implants. Thus, it is difficult to obtain a fluent sequence treatment where prior operations set limits for following ones. In this case, we elaborate the workflow of a fully digital mandibular reconstruction to shed light on an effective protocol for patients with jaw defects.

Methods: We performed a restoration-oriented mandibular reconstruction applying a variety of digital techniques. Pre-operative virtual surgery and rapid prototyping were utilized to aid the vascularized iliac bone graft surgery, which offered a solid basis for the following treatment. Subsequently, implant placement was accomplished with the assistance of digital surgery template. Final restoration was applied by the aids of laser treatment, selective laser melting (SLM) technique, and CAD/CAM technique.

Results: The usage of digital technique-facilitated surgical operations promoted the predictability of the workflow. Under the aid of virtual surgery and pre-bent reconstruction plate, the successful use of well vascularized iliac bone graft offered a solid basis for restoration. The predictable accuracy of implant placement was also achieved by using a pre-treatment planning, try-in, and CAD/CAM, which facilitated subsequent treatment. The second phase of implant surgery was carried out by Erbium: YAG laser with minimized surgical wound and little postoperative reaction. Using adhesion-retained abutments, a screw-retained final restoration was made possible thanks to highly parallelized implant axes. The whole procedure was carried out smoothly without any complications.

Conclusion: We have shown that a digital workflow consisting of pre-operative virtual surgery, rapid prototyping, vascularized iliac bone graft, digital implant surgery template, laser treatment, and CAD/CAM techniques can be accurate and predictable. The effective treatment procedure suggests that it could be a valid digital protocol for developing a treatment sequence for patients with jaw defects caused by trauma, congenital anomalies, or mandibular tumor resection.

174. The application of root submergence technique for pontic development in esthetic area: A clinical case report

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Objectives: Alveolar ridge resorption and gingival recession were inevitable following tooth extraction. Even though periodontal surgery can be used to restore the alveolar ridge for implant placement, however, it is still a challenge to maintain the original prominence of the soft tissue, especially in anterior esthetic area. Prevention of severe ridge resorption after tooth extraction is one of the key factors to achieve the optimal esthetic appearance. This case report presented a method to preserve the profile of the soft and hard tissue in esthetic zone by using the root submergence technique.

Methods: A 32-year old female patient visited our department due to toothache in the upper anterior area. Upon clinical and radiographic examinations, ill-fitting margins of prosthesis with apical lesions were detected from upper right lateral incisor to left central incisor. After removal of the prosthesis and carious lesion, insufficient tooth structures were remained. Extraction of poor prognosis teeth and implant placement were indicated after discussing with the patient.

Initially, endodontic treatment was performed to relieve the symptom and apical infection. Maxillary right lateral incisor and left central incisor were extracted when the apical lesions were subsided. At the same appointment, maxllary right central incisor was used as an abutment tooth to support the provisional prosthesis for missing teeth. Two bone level implants were placed in the extraction sites after healing of alveolar socket. During the second-stage surgery, the crown of maxillary right central incisor was amputated and filled with glass ionomer materal on the cutting surface. A new implant-supported provisional prosthesis was delivered at the same visit to avoid the embrassment of missing teeth. The wound healing process was uneventful. Final impression was taken after 3 months when surrounding soft tissue was stable. Definitive implant-supported prosthesis was delivered. The original soft tissue profile in pontic area was maintained due to the root submergence technique. No clinical complications were noted after one year follow up. Patient was satisified with the esthetic outcome.

Conclusions: Bone resorption and soft tissue profile change after tooth extraction were inevitable. The conditions became more complicated if the apical infections were involved initally. The results became a challenge especially in the esthetic area for implant placement. Although lots of techniques such as socket preservation and guided bone regeneration tried to compensate for bone resorption, the outcomes still unsatisifed. The case report described how to deal with the conditions of apical infection and preserved the alveolar ridge architecture in dental implant surgery. The root submergence technique for pontic development is an alternative method to achieve an optimal esthetic outcome in anterior esthetic area. The hard and soft tissue profiles can be maintained without the intervention of complicated surgery.

175. Managing complication resulted from limited prosthetic space with a monolithic, multi-chromatic CAD/CAM implant-retained overdenture

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Objectives: To propose a 2-visit clinical protocol to manage the prosthetic complication resulted from limited prosthetic space

Methods: A 72-year-old edentulous female with repeated fractured mandibular implant retained overdenture (IOD) was treated via the following protocol:

The fractured IOD was examined and reassembled with cyanoacrylate adhesive (Scotch-Weld Instant Adhesive; 3M USA). The polyvinyl siloxane putty material (Sil-Tech; Ivoclar Vivadent) was mixed and adapted to the intaglio surface of the reassembled IOD.

After taking off the reassembled IOD from the polyvinyl siloxane putty cast, the repair material was removed, the exposed fractured surface was roughened and cleaned with a laboratory carbide cutting instrument (Cutter Carbide; Brasseler USA). Fractured IOD fragments were repositioned on the putty cast and connected with auto-polymerizing acrylic resin (Jet Denture Repair; Lang Dental Manufacturing).

Patient's intraoral condition was examined, the existing implant abutments were clinically acceptable. The implant abutments (Locator attachment; Zest Anchors) were re-secured under the torque values (35 Ncm) recommended by the implant manufacturer (Regular Neck/ Standard Plus Implant; Straumann AG). Diagnostic impression for the antagonist prosthesis was made with irreversible hydrocolloid impression material (Jeltrate Fast Set; Dentsply Caulk) and poured with type III dental stone (Buff stone; Whip Mix Corp). After applying the tray adhesive (Polyether Tray Adhesive; 3M ESPE) to the intaglio surface, the repaired IOD was used as custom tray to make mandibular definitive impressions with polyether impression material (Impregum Penta Soft Medium Body; 3M ESPE). Excessive polyether material was trimmed from the impression. When the IOD was repositioned intraorally, the maxillomandibular relationship was recorded with polyvinyl siloxane material (Sil-Tech; Ivoclar Vivadent).

The information of tooth shade and mould was recorded. The antagonist diagnostic cast, mandibular definitive impression, and maxillomandibular relationship record were sent to the manufacturer's laboratory (Global Dental Science) and scanned using its proprietary laser scanning technology, creating a mandibular virtual cast (including virtual analogs of abutment-attachment system) articulating with antagonist prosthesis (or dentition). Minimal of 3 mm in thickness was achieved in all aspects of the new prosthesis design. Occlusal scheme and denture base contour were designed as desired and the prosthesis was finalized. The new monolithic CAD/CAM prosthesis was milled using a 5-axis CNC milling machine, a pre-polymerized, multi-chromatic acrylic resin block and the proprietary methods of the manufacturer (XCL-2; Global Dental Science).

The new complete monolithic CAD/CAM prosthesis was inserted following regular clinical procedures.

Results: The new CAD/CAM denture was completed in 2 visits with precise design control, especially for the required minimal material thickness. The milled monolithic prosthesis may offer several advantages including reduced porosity, increased strength, improved dimensional and color stability, and improved biocompatibility. No further complication has been observed during the 6-months post-insertion follow-up.

Conclusion: Using monolithic, multi-chromatic CAD/CAM acrylic IOD is a reliable method to manage a repeatedly fractured prosthesis resulted from limited prosthetic space.

176. Oral rehabilitation to use dental implant supported temporary restoration

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Objectives: Dental implant supported temporary restoration can finish oral rehabilitation.

Methods: 47 y, female, both posterior teeth of madibular missed and both anterior teeth of maxillary abrased. Before placing implants in posterior area of madibular, we did something to make sure the occluding relation. And we took impression to Fully adjustable according to the new occluding relation. Then we placed implants in #34, #36Ð#37, #43, #45, #46, #47 (#34, #43, #45 Axiom and #36, #37, #46, #47 Straumann). After 4 months, we made implant supported temporary restoration in posterior area of madibular (#34, -#37, #43-#47) and resin restoration in anterior area of maxiilary (#12-#22). Patient felt very well, and after 6 month, we started to make final restoration.

Result: Patient felt very well and had no any uncomfortable, and implant osseointegration was good, no bone resorption.

Conclusion: Implant supported temporary resoration can help oral rehabilitation.

Keywords: Oral rehabilitation abrasion dental implant

177. Full mouth rehabilitation with multi-layered lithium-disilicate pressed restorations using 3D printed patterns - a clinical case report

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Introduction: In digital dentistry, additive manufacturing is gaining significant recognition. Digital files can be generated through intraoral or laboratory scanners, to provide stereolithographic (STL) files, used to fabricate various appliances such as dental casts, surgical guides, occlusal device, temporary crowns, and other appliances.

Clinical Case report: This clinical case report involves a 45 years old female seeking treatment for her deteriorated dentition. This complex full mouth rehabilitation included three-dimensional printing (3DP) combined with conventional techniques and milling technology in different stages of the treatment.

The initial findings included a need for endodontic treatment of 12 maxillary and 2 mandibular teeth and extraction of a non-restorable #4. There are four edentulous sites which were planned for four dental implants. After root canal therapy, indirect impression technique was made for the canals, using polyvinyl siloxane impression material (Aquasil Ultra, Dentsply). The Impression was scanned with a 3Shape digital scanner (D750, 3Shape A/S). Posts were designed and 3D-printed in a polycarbonate-like resin pattern (VisiJet® FTX, 3D systems). For posterior segments, 3D-printed post patterns were cast into gold (type IV, Jelenko), while anterior posts were rescanned and milled out in zirconia (Prettau®, ZirconZhan). All posts were cemented with resin modified glass ionomer cement (GC Fuji PLUS®, GC) and temporized to ideal form and function.

Final impression of all natural abutments and implants (Straumann and Nobel Biocare) were made in polyether impression material (Impergum, 3M ESPE) for both maxillae and mandible, using standard protocol. The master casts were mounted in centric relation, by means of anterior positioning jig with occlusal registration material (Blu-Mousse, Parkell, Inc.) and facebow orientation record.

Pressable patterns (VarseoWax CAD/CAST, BEGO) were 3D-printed. These patterns were tried in the patient's mouth for esthetic analysis and verification of occlusion. Alterations to the patterns were done chairside with final touches in the lab to improve the anatomy by adding wax. Final restorations were fabricated though pressing the 3D-printed patterns into monolithic multi layered lithium disilicate restorations (e. max, Ivoclar Vivadent Inc.) with minimal feldspathic porcelain added in some proximal areas to adjust the contacts. Two 3D-printed patterns for teeth #3 and #31 were cast into gold (type IV, Jelenko) inlay and onlay respectively.

All restorations were tried in and verified clinically for marginal adaptation, proximal contacts and occlusion. No further adjustments were required. All restorations were cemented with resin cement (Panavia SA, Kuraray) following manufacturer's instructions. The partial veneers for #22 and #27 were cemented with resin cement (Variolink Veneer, Ivoclar Vivadent Inc.) under rubber dam isolation.

Conclusion: 3D-printed patterns in this clinical case provided a balance between conventional and digital technology. To optimize a full mouth rehabilitation with comfort, ideal occlusion, improved esthetics and decreased chair time, the paradigm shift to digital techniques may facilitate the achieving of these goals.

178. Altered implant cast technique

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Introduction: Making an accurate final impression for implants and natural teeth in a single attempt has always been a challenge in complex prosthetic rehabilitation. Capturing details around the margins of natural teeth preparation can be difficult with the impression copings interfering. With this “altered implant cast technique”, complications as such can be resolved by combining two separate impressions of implants and natural teeth into one master cast. Recapturing details of the prepared margins lost during the first attempt or capturing newly prepared margin after refinement can be achieved through this technique.

Clinical Case report: This clinical report describes how to alter a final implant master cast with a special two-piece custom tray (Tray 1 and Tray 2) to make an impression for natural teeth abutments. This technique utilizes the stability of existing implant analogues on the implant master cast to fabricate this two-piece custom tray which can transfer into the patient's mouth with maximum adaptation and stability.

This custom tray utilizes the corresponding implants in the patient's mouth to secure Tray 1. Tray 2 which locks into Tray 1 with the impression copings, providing adequate space for accurate impression of the natural teeth without any movement. An altered implant cast technique can then be performed through combining the previous final implant master cast with this new impression and making it into one solid cast.

Conclusion: This technique prevents the patient to go through another strenuous appointment without splinting implant impression copings while capturing details of the new abutment preparation with minimal impression materials, providing comfort and precise orientation to the adjacent implant for fixed dental prosthesis fabrication.

179. Management of invasive cervical resorption with complete implant-supported prostheses: A clinical report

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Objectives: Invasive cervical resorption is an aggressive pathological form of external root resorption. Clinically, the affected teeth are vital, show “pink spots” in the cervical regions due to internal defect, and still maintain mineralized outer enamel. Radiographically, the cervical regions of affected teeth are uniformly radiolucent with an intact root canal leading to a balloon-out radiolucency. Histologically, once the odontoclasts resorb the cementum and dentin encroaching upon the pulp chamber the resorption can no longer be arrested and the affected teeth become non-restorable. This clinical report illustrates the surgical and Prosthodontic management of a case with aggressive resorbed teeth that were extracted and replaced with complete implant-supported fixed prostheses.

Methods: 31-year old male presented with a chief complaint “I want to find a long-term solution for this problem and I am too young to have anything removable”. The medical history was non-contributory. Comprehensive examination revealed twenty-eight, asymptomatic teeth with positive results for vitality, except #10. All teeth presented with non-cavitated and intact enamel. Radiographically, no apical pathology or bone loss was present with intact root canals. Mottled radiolucent lesions presented on the mesial and distal cervix in all quadrants except mandibular left. Biopsies revealed fibrous connective tissue surrounding tooth and irregular resorptive areas along the cementum. Diagnostic CBCT determined the extent of the resorption of abutment teeth for staged-approach treatment. The dicom was uploaded into an implant

planning software (CoDiagnostics, Straumann) to plan the prosthetically driven implant placement. The final treatment plan would include 8 implant placed in the maxilla for 2, 3-unit and 1, 6-unit FPD and 6 implants in the mandible for 2, 3-unit and 1, 6-unit FPD.

Results: 28 teeth were prepared, resorption was evaluated, and sealed with glass ionomer before encroaching the pulp. Provisionals were placed based on the diagnostic evaluation and wax-up. Teeth #3,5,7,9,10,12,14 and 19,21,22,27,29,30 were extracted in preparation for implant placement. Early implant placement protocols were followed with bone-level implants placed in the maxilla with guided surgery and tissue-level implants placed in the mandible. Temporary abutments were prepared and loaded with provisionals 8-weeks after placement. It was decided to extract and early place implants at #6,11 with guided surgery. The remaining dentition was extracted and after 6 months, open tray impression copings were inserted, PMMA was applied, sectioned, and reconnected prior to implant level impression. Master casts were cross-mounted and utilized to fabricate the metal framework for screw-retained 2, 3-unit FPD and 1, 6-unit FPD per arch. Porcelain was added for the bisque and final try-in. At the delivery, multi-abutments were placed in the maxillary anterior to modify the angulation. A ceramo-metal prosthesis was torqued (35 Ncm) at the implant level and (15 Ncm) prosthetic level. Radiographs were taken after the insertion and occlusal guard was fabricated.

Conclusion: Invasive cervical resorption is a rare condition, often misdiagnosed. Clinicians must be aware of the findings for a proper diagnosis and treatment. The surgical and prosthetic management of a case with invasive cervical resorption was planned thoroughly for optimal functional and esthetic results.

180. Total Digital Workflow: implantoprosthetic substitution of tooth n. 3.1.

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Objectives: Total digital presurgical and restorative guide for implantoprosthetic substitution of tooth n. 3.1

Materials and Methods: Extraction of tooth 3.1 (for radicular fracture) in a 60-year-old male patient (heavy smoker) according standard techniques and pre-implantar removable temporary prosthesis placement. Computer-guided presurgical planning for non-functional immediate load implantoprosthetic substitution with Straumann BLT Roxolid SlaActive®: digital dental arches models (STL files) obtained with dedicated oral scanner (DWIO Dental Wings®); obtained SDL files matched with DICOM Dental scan TC files allow presurgical planning to define the correct axis for implant and to create a polymethylmethacrylate (PMMA) transitory prosthesis with 3D printing technology (Software: coDiagnostic®, DWOS Synergy® , CAD DWOS®). Surgical procedure: full-thickness surgical flap to allow concomitant GBR (with Geistlich Bio-Oss® plus collagen membrane Geistlich Bio-Gide®) and alveolar implant site preparation with a 3D printed surgical template. After osteotomy, the implant was placed through the same template using a dedicated mounting device. The PMMA transitory prosthesis was then realigned on a STRAUMANN VARIOBASE® stump.

Definitive prosthesis placement (obtained by DWIO optical impressions and CAD-CAM DWOS projecting software) 3 months after implant surgery (the estimated time needed for hard tissue stabilization and complete maturation of perimplantar soft tissues)

Results: Successful implantoprosthetic substitution of tooth n. 3.1 with complete digital presurgical and restorative planning.

Conclusions: The advances in digital preoperative surgical guiding systems and simulation software allow a shorter treatment time with optimal aesthetic and functional results. Furthermore, it enables a complete and highly defined implantar pre-surgical planning with marked level of precision and consequent high predictable and reproducible results. Moreover, it allows immediate placement of a temporary prosthesis that can be projected and created prior to surgery itself, with the advantage of preserving volume and shape surrounding soft tissues with optimal aesthetic outcome. Further advantages in terms of shortened treatment time are due to digital optical impressions techniques, with optimization of entire procedure time and reduction of patient discomfort. Relative disadvantages are still represented by the need for specialist computer skills of operators (and necessary period of training) and elevated costs of these technology-dedicated instruments.

181. The intraoral scan of Straumann dental implants and the prosthetic realization with CARES® and a comparison to competitors

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Intraoral scan and CADCAM-based restoration is regarded as a standardized procedure in conventional prosthetics formed by investigations on accuracy of the scanning methods employed as well as the resulting models and restorations. Special requirements of implants for intraoral scanning have led to changes in the information to be transferred as well as the principles of present implant workflow.

All cases descriped in this clinical presentation this standardized protocol was performed:

Implant placement was done by a crestal incision and a Straumann implant was inserted. Healing was submerged for 2 months and after uncovery a healing cap was left in situ for 4 weeks for soft tissue healing. For the intraoral scan the healing cap was replaced by an intraoral scanbody. Drying of the situation was performed and the area to be scanned was powdered slightly. With the aid of an intraoral scanner the jaws were imaged. For digital bite registration, the scanbody was unscrewed as the standard height did not allow unimpaired occlusion. This was followed by checking the digital image of the scanbody as well as the approximal areas of the adjacent teeth. The occlusal surfaces and the antagonist relationship of the opposite jaw and bite registration had to be checked prior to defining the precise reconstruction area with appropriate marking of the different data volumes for later transfer. As part of the order to the laboratory the implant data were described next to the patient data, information on the position of the tooth, abutment material, implant platform as well as the type of restoration.

The generatively fabricated dental model was produced following online transfer via Straumann CARES on the basis of the STL files. The appropriate repositionable implant analog was placed. The planned abutment customized via Straumann CARES X-Stream and the corresponding zirconium coping were fabricated and transferred to the model. Veneering of the crown cap was performed. For integration purposes the CARES titanium abutment was screw-retained intraorally in the implant and after adaptation of the peri-implant gingiva the crown was definitively cemented.

Success of implant treatment doesn't only depend on implant surgery. Prosthetics can contribute avoiding peri-implantitis and the long-term success by creating an optimal emergence profile. In this context, the individual abutment is to be regarded as a basis for successful implant prosthetics. Intraoral scan and related dispensing with plaster models ensure that the digital prosthetic workflow is integrated right from the start. This leads to significant simplification of fabrication steps at increased precision and less sources of error. Individual abutment shapes can be designed and fabricated optimally on a CADCAM basis together with the corresponding restoration. This enables less changing of screws and manipulation on the implant, which can lead to a reduction of peri-implant bone resorption. Dental technicians and prosthodontists should be aware of the importance of an emergence profile at the time of temporary and definitive prosthetics. The goal of fixed implant restoration is to be as close as possible to these requirements. Maintaining gingival dimensions and health are a decisive factor for the long-term success of implant reconstructions and forms a barrier against the penetration of micro-organisms and bacteria. This enables long-term preservation of the peri-implant bone.

182. The influence of connective tissue grafts on upper lip support and lower facial esthetics with implant-supported fixed prostheses in the edentulous maxilla

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Objectives: To evaluate whether connective tissue grafts performed at the upper front gums could be effective in improving upper lip support and lower facial esthetics with implant-supported fixed prostheses in the edentulous maxilla.

Methods: One edentulous maxilla patient requiring at least eight implants in the premolar and molar areas of both sides of the maxilla involved in diagnosis and treatment with implant-supported fixed prostheses. The subjects underwent a surgery which involved harvesting two connective tissue grafts from two sides of the palate and introducing them into the multiple-envelop recipient bed at the upper front soft tissue in the edentulous maxilla using the technique previously described[1] at the second-stage dental implant surgery. To restore the edentulous maxilla with implant-supported fixed prostheses After six weeks. Outcome measures were thickness of the soft tissues, aesthetics, and patient's satisfaction.

Results: No connective tissue graft (CTG) from the palate failed. The mean thickness of the CTG was 1.71mm. At 6 weeks postoperatively, soft tissues at augmented sites were 1.57mm thicker when compared with baseline for the labial inadequate soft tissue; Patients were highly satisfied with their anterior dentures, upper lip support, gummy smile and lower facial esthetics.

Conclusion: This case showed an ideal lip support and gummy smile and esthetic dentistry without using gingiva-colored material. A pouch surgical technique and connective tissue grafts are effective in augmenting soft tissue thickness in the maxillary anterior region of an edentulous maxilla patient, thus improving aesthetics. 3-year follow-ups of this case showed the stable and ideal prosthesis-tissue junction in the maxillary anterior region. Longer follow-ups are needed to evaluate the stability of augmented soft tissue over time.

183. Reconstruction of an extensive midfacial defect using additive manufacturing techniques

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Malignant peripheral nerve sheath tumours are extremely rare tumours arising in peripheral nerves. Only 17 cases involving the trigeminal nerve have ever been reported. These tumours have a very poor prognosis and very high rates of recurrence and metastases. Their recommended treatment involves complete tumour resection followed by radiation. This can be problematic in the head and neck region. We present a clinical case involving a 33-year old female patient presenting with a slow growing exophytic mass of the anterior maxilla. Incisional biopsy and subsequent histological examination revealed a diagnosis of a malignant peripheral nerve sheath tumour. Surgical resection involved a complete maxillectomy, rhinectomy, and resection of the upper lip and aspects of the left and right cheeks. Reconstruction of the subsequent defect incorporated the placement of 4 zygomatic oncology implants to aid in retention of a facial prosthesis. These implants, however, were subsequently lost so it was decided to manufacture an anatomical model of the hard tissues via 3D printing. This model was used to design and manufacture a titanium frame (customised implant) for the patient, which was then fixated and secured intra-operatively with 21 cortical screws. A maxillary denture and silicone facial prosthesis were also made to fit onto this frame. This is the first known case where additive manufacturing, via the use of rapid prototyping and 3D printing, was employed to manufacture a facial prosthesis.

184. Tooth- and tissue-supported provisionalization for full mouth implant rehabilitation: A 5-year case report

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Background: The transition of patients from failing dentition to complete arch implant rehabilitation often requires that the patient is rendered edentulous and has to wear a removable complete denture for varying periods of time. This is often objectionable to many patients.

Purpose: The purpose of this clinical report is to illustrate a staged approach protocol with a new type of interim prostheses supported by hopeless teeth and the soft tissues of the maxillary tuberosities and mandibular retromolar pads for the complete arch implant rehabilitation of a patient with a failing dentition.

Materials and methods: A 56 years old female patient presented with failing dentition and requested a consultation for full mouth prosthetic treatment. The radiographic and clinical examination revealed severe periodontitis and teeth with poor prognosis supporting old metal ceramic restorations. The treatment plan included the extraction of all maxillary and all posterior mandible teeth and the restoration of both arches with eight and four dental implants respectively.

In order to avoid removable prostheses, tooth and tissue supported provisional restorations were fabricated in both arches. For that reason, two maxillary teeth with poor prognosis were retained and the mandibular anterior teeth were used for the provisional restorations. The implant placement followed the predetermined by the provisional restorations tooth position. After the osseo-integration period other transitional restorations were constructed based on the previous until the final metal ceramic restorations were placed.

Conclusion: Tooth and tissue supported provisional restorations can be an alternative for those patients who feel discomfort and stress using complete dentures. Additionally, they can be a helpful tool for the dentist to determine the anterio-posterior teeth position, select the right tooth shape and size, evaluate esthetic and phonetics and avoid pressure on implant sites during osseo-integration. Finally, they can be used as a guideline to the dental technician for the fabrication of the final fixed prostheses. This protocol allows for fixed interim prosthesis with combined tooth- and mucosa-support or implant-support during the entire rehabilitation process, thus avoiding the use of complete dentures and problems associated with that. Implant and prosthesis survival rates were 100% after 5 years of clinical function.

185. Comparison of 3 methods of transferring optimized emergence profile of anterior implant provisional restorations into definitive restorations

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Objectives: Provisional restorations allow guided soft tissue management to create an esthetic emergence profile. The objective is to describe and compare 3 methods that precisely transfer an optimized emergence profile of anterior implant-supported provisional restorations into the definitive restorations.

Method 1: Fabrication of a customized impression coping Implant-supported provisionals were connected to implant replicas. It was boxed and poured with PVS impression material up to the cervical third. After setting, the provisional was removed, and a standard impression coping was inserted. The space between the PVS and the coping was filled with GC pattern resin, duplicating the emergence profile of the provisional crown. A customized impression coping was inserted intraorally for a final impression. The master cast's soft tissue substitute presented exactly the same as the peri-implant soft tissue intraorally. The disadvantages are the volumetric changes of the material used, and there is a short period of time the patient will go without the provisional.

Method 2: Injection of impression materials around provisional restorations seated on the master cast A standard final impression was taken and the master cast was poured. The soft tissue substitute was removed from the master cast and the provisional was placed on the master cast. Impression material was injected around the provisional restoration, allowing both the emergence profile of provisional restoration and the tissue surface of the pontics to be duplicated. The disadvantages are that a master cast is required and the soft tissue substitute may need further modification to resemble the actual clinical presentation.

Method 3: Fabrication of PVS index of the entire provisional restoration Provisional restorations were connected to implant replicas, which were mounted in plaster just below the implant platform. It was poured with PVS up to the incisal edges. The PVS was cut to leave half of the crown exposed. The provisional crown was replaced by a UCLA abutment. The PVS index was placed back on the block and the space was filled with GC pattern resin to duplicate the shape of the provisional crowns. A resin replica of the provisional restorations was prepared using the PVS index, allowing for proper reduction for PFM restorations, while preserving the emergence profile. The customized abutments were adjusted and verified with the PVS index, and tried in. The peri-implant emergence profile, the shape and the dimensions of the provisional restorations are copied in the definitive restorations. An optimized custom abutment with favorable emergence profile and dimensions can be fabricated. The overall contour of the custom abutment will ensure adequate clearance for the definitive crowns.

Conclusion: The optimized peri-implant emergence profile of the provisional restorations can be replicated in the definitive restorations by using any of the 3 methods. However, the shape and dimensions of the provisional restoration can be duplicated only by using method 3. The tissue surface of the pontic can be easily transferred by method 2. The clinician should choose a proper method depending on different situations. The definitive restorations should be a virtual duplicate of the provisional restorations, so the soft and hard tissues can be maintained with maximal stability, along with a favorable long-term esthetic result.

186. Rehabilitation of malpositioned implants with soft tissue management in the asthetic zone

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Objectives: An accurate soft tissue management around an implant in the esthetic zone represents a crucial point for the success of a restoration and gingiva health.

The objective of this case is to show how an adequate tissue management can improve predictability for the restoration of malpositioned implants in the aesthetic zone.

Three cases were solved using this technique, that begins with the provisionalization fase, where the provisional crown leads the gingiva to its adecuate place, making a stable tissue for the final restoration.

The control of the resin increments on the provisional crown, roles as an important factor to generate a tissue stability; also taking in consideration the gingival biotipe of each patient.

Methods: There are numerously techniques described to improve soft tissue around malpositioned implants in the aesthetic zone.

In case number one, a titanium abutment was personalized; where resin increments lead to positionate the gingiva correctly; also the abutment emergence was placed bucal, developing a final cement restoration to compensate the malposition of the implant.

In case number two, an aesthetic crown lengthening without implant implication was developed to equilibrate gingival margins, then, adjacent teeth were restored to improve aesthetics in the anterior zone.

In case number three, two implants with different platforms were malpositionaly placed; a free gingival graft promoted gaining of volume and keratinized gingiva; then with the provisional crown, soft tissue management was performed to lead the ideal emergence profile.

Results: In case number one, resin increment in the titanium abutment improved and stabilized soft tissue around implant.

In case number two, aesthetics problem with a high smile; the perform of the aesthetic crown lengthening equilibrate gingival margins and created a harmonious smile without implant implication.

In case number three, free gingival graft generates volume and keratinized gingiva, developing a strong and stable tissue around the implants, solving the complex restoration of the implants.

Conclusion: Replacing missing teeth in the anterior maxilla is a challenging treatment and involves an accurate soft tissue management to guide a successful restoration.

Numerous options to solve this kind of problems are found in specialized odontological literature but it depends on the particularities of each case to know which one is the best and more predictable option for the patient. The key factors for long term success are based on an accurate diagnosis wich will lead a personalized treatment in each case.

187. Case reports of mandibular overdenture rehabilitation in patients with extreme alveolar ridge atrophy by means of both slim and short mini dental implants

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Objectives: It is almost impossible to achive stable and well functioning complete dentures in patients with extreme alveolar ridge atrophy. Moreover, in cases when mandibular hight is less than 10 mm and the buccolingual diameter is reduced, standard size implants are not recommended. According to standard procedures, mini dental implants (MDI) for retention of mandibular overdentures should be at least 10 mm long. We aimed to rehabilitate patients with less than 10 mm of mandibular hight by means of both, slim and short implants for complete denture retention and to monitor them over time.

Methods: Several patients with extreme mandibular ridge atrophy (D or E classification according to Leckholm and Zarb, 1985.) were examined by means of panoramic radiographs and CBCTs. Each patient recieved four mini dental implants (2,0 or 2,5 mm wide and 6 to 8 mm long) by flapless techique. Insertion torque varied between 20 and 30 N/cm2 (less than 35 N/cm2). Therefore, implants were splinted temporarily with composite resin and left 2-3 months to ossteointegrate. Meanwhile, mandibular new complete dentures were made. Dentures were reinforsed with CoCr metal framework to prevent denture fractures. Patients completed the OHIP-EDENT questionnaire, as well as the chewing function questionnaire at the baseline, and one month after the dentures were delivered and adjusted. They also completed a questionnaire related to pain and swelling perception after implant insertion. Patients also provided data about analgetics intake after the procedure.

Results: Five patients were successfully provided with short and slim MDIs for denture retention. They did not perceive a high level of pain and reported almost no swelling. They took analgetics only after the procedure, and 1 to 3 times afterwards. Panoramic radiograph after implant insertion showed that implants had been in proper positions. Dentures were delivered 2-3 months after insertion. Implants were firm, without any clinical signs of periimplantitis. After all denture adjustments had been finished, the OHIP EDENT scores significantly decreased from the baseline scores ($p < 0.05$), as well as the scores of the chewing function questionnaire, presenting satisfied individuals. Patients have been successfully wearing respective dentures between 5 months and one year and no implant has been lost.

Conclusions: A success of both, slim and short implants have not been thoroughly investigated or reported yet. Preliminary experimental clinical results in our patients show a clinical success in extremly resorbed mandibles, however more patients and controled clinical cases throughout a longer time period of observation are necessary to confirm this treatment option as valid.

Acknowlegment: Croatian Science Foundation for funding project: 1218,
Acronim: Mini dental implants

188. Digital technology assisted implant rehabilitation for torsiversion tooth. CAD/CAM guided surgery, immediate implant prosthesis, permanent restoration

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Objectives: The aim of this report is to present digital technology assisted for implantation that has compromised interocclusal space and opposite rotated teeth. Immediate prosthesis rehabilitation is done after guided surgery dental implant placement. With the progression of CAD/CAM technology in implant dentistry, we can ensure the accuracy of implant placement, provide immediate provisional prosthesis, and reduce the treatment duration efficiently.

Methods: In this case, a 32-year-old woman had a crown-root fracture of torsiversion tooth 45. After the tooth was extracted, we used an early implant placement protocol. CAD/CAM digital workflow was used to solve the problem of insufficient interocclusal space and torsiversion related mal-occlusion via the following steps:

1. Integration of the intraoral scanning data and Cone-bean CT.

2. Virtual treatment planning with prosthetic driven concept,

3. Guided implant surgery (Strauman® Bone level implant, 4.1mmx10mm) with custom made stent,

4. Pre-fabricated of temporary crown and abutment.

After the osteointegration period, the permanent prosthesis was duplicated to match the current condition of immediate crown, including the emergency profile and uneven occlusion.

Results: The entire treatment time of implant surgery and immediate prosthesis was less than one hour. Digital design guided surgical stent and prefabricated immediate prosthesis indeed speed up the treatment process. In addition, the emergency profile and occlusion of the final prosthesis can be duplicated to match the immediate crown.

During the follow-up period, the condition was uneventful and function was well.

Conclusion: In our case, the innovative CAD/CAM workflow can help solve the anatomic restrictions.

There are tremendous benefits of this protocol which include reduced chair-time, decreased costs, elimination of second surgical procedures, and the psychological benefit to patients.

189. Immediate placement and restoration of a single-tooth implant in the esthetic zone: A case report with 2-year follow-up

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The immediate restoration of implants after placement is a possibility where aesthetic requirements are high. However, anterior tooth loss often represents a considerable challenge for involved clinicians, since various risk factors have the potential to compromise the predictability of result. This report presents a case with immediate implant placement and immediate loading of a maxillary central incisor with a vertical fracture. The patient was a 34-year-old woman with a hopeless left maxillary central incisor diagnosed as vertical fracture by the x-ray. Cone-beam CT examination revealed that the length of the residual root is 10.9 mm with 1mm-thick buccal bone, and the sign of periapical disease was not obvious. After clinical and radiographic examination, a taper implant (Straumann Bone Level) with a 3.3 mm width and a 10mm length was selected for replacement of left maxillary central incisor. Using local anesthesia, the minimally invasive extraction was performed without flap reflection, following that, the intact facial bone wall of the extraction socket was confirmed by a probe. The implant was inserted along the palatal wall of the socket with the insertion torque of 35N•cm. Then, the gap between the implant and socket was grafted with β-TCP. A screw-retained provisional prosthesis was fabricated and delivered to the patient immediately after the surgery without functional occlusion. After 4 months' healing, a personalized implant impression was taken and then, the porcelain fused to gold restoration was delivered. The patient returned for follow-up appointments 2,6, 12 and 24 months after prosthetic loading. The clinical and X-ray examination were performed at every follow-up for soft tissue and bone evaluation after immediate implant restoration. The results of the examination demonstrated that the gingival papilla maintained in a very stable state while the marginal bone loss was not significant. Two year follow up of this clinical case clearly demonstrates that immediate placement and restoration of the implant in the anterior regions can achieve the desired treatment results and display significant advantages comparing to conventional protocol, including fewer surgical procedures and shorter treatment time. However, the predictability of the clinical and aesthetic outcomes is based on strict and detailed inclusion criteria.

190. Rehabilitation of mandibular edentulous patients with few unilateral remaining teeth with implant-assisted removable partial denture - A case report

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Objective: In the case of a patient with a small number of unilateral remaining teeth in mandible, restoration with conventional removable partial denture can cause several problems such as poor stability from multi-directional movement of denture during function and difficulties to predict long-term prognosis of remaining teeth. The objective of this article is to present a case report describing the fabrication and advantages of removable partial denture assisted by teeth and implants (IARPD) for a patient with a small number of unilateral remaining teeth in mandible.

Methods: Two Patients with few unilateral residual teeth in mandible were clinically and radiographically evaluated. To achieve tripodization or qaudangular support with residual teeth, additional implant fixtures was placed on strategic positions of mandible. After taking impression, meticulous surveying on residual teeth was carried out to make a path of insertion parallel to implant impression copings. To make a clasp arm dislodge during function from its position to the undercut area without any resistance, the entire clasp arm contacts tooth only along the survey line. Therefore, the clasp provides only stability of removable partial denture by encircling the tooth more than 180 degrees. After fabrication of removable partial denture, locator abutments were delivered by direct pick-up technique. Retention of removable partial denture was attained by locator abutment only.

Results: Both patients were satisfied with newly fabricated dentures in terms of function and aesthetics. Regular follow-up visits over a period of two years revealed that the periodontal condition of remaining natural dentition and peri-implant conditions were stable. There was no evidence of excessive residual ridge resorption or mobility of the teeth, nor were any visible changes in the bone levels of the natural teeth or implants noted on radiographs.

Conclusion: Implant assisted removable partial denture(IARPD) with a small number of implants which are placed on strategic positions can be a treatment modality that offers the multitude of benefits of biologic, functional, social, and psychological to patients with few unilateral residual teeth in mandible.

191. Performance of immediate implantation with double guides, fixed prosthesis and follow-up for the patient of "Mandibular edentulous jaw" with microstomia

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Objective: To establish a fixed prosthesis of implanted denture for the edentulous jaw with microstomia of the oral fissure about 2 transverse finger and bilateral serious lower alveolar bone absorption.

Method: One month after the completion of the periodontal treatment, the implantation plan was made by Simplant software to design two short guide plates. One guide plate was supported jointly by tooth and mucosa, another was supported jointly by three vanguard drills and mucosa. The fixed prosthesis was planned to design as 10 restorations of short dental arch supported by 4 hydrophilic implant of Straumann and delayed repair. The implants at both ends had a tilt angle implantation. The first guide plate was utilized and supported by remaining teeth and mucosa to locate three implants in surgery. Then remaining teeth was extracted and the second guide plate was fixed on the mucosa through 3 vanguard drills insert the site which had been determined by the first guide plate. And the fouth implant was immediately implanted after surgical extraction of residual mandibular teeth. After four months, the mandibular impression was made by a series of procedures, which were directly making impression column inside the mouth, personalized tray, silica impression, and wax dam consortium. Then preparation of the maxillary posterior teeth of both sides had been done, and impressions of both sides were taken, respectively. The impressions were connected together in vitro to form the maxillary model. After transfer with the facebow, technician made the maxillary and mandibular temporary crown, and united crown was designed in mandibular from the right second premolar to left second premolar. In a following month, the occlusion of the prosthesis was adjusted for 3 times. At last, permanent prosthesis was made and fixed into the mouth of patient.

Results: The Simplant software matching result shows that the position of implant is consistent with the preoperative design. After 36 months of wearing the permanent prosthesis, the reexamination shows that the bone around the implant remains stable and the function and the occlusion of the prosthesis are good. The patient is asked to strengthen the concept of oral self-cleaning, reexamine regularly and follow up.

Conclusion: The patients of "Mandibular edentulous jaw" with microstomia can endure immediate implantation of four implant-supported fixed united crown prosthesis, the implantation process can be accomplished with a specially designed and short double guide. The process of fixed prosthesis needs to take impression directly in the mouth, and short dental arch can meet the functional requirements of patient.

192. A digital integration for complete-mouth rehabilitation by using implant-supported fixed prosthesis: A clinical case report

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Objectives: Complete-mouth rehabilitations by using implant-supported fixed dental prosthesis (ISFDP) are always complicated. They call for dentists' experience, multiple follow-up, and long surgical and clinical time. Meanwhile, the functional and esthetic outcomes are unpredictable. This case report demonstrated a digital approach of designing and milling a computer-aided design and computer-aided manufacturing (CAD/CAM) ISFDP for complete-mouth rehabilitation.

Methods: This was a fully edentulous male patient, asking for a minimum invasive surgery. The impressions and occlusal record were taken to make a diagnostic wax teeth, which was subsequently duplicated with resin and radiopaque material for radiological guide. With the radiological guide, the denture and anatomy information were achieved by cone-beam CT scanning in one-time. Then, the CBCT data was imported into a virtual planning software (SIMPLANT) and the surgical approach and implants were designed. A CAD/CAM flapless surgical guide was fabricated by stereo lithography appearance (SLA) technology.15 Straumann SLActive implants were placed with the surgical guide. 8 implants in maxilla and 7 implants in mandible. After 1-month healing, splinted impression copings were used to make impressions and fabricate the stone casts. Waxing up were made to evaluate the esthetic and preliminary functional outcomes. After scanning the waxing and stone casts data, the first implant-retained provisional resin restorations were fabricated by using CAM technique. With the help of resin restorations, patient's mandibular movements were recorded by using a digital device (GAMMA DENTAL), in order to obtained an individual occlusion design coordinating with real movements. The digital movements data were transferred to a fully-adjustable articulator and redo the waxing. The second resin provisional restorations were milled after scanning the new waxing. The definitive occlusion was evaluated in clinic, presenting function well without adjustment. The second restorations were maintained for 3 months in oral. According to the digital second waxing data, the shoulders feature of titanium frameworks was designed and the frameworks were manufactured by using CAD/CAM cut-back technology. The zirconia restorations were designed into single crown or 2-units crown and milled. The labial contour of the CAD/CAM milled zirconia crowns were completed with veneering porcelain in esthetic zone and the occlusal surfaces of all crowns were highly polished. Resin gingiva moulage were finished on titanium frameworks. Finally, the crowns were cemented to titanium frameworks intraoral.

Results: The CAD/CAM fabricated titanium frameworks presented fine passive fit vertical and horizontal. The ceramic restorations showed pleasant white esthetics and the resin gingiva moulage helped reaching well pink esthetics. After 1-year follow up, neither the ceramic restorations showed wear on occlusion surfaces, nor the prosthesis come up with the other complications.

Conclusion: The digital approach for complete-mouth rehabilitations could obtain a predictable clinical outcome. The combination of using titanium, zirconia and resin materials could be an alternative solution for implant-supported fixed prosthesis.

193. Treatment alternatives in overdentures from the provisional stage to the definitive prosthesis

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Objectives: Diagnose and treat the edentulous patient reviewing the alternatives we had using overdentures with bars with Ball attachments, Usig membrane, Swiss Lock and Locator.

These restoratives options give us labial support, certain flexibility with the position of implants, less implants in comparison than a fixed prosthesis, splinted implants through a bar, high hygiene and in some cases more economic laboratory production.

Methods: The clinical case was treated at UNAM (National Autonomous University of Mexico) Prosthodontics and Oral Implantology department in Mexico City.

The patient was registered as an edentulous patient with 6 divergent Straumann Tissue level implants in the maxilla and 4 divergent Straumann Tissue level implants in the mandible

Because one of the patient´s primary concerns was the chewing performance, we decide to use two oseointegrated implants in the maxilla and mandible and place locator attachments to improve the retention and stability of the interim dentures, having in mind we´re using the 4 locators in the definitive mandibular prosthesis.

Because of the inter-occlusal space we couldn't use the ball/bar (+15mm per arch), also we prefer the use of Swiss lock attachment over the use of USIG membrane because of the patient´s issue about chewing performance. The Swiss lock it's a removal prosthesis that functions as a fixed and it's recommended to use it only in the upper arch, it also give us the labial support and splinting the implants in two sides gave us the advantage of not crossing the midline with something fixed, avoiding tension and achieve passivity; also maintenance of the attachment is not needed.

Results: After studying the patient´s scenario, reviewing the alternatives with implant supported overdentures, and taking in consideration the patient´s issues we were able to return the functionality and fulfill the patient´s expectation with overdentures with Swiss lock attachment in the upper arch and locator attachment in the mandible

Conclusion: There are many alternatives in overdentures. In order to choose the right one, it is necessary to consider the inter-occlusal space, implant angulations, hygiene performance, maintenance and cost production of the laboratory.

194. Clinical considerations between fixed implant-supported prosthesis vs overdentures

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Objective: To explain the importance of knowing the factors to be considered in the decision to perform a fixed prosthesis or overdenture; whose comprehension will allow to take a solution in patients with an edentulous maxilla, affected in functional and aesthetic.

Methods: For implant supported prosthesis in the edentulous maxilla, fixed prosthesis and removable overdenture are the most common solutions of treatment. There are crucial factors that will lead to decide whether to perform a fixed or removable implant supported maxillary prosthesis, and it will depend on the patient´s characteristics.

The number of dental implants in the edentulous maxilla; is limited by the amount of bone available for placement. The variability of implant placement indicates the need for multiple prosthesis designs in the maxilla.

The distribution of occlusal forces on a multiple implant system of a rigid prosthesis allows force distribution among implants and bone, with a removable prosthesis, connection of implants with a splinted bar and an overdenture supported by the bar with passive soft tissue contact will provide comparable load distribution to a fixed prosthesis.

The labial flange is extended to replace the missing soft and hard tissues in the vertical dimension according to the lip line to avoid displaying the buccal margin while smiling. In the horizontal dimension the thickness of the buccal flange is formed according to the need for soft tissue support.

The interarch space in a fixed prothesis ≤ 10 mm, will allow that the clinical crown of the prosthesis ends at the level of the soft tissues. When there is a great distance between the artificial teeth ideally positioned and the underlying tissues ≥ 15 mm, an overdenture will compensate for moderate or severe resorption of the maxilla.

In the maxillomandibular relationship the resorptive pattern of the edentulous maxilla and mandible, can result in a reverse residual ridge relationship in ridge anteroposterior and mediolateral dimensions. This relationship is pronounced in patients with prognathism increasing the problem, needing a labial flange to compensate the relationship. The retrognathic patient may benefit from some superior and medial resorption of the maxillary residual ridge, being candidate for a fixed maxillary prosthesis.

Hygiene is more complex when it comes to a fixed prosthesis on implants, if the ability to clean is reduced it will be preferred to perform an overdenture.

The cost of overdenture is less than the fixed prosthesis. The increased number of appointments represents a higher monetary cost. For the fabrication of the overdenture, an average of 5 to 8 appointments are needed, while for fixed prosthesis 5 to 21.

Results: Two patients with a similar position of osseointegrated maxillary implants received different designs of prostheses thinking about the factors described above, an overdenture was made in one case and a fixed prosthesis in another, obtaining a suitable functional and aesthetic result.

Conclusion: Crucial factors in deciding whether to make a fixed prosthesis or overdenture should be taken into account during planning and influencing the entire treatment plan.

195. Case presentation of soft tissue recontouring in the aesthetical area with permanent implant-supported crowns

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Objective: Reshape the soft tissue contours by slight pressure after permanent implant loading in cases of inadequate pink aesthetics. Diminish the time, procedure and treatment costs for implant aesthetic improvement.

Methods: The abstract is based on three clinical case of implant-prosthetic treatment that helped to improve the aesthetical appearance of pink aesthetic. The first and second cases showed the advantage of implant screw-retained crown vs. cemented one. The third case has the combination of both screwed and cemented fixation. The clinical steps followed the standard clinical protocol for implant-crown manufacturing. During the laboratory stages the excessive amount of artificial gingiva has been cut from the cast so it was at the level with adjacent teeth. After crown manufacturing, the screw retained crown has been gradually inserted thus applying compressive force to the underlining gingiva. After ten days, a slight recession of the gingiva was noted being at the level of adjacent teeth.

Results: Crown shortening after implant treatment can cause unpleasant appearance might not be accepted by the patient. The method provided the required soft tissue level after 10 days with stable results after 6 months without causing any discomfort to the patients. The further recession or implant exposure was not noticed.

Conclusions: The method used in these clinical cases can be easily applied when a small recontouring of vestibular soft tissue aspect is required avoiding thus the use of provisional crowns with multiple insertions and removal of the crowns. However, excessive forces can lead to bone resorption after soft tissue recontouring can lead to unpleasant aesthetical problems which be difficult to manage.

196. Rehabilitation of high aesthetic value area

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Objective: Return the aesthetics and function in badly damaged zone, due to trauma, through therapeutic procedures and practices realized by regenerative techniques, implant and prothesis

Materials and method: Female patient, non-smoker that following trauma suffered the root fracture of 1.1 and coronal fracture of 2.1. We proceeded with avulsion of 1.1 with the simultaneous preservation socket, and the introduction of a mobile temporary prothesis. After three months, we replaced the removable prothesis, and with the inclusion of an implant in the area 1.1 (BL 4.1 x 12 mm) was achieved an immediate temporary restoration with resin crown; we also replaced the crowns on 2.1 and 1.2 with provisional resin. Subsequently we improved the quality of the peri-implant tissue with a second composite provisional. The restoration was finalized with a zirconia abutment of 1.1, zirconia-ceramic crowns of 1.1, 2.1 and feldspathic porcelain veneers of 1.3, 2.2 and 2.3.

Results: The application of scientifically validated techniques, and the use of high performance therapeutic aids, even forcing the timing dictated by the guidelines, have allowed very satisfactory result.

Conclusions: The case presented a complicated initial situation, for a number of risk factors, especially of an aesthetic nature. The application of scientifically validated therapeutic choices, both prosthetic implant that has even improved the final result as a whole, compared to the situation prior to the episode traumatic, with great satisfaction of the patient.

197. One-year follow-up of 4mm short implant connected with natural tooth to support three-unit bridge in lower jaw

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Objective: Seventy years old female patient came to our clinic for rehabilitation of missing posterior teeth in lower jaw. Careful evaluation of patient in extra-oral, intra-oral and radiographic aspects was made. Treatment plan was to restore teeth #46,45,44 on right and #35,36 in the left lower jaw with fixed dental prosthesis. Cone Beam Computerized Tomography (CBCT) showed that site #36 had limited bone quantity for a standard-length implant, but favorable bone quality and width. Therefore, rehabilitation of patient on the left side was planned as single implant placement on tooth #36 position and restore the region with tooth-implant-supported three unit fixed restoration.

Method: After careful evaluation of periodontal status of tooth #34, metal fused to porcelain (MFP) crown was sectioned from old bridge restoration and tooth prepared for three-unit future bridge restoration. A surgical template was produced accordingly before surgery to provide implant placement to be located exactly in position of tooth #36 in order to support tooth #34 connecting to implant #36 with three-unit bridge. Following implant osteotomy protocol, 4.8mm in diameter and 4mm in length slactive surface tissue level one-piece implant was placed in position #36. Following 8 weeks of uneventful healing and radiographic evaluation, restorative stage started with obtaining open tray impression. Cement retained three-unit bridge MFP restoration was produced and cemented with zinc-oxide eugenol temporary cement. Radiographic evaluation of cement remnants and accurate crown fit on implant shoulder was made. Patient was instructed to use water flosser and interdental brush regularly for long-term hygiene maintenance. Radiographic and clinical evaluation in different periodical appointments showed good oral hygiene and retention of bridge up to 1-year follow-up period.

Results: After one-year follow-up of the case, it is possible to observe patients full satisfaction of the restoration and ability to function. Although main advantage for patient is transition into fixed restoration after long period of removable partial denture use; reduced healing time, morbidity and treatment costs are also highly beneficial. Due to different mobility levels in teeth and implants in retention, a cement retained bridge was chosen, and loss of retention was not observed during the first year follow-up period. Even though implant neck did not have ideal keratinised tissue width, tissue level implant neck design and patient's hygiene habits were sufficient to maintain proper hygiene with water flosser and inter-dental brush during the follow-up appointments.

Conclusion: Short implants are becoming more and more popular in today´s treatment planning. Since we are looking for simpler treatment approaches for our patients, this case is a good example to encourage us on how short implants can reduce not only patient morbidity but also treatment complexity and additional costs. Although a one-year follow-up period is not strong enough to demonstrate long-term prognosis of 4mm short implants in such clinical situations, it is a promising result for such case. As a result, we can conclude that when planned carefully, short implants with 4mm length could create simpler surgical and restorative solutions in the near future. Different parameters in different types of restorations and retentions can be investigated to evaluate and define the limitations in clinical situations.

198. Combination of intraoral cemented and screw-retained techniques for implants to obtain passivity

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Objectives: To have a successful treatment with implants, passivity is the key for it. The lack of passivity may cause biological (inflammation of soft tissue, bone resorption, failure osseointegration) and mechanical (screw loosening or fracture, fracture structure) affections. Complete-arch implant-supported prosthesis can be: cemented, where distortion during processing is evade which ensures their passivity and greater resistance, but there is a risk of periodontal affection by residual cement; screwed, that its main benefit is the retrievability; and finally cement and screw retained prosthesis, were the combination of benefits is achieved. During treatment, it was sought to obtain complete arch prosthesis supported over multiple implants with a high passivity using the combination of screwed and cemented techniques to achieve a successful outcome avoiding mechanical complications and biological affections.

Methods: After the impression taking with single-phase material, the working model was achieved. The assembly of tooth was performed, having previously oriented rims and getting the desired vertical dimension. Having made the final test of the teeth in mouth with the approval of the patient and ours, a silicon matrix of the position of the teeth was made. Respecting the marked spaces, the framework matrix was drewn up over prefabricated abutments that were previously screwed to the analogs of the implants on the working model. The framework cast was obtained and the artificial teeth were arranged on it. The titanium-prefabricated abutments were screwed in the mouth and the prosthesis was finally intraoral bonded to them. This way we make sure to get a complete arch implant supported prosthesis that has a high passivity.

Results: The desired passivity and settlement of the complete arch implant-supported prosthesis was achieved, by cementing it intraoral to avoid any stress, misfit of the structure and micro strain.

Conclusion: Passivity between the prosthesis and implants is important to prevent complications. No structure ends up being completely passive either milled or casting. Therefore, the combination of cemented and screwed techniques give us benefits that outweigh any other prostheses, where we get the passivity we look for avoiding biological affections and mechanical failures by preventing cement residuals and obtain retrievability that is very important clinically speaking.

199. Rehabilitation of atrophic mandibular ridge by “all-on- four” concept and guided surgery in 3 appointments

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Background: Extreme mandibular ridge atrophy represents a serious challenge, for the proper placement of implants of sufficient length.

For this limited group of patients, the solution is either use of the bone augmentation such as fibula graft or rehabilitating with only 4 implants (the ''All-on-Four'' concept) using tilted implants.

Objective: To present the rationale and treatment considerations to reduce treatment complexity, the number of surgeries, and the overall treatment time for the patients with extreme mandibular ridge deficiency.

Material and methods: A 67-year old male rehabilitated with upper and lower removable dentures over 35 years ago presented with a chief complain of poor retention and stability of the mandibular removable denture with consequent discomfort and inability to chew. After comprehensive diagnostic work-up, new interim maxillary and mandibular conventional denture with acceptable esthetics and function were delivered to the patient.

A novel 3-visit protocol from implant placement to definitive prosthesis delivery was implemented. At the first visit, the Nobel Guide protocol with the All-on-4 concept was used in the mandible. Four dental implants were placed, followed by immediate placement of provisional fixed all-acrylic bridges providing the patient with Immediate Function solution. Final impression, cast verification and articulation as well as determination of OVD and inter-occlusal records in one visit.

The second visit, the framework try-in was performed and a pick-up impression was done after a new CR record was taken.

Third visit included the final rehabilitation consist of screw-retained one-piece full arch prosthesis with a titanium framework and individual emax crowns opposed by Conventional maxillary denture with emax onlays.

Results: All-on-Four concept along with computer-assisted and guided surgery has radically improved the possibility of using all available bone for implant support, reducing the need of extensive grafting procedures and allowing for a better restoration-driven implant placement. This

approach allows for an accurate placement of implants using a flapless technique under the guidance of a surgical template generated from preoperative virtual planning of the implant.

Conclusion: The patient was satisfied with the esthetic and functional outcome and was enrolled on a 6-month recall program.

Keywords: All-on-Four, guided surgery, implants, immediate loading, fixed provisionalization

200. Reverse implant planning: Clinical case report

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Objective: The aim of this clinical case is to demonstrate the clinical accuracy of a protocol-type prosthesis, restoring occlusal stability and improving the patient´s facial profile, using reverse implant planning. Showing the effectiveness and safety of the technique.

Methods: All preoperative methods in this treatment follow the reverse implant planning protocol of the patient. From this planning, they made surgical guides duly established in a semi-adjustable articulator. Implants with treated surfaces were installed and installed according to the company recommended (Bone Level, SLA straumann), on the implants, they used straight SRA abutments and angled SRA for a better exit of the retention screws. They performed ostectomy for bone resurfacing in order to improve the facial profile of the patient and better positioning of the prosthesis type protocol. In the maxillary sinus region, they used an osseous replacement for height gain in the posterior maxillary implants.

Results: In the clinical case, 23 teeth were extracted, 13 in the maxilla and 10 in the mandible, bone regularization in the maxilla and mandible, 6 implants in the maxilla and 5 implants in the mandible with the surgical guide in place, both implants with a Straumann treated surface (Bone Level, SLA), use of 6 SRA angled abutments in the maxilla and 5 RRA abutments in the mandible. Molding with addition silicone and using 4-layer acrylic teeth of the brand Ivoclar Vivadent. After 2 months of installation of the maxillary implants, the installation of the angled abutments SRA 17 degrees, transfer molding with addition silicone, laboratory steps, and teeth tests were started to define patient profile, smile line, midline and aesthetics. They completed the clinical case with acrylization of the prosthesis type superior and inferior protocol at the same time.

Conclusion: This clinical case report shows the extreme accuracy of this type of implants supported implant type protocol. It returns the masticatory function and aesthetics of the patient. It guarantees satisfactory and long-term functional stability.

201. Post-extractive immediately loaded surgical guided implant supported rehabilitation

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Introduction: The aim of this case report is to clinically evaluate the fitting precision of an immediately-loaded implant-supported rehabilitation realized on a computer-aided planning and to test the accuracy of a low-cost desktop 3D stereolithographic printer.

Materials and methods: A 47-year-old male complains of severe mobility of upper incisors. After medical and dental anamnesis data were collected, the pictures and the impressions of upper and lower jaws were taken. Using the software Digital Smile System (DSS-Italy) the ideal position and dimension of the upper incisors was planned and a virtual diagnostic wax-up was elaborated. A CBCT scan was taken using the Planmeca Promax 3D (Planmeca Oy-Finland), positioning the patient's jaws with a 5mm distance between maxillary and mandibular occlusal surfaces to facilitate the 3D planning. In the dental lab, the impressions were poured realizing two gypsum casts of the upper maxilla: in one of the casts the extractions of the teeth numbers 1.1, 1.2, 2.1, 2.2 were simulated. Both the casts were scanned using 7-Series scanner (Dental Wings-Canada). All the data from CBTC (DICOM files) and from casts scanning (.STL files) were imported in the software coDiagnostiX (Dental Wings-Canada) to elaborate the computer-aided treatment planning: the extractions of the teeth 1.1, 1.2, 2.1, 2.2 and the insertion of 2 implants (Straumann BL SLActive 4.1 x 12mm) in the position 1.2, 2.2 were simulated. On that virtual planning a customized surgical guide and a virtual model with scan-bodies were realized. In the lab, the software Straumann CARES (Straumann-Switzerland) re-elaborated the virtual model with scan-bodies generating a new virtual model with two digital implant analog perforations. Importing .STL files into PreForm software (Formlabs-USA), the 3D printer Form 2 (Formlabs-USA) printed the surgical guide in an autoclavable resin (Formlabs Dental SG Resin) and the model in a standard resin (Formlabs Grey Resin STS). After printing, the guide and the model were rinsed into isopropyl alcohol for 20 minutes, air dried, fully post-cured in a cure chamber and then the supports were removed. The customized surgical guide was completed by inserting two sleeves and then it was autoclaved. Two digital analogs were inserted into the printed model on which the dental technician fabricated the temporary implant-supported prosthesis. As previously planned the surgery consisted in the extractions of teeth 1.1, 1.2, 2.1, 2.2 and the flapless and guided insertion of two implants in positions 1.2 and 2.2. Final implants placement was completed by hand-using the manual torque wrench at 35Ncm. After removing the surgical guide and suturing in positions 1.1 and 2.1, the temporary implant-supported prosthesis was screwed. Two radiographs were taken.

Results: This workflow allowed us to produce an immediately loadable perfect fitting implant rehabilitation with a consistent reduction of the surgery and of the prosthetic insertion duration.

Conclusions: The traditionally high cost of surgical guide fabrication has been a barrier to use. With the Form 2 3D printer and coDiagnostiX implant planning software, the workflow produces low-cost accurate surgical guides and resin models. The clinical case evidenced that a careful previous treatment plan design results in reduction of surgery duration and in good clinical outcome for the patient.

202. Use of supershort dental implants to rehabilitate a severe vertical maxillary atrophy: one case report with 2 years of follow-up

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Objectives: Our objective is to rehabilitate a partial edentolous patient with a fixed prosthesis in a case of severe vertical atrophy associated to pneumatization of the maxillary sinus through the use of an ultrashort implant (4 mm in length) connected to a standard one.

Methods: A 52-year old male patient, in good general health, non-smoker, needed fixing implant prosthetic rehabilitation in the area 16-17 suffering from severe vertical atrophy was enroled. The patient did not undergo reconstructive jaw surgery and therefore it was chosen for rehabilitation with super short Straumann SLActive Implant (4.1x4 mm) in position 16 and traditional Straumann SLActive implant (4.1 x 10 mm) in position 17. These implants were loaded after 2 months after surgery with a metal-porcelain fixed prosthesis.

Results: The patient did not report any problems during the surgical phase and the post operative time was comparable to a routine surgery. At 2 years after implant prosthetic rehabilitation there were no biomechanical complications and perimplants probing depth. The radiographic analysis didn´t show any marginal bone loss for both implants.

Conclusions: The case report proposes the use of ultra short implants connected to standard ones as an alternative solution to rehabilitate areas affected by severe bone atrophy with lower morbidity and lower costs for the patient. The reduced observation time does not allow to draw definitive conclusions, although two years of monitoring show complete successful rehabilitation.

203. Digital workflow: From surgery to prosthesis

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Objective: Highlight how the use of digital technologies, both in surgery and in the prosthesis, leading to a highly predictable workflow.

Method: Female patient manifests the desire to abandon the use of the upper mobile denture and calls for rehabilitation of fixed implant type without being subjected to invasive surgical procedures.

STL files are obtained by scanning both the prosthesis is the master model.

With STL file and the Dicom files of Cone-Beam proceed to surgical planning appropriate by coDiagnostiX software Dental Wings. The result of the planning involves the use of No. 4 Straumann implants BLT Roxolid SLActive with computer guided surgery. Through DWOS Synergy software, surgical project is imported into CAD software DWOS, so you have the implant axes and able to make a PMMA temporary for immediate loading. The template is stabilized with the anchor pin. After mucotomy you perform a flapless surgery type. Once the sites prepared, the implants are inserted through the template by the use of dedicated mounter. It proceeds to the relining of the provisional stumps Variobase and Temporary Abutment.

Result: Using STL files, obtained by optical impression and CAD-CAM design software, it proceeded to the implementation of customized abutments and a final restoration cemented zirconia, both on implant abutments, both on the natural elements.

Conclusions: The use of this method has reduced the working time ensuring an immediate prosthesis with a reduction in patient discomfort and post-operative pain and allowing an immediate conditioning of the soft tissues.

204. Impression technique for simultaneous recording of implant and prepared teeth

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Objectives: Making an impression in implant dentistry is accurately relating the impression coping to the other structures in the dental arch. This impression coping is incorporated in impression material. Usually elastomeric impression materials are used, Polyether and polyvinyl siloxane are two most widely used types and have proved to be the most appropriate materials. However, the impression technique is also a critical factor that can affect the accuracy. One step putty wash technique can be successfully used for impression of implant-supported restorations. In some clinical cases in addition to the placed implants, some of the existing teeth are also prepared for indirect restorations and need to be included in the impression. As a result, registration of accurate dimensional and surface detail of prepared teeth is a matter of great importance in the process.

In that case there are some complications regarding using one step impression technique. For instance, usually recording the prepared margin of the teeth seems complicated. On the other hand, in two step putty wash technique it is very difficult to reseat the impression tray over the implant impression copings in the mouth. The impression method described here helps the clinician to record both the implant surface and prepared teeth in one tray.

Methods: Clinical Steps:

1. Prepare the natural teeth for zirconia-based single crown.
2. Remove the cover screws (048.371; Straumann AG) from the implants and insert the impression copings (048.090; Straumann AG).
3. Make an impression with a stock tray modified for the open tray technique and putty impression material. (Panasil; Kettenbach)
4. After the putty is set, unscrew the impression copings and remove the tray from the mouth.
5. Use the screwdriver (046.401; Straumann AG) to dislodge the copings from the putty.
6. Use acrylic trimming bur (Brasseler) to expand the holes that the copings have created in the putty.
7. Once again fasten the impression copings on the implants and try the passive seating of the tray containing putty.
8. Use double cord technique to clearly record the margins of the prepared teeth.
9. Fill the intaglio surface of the putty with wash material (Panasil; Kettenbach) and inject the wash material around implant impression copings and prepared teeth after removing the second retraction cord.
10. Unscrew the impression coping and remove the impression form the mouth.
11. Screw the appropriate impression analogues (048.124) on the impression copings.
12. Send the impression to laboratory after the disinfection routine.

Results: This technique helps the clinicians to efficiently and simultaneously record the prepared natural teeth and the implants.

Conclusions: Using this technique will provide one single impression of the natural teeth and the implants.

205. Chair-side CAD/CAM technique for comprehensive implant dentistry: A case report

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Objective: This clinical case report demonstrated the use of a chair-side digital workflow for comprehensive implant dentistry in one-time visit. Digital diagnostic impression, virtual planning, computer-guided implant surgery, and an immediate loading protocol were used to complete treatment with a CAD/CAM-fabricated and implant-supported fixed dental prosthesis.

Methods and materials: Intraoral opticalimpression and hard tissue anatomy data were obtained by using chair-side CEREC Omicam and Galileos CBCT software (Sirona Dental Systems, Charlotte, N.C.) respectively, and merged by adjacent teeth to complete the whole information diagnostic data. The implant type and position were determined and the data were sent to SICAT for fabrication of a tooth-support flapless surgical guide. Once implantation was complete, the restorative phase began. A digital intraoral impression of the implant was obtained and all-ceramic crown were designed and fabricated by CAD/CAM technique.

Results: Within approximately two hours and directly at the chair-side, a cad/cam guided implant surgery and immediate loading protocol with custom abutment and all-ceramic crown were completed by using comprehensive cad/cam technique.

Conclusion: The chair-side cad/cam technique allowed the one-visit implant treatment to come true. The high predictable results can be achieved during the whole stage of digital treatment.

Keywords: Implant, cad/cam, chair-side

206. Maxillary implant-supported overdenture and mandibular distal free-end removable partial denture with tilting anterior teeth - case report

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This is a case conference about maxillary implant-supported overdenture and mandibular removable partial denture with teeth of compromised periodontal support. A 64-year old male suffered from ill-fitted maxillary and mandibular removable partial denture and hyper-mobility of teeth for a long time. Recently, the last teeth of maxilla were extracted and the maxillary removable partial denture could not be used. He decided to have full mouth rehabilitation. This patient was referred to our hospital for further treatment. After intra- and extra-oral examination, residual roots over maxilla and tilting anterior teeth with compromised structure in mandible were noted, and there was huge torus palatinus in midpalatal suture. Diagnostic wax-up was performed, hopeless teeth and residual roots were extracted, and root canal treatments were arranged. Because of no will to remove torus palatines by surgical procedure, patient decided to have implants to retain maxillary denture. After delivery of the provisional dentures, the surgical stent was fabricated according to maxillary denture. The quality and quantity of anterior maxilla bone is poor by CBCT examination. Total four implants were placed in the bilateral posterior area of maxilla. Two bars were designed to retain and support the maxillary overdenture. The axis of mandibular teeth was corrected according to the preparation guide. All implants were placed and trans-crestal sinus lefting was done in the same time. After six months, the design of definitive prosthesis was confirmed. The maxillary working cast was impressed by board molding and open tray technique. Two bars for maxillary implant supported overdenture was fabricated. In the mandible, final impression was performed by polyvinyl siloxane impression material for mandibular fixed prostheses fabrication. Altered cast impression technique was used for mandibular removed partial denture. A six-month follow up of this case was also completed.

207. Immediate flapless implant replacement of single tooth in the esthetic zone

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Objective: To investigate the effect of the immediate implant immediate restoration, one abutment one time, and the temporary crown of the maxillary central incisors.

Methods: Preoperative routine blood examination, no implant contraindications. Before operation, the bone mass of implant site was designed by CBCT and software, and the position, length, diameter and three-dimensional position were determined. Minimally invasive extraction of the maxillary right central incisor to prosthetic-drive implant. One Straumann® 4.1 mm x 12.0 mm bone level implant was placed immediately after minimally invasive extraction in esthetic zone. Probing can be found with a small amount of labial bone defect, we impacted with two PRF. Grinding permanent base, screwed into a permanent base station, afterburner to 20N•cm, Plastic crown and acrylic fixed prosthesis were finished immediately leaving 0.5-1mm occlusal space made sure that the provisional restoration was cleared of all contact in centric occlusion in order to avoid full functional loading of the implant during healing. At the time of 6 months after implantation, the temporary prosthesis was adjusted to further induce the formation of the soft tissue. After 7 months of implantation, the final restoration impression was made, all-ceramic crown restored the site of a missing central incisor.

Results: The case got a good bone and soft tissue stability and aesthetic effect.

Conclusion: Base on the strict control of indication, the ideal clinical asethetic effect, the stability among peri-implant bone and soft tissue and the original gingival contour and shape could be achieved using immediate flapless implant replacement of single tooth.

208. Immediate implant placement and immediate loading for maxillary and mandibular edentulous arches

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Objectives: This case presents the procedures of immediate implant placement, immediate loading and permanent restorations for maxillary and mandibular edentulous arches. Discuss the possibility of immediate placement and immediate loading for edentulous patients with severe periodontitis. Estimate the results of screw-retained one-piece framework suprastructure for full arch with CAD/CAM titanium milling technique.

Methods: One patient with partial edentulous maxillary and mandibular arches was referred to clinic for implant prosthetics. The remaining teeth had severe periodontitis, and the mobility was Ð, with poor masticatory function. Fabricated complete dentures before extraction of all the remaining teeth. After extraction, immediately placed 8 implants respectively in the maxilla and mandible. Took closed tray impressions and poured casts. Fabricated temporary restorations with prepared complete dentures and delivered the temporaries 2 days postoperatively. 4 months later, final rehabilitation of hybrid with CAD/CAM titanium milling framework was finished.

Results: 4 months after surgery, implants osseointegrated well and had no mobility. The gingiva was healthy and had no inflammatory. The masticatory function and esthetic results of the implant rehabilitations were satisfying. Radiography examination indicated well osseointegration and no translucent area around implants. Restorations were seated completely and no visible gap between suprastructure and abutments.

Conclusions: Immediate implant placement, provisional restorations with pick-up technique and CAD/CAM titanium milling framework hybrid for partial edentulous patients with severe periodontitis could obviously shorten treatment period, relieve patients discomfort greatly. The short-term result was satisfactory.

209. Treatment of an edentulous patient using a fixed implant-supported cross-arch prostheses with very short distal implants - a pilot case report

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Objectives: Compared to conventional complete dentures, implant-supported prostheses offer substantial psychosocial and functional benefits to the edentulous individual. The rehabilitation of edentulous patients with implant-supported removable dental prostheses (ISRDP) supported by interforaminal placed implants has become a routine procedure. Implant-supported fixed dental prostheses (ISFDP) might be superior to ISRDPs in regards to function and patient comfort, but in the posterior region is often complicated to place supporting implants because of the lack of sufficient bone volume and the close presence of anatomic structures. To evaluate the clinical performance of distal 4mm short dental implants supporting cross-arch fixed reconstructions a randomized clinical trial will be conducted supported by an ITI Grant (ITI Grant Number: 1123_2015). The pilot case within this study is presented here.

Methods: A 65 years old non-smoking female patient Ms G. was edentulous for 12 months. Her chief complaint was the loose mandibular denture and her inability to chew. Thus, she expressed the wish for an ISFDP in the mandible and a complete removable denture in the maxilla. Her medical history was non-contributory.

Prosthetic and surgical workflow will be presented step-by-step including virtual planning of the future implant positions according to the cone beam CT scans and the implant placed with a drill guide.

A total of 6 tissue level Implants were inserted in the mandible. Two implants placed interforaminal with a standard length (10mm+) and four short implants were inserted bilaterally in regions 6 and 5 (both 4mm). After 8 weeks, open tray impressions were taken, the CoCr framework was milled using CAD/CAM technology and the final prostheses were realized employing the BPS clinical protocol.

Results: The screw-retained cross-arch prosthesis was delivered in the mandible and a complete mucosa-borne denture in the maxilla. The patient was extremely satisfied with esthetics, comfort and masticatory function.

Conclusion: The present pilot case demonstrates the clinical feasibility of providing an edentulous patient with atrophied mandible with an ISFDP, supported with very short, parallel placed implants in the region of the masticatory centre. This is a promising concept in regard to minimal invasive surgery, long-lasting function and a backing-off strategy, also for elderly patients.

210. Reconstruction of maxilla with fibular free graft and implant retained prosthesis: A case report

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Introduction: The reconstruction of the maxilla following resective surgery can pose a challenge for surgeons and restorative specialists alike. A defect in the maxilla can affect eating, speaking and swallowing. Previously, the majority of reconstruction involves the provision of an obturator, which patients can find difficult to manage and poorly functional.

The following case report will describe the process in which a maxillary defect following PSA resection, was reconstructed using a fibular free flap and dental implants to create a functional and aesthetic prosthesis.

Background: The treatment for Pleomorphic Adenoma tumours involve enucleation, resection and whole gland removal. Maxillary resective defects can be classified using several systems. A commonly used system devised by Brown et al. describes defects by their horizontal and vertical nature.

Majority of defects can be reconstructed using an oral prosthesis, however in some cases where the defect is too large for retention of an obturator or an effective oro-nasal-antral seal cannot be achieved, the use of fibular flaps may be indicated. The outcomes for either modality is similar

Case report: A 49-year-old female patient presented with a recurrent PSA surrounding the upper left canine, with her initial presentation of PSA some 20 years previous. Her initial PSA involved a partial maxillectomy Brown's Class 2b with reconstruction using a fibular free flap and remedial radiotherapy. The Multidisciplinary Team outcome agreed for wide local excision of the new lesion including teeth. The PSA was excised fully and the patient made a good recovery. Post-operatively, the patient remained partially dentate, with four teeth in upper left quadrant present.

The patient struggled to cope with a bulky partial acrylic denture, which was poor aesthetically and inadequate functionally. Attempts were made to create a swing lock partial denture using the remaining teeth, however it lacked support from the ipsilateral side. Following a discussion on the risks of potential osteoradionecrosis, the patient returned to theatre to have de-bulking of the flap and the placement of implants (Straumann) in the posterior and anterior regions of the maxilla. The pre-operative planning using SIMPLANT Software aided the positioning of the implants and created a 3D reconstruction of the possible prosthesis.

The implants were restored using a bar retained partial overdenture which was aesthetically pleasing, retentive and functional within the mouth.

Conclusion: The prospect of restoring a patient's mouth which has undergone cancer treatment can be challenging. In this particular case, reconstruction using fibular bone provided suitable bone for implant placement. By de-bulking the flap, the fibular bone could be utilised to its fullest potential, housing implants which were functional. Using software such as the planning tool, can aid surgeons in the placement of implants which will be restorable post-operatively.

211. A case of clinical application using digital technology in implant surgery and rehabilitation

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Objectives: The aim of this study was to complete the whole process from implant surgery, implant-supported immediate restoration to the permanent prosthesis using digital technology and to evaluate the clinical effects.

Methods: Male young patient,the second premolar in the mandible is congenital lost.Height and width of the available bone is acceptable.The patient required the precision of surgery,implant-supported immediate restoration after surgery and perfect effects of permanent rehabilitation. So,using the digital technology preoperation,including adopting digital impression by 3Shape oral scanner in order to make immediate restoration,taking CBCT,designing the ideal dimensional location of dental implant via the software of Implant Studio,fabricating surgical template,designing and making the immediate restoration through the software of 3Shape.During operation,utilizing surgical kits specialized in template surgery of Straumann dental systemÐplacing the Straumann dental implant by surgical template precisely with the insertion torque above 35N•cm as well as with ISQ above 70Ðwearing the implant-supported immediate restoration which fabricated preoperation.Taking a zirconia crown and abutment are connected as one unit as the permanent prosthesis after osseointegration.Adding porcelain in the model which designed and printed by the laboratory.

Results: The dental implant was placed successfully, and implant-supported immediate restoration was achieved. During the observation period, the implant-supported permanent restoration achieved the ideal stability of hard and soft tissue as well as the aesthetic effects.

Conclusion: Using digital technology through the whole therapy process, which from implant surgery, immediate restoration to permanent rehabilitation. The use of digital technology can ensure the precision, efficiency and minimally invasive of the whole treatment process, as well as the pretty of the final results of the temporary restoration and permanent prosthesis.

212. Immediate loading of eight implants with pick-up technique in the maxilla and final rehabilitation with a full-arch CAD/CAM titanium framework FDP: 5-year clinical follow-up

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Objectives: This work is to explore the effectiveness of immediate-loading implant restoration using a static surgery template and a computer-aided design/computer-aided manufacturing (CAD/CAM) technique and to evaluate the long-term prognosis in a clinical case.

Methods: A 53-year-old male patient missing all his maxillary teeth apart from tooth #28 was referred to the Implantation Center of Beijing Stomatological Hospital in March 2011. The patient retained all his natural teeth in his mandible.

Diagnostic Evaluation: A diagnostic wax-up was designed and fitted. Subsequently, radiological diagnostic template including radiopaque markers was obtained. Double scanning procedure was performed through CBCT to reconstruct a model of the patient's maxillary region with the diagnostic template and to evaluate the requirements of alveolar quality and quantity.

Preoperative Planning: After inputting the 3D information from CBCT into Simplant®, a commercially available 3D implant planning software, the implantation plan was projected. CAD/CAM technique was used to generate a stereolithographic surgical guide plate according to the plan.

Implant Operation: After the surgical guide was fixed on to the maxilla, implant sites were prepared with the Straumann® Guided surgery instrument kit and eight Straumann® Standard Plus (SP) SLActive implants were inserted transgingivally in a flapless approach. All the implants presented primary stability and an insertion torque of over 35Ncm.

Immediate Implant Loading: Subsequently, impressions were taken at implant level and screw-retained provisional copings were connected to each analog in mockup. Pick-up technique was used to finish the immediate provisional by bonding the perforated template with the copings. The provisional restorations were immediately loaded.

Final Rehabilitation: After six months of functional loading, final impressions were taken and occlusion recorder device (ORD) was completed according to provisional restoration. Then, a wax-up was set up for esthetic and functional evaluations. A scanner was used to scan the ideal fixed-restoration set-up and to generate a 3D CAD file. The data were transferred to a CAM milling center, and a titanium block was milled accordingly into a titanium framework. After a further try-in of the final framework, the ceramic and resin veneering was completed, and the final rehabilitation was screwed onto the implants through synOcta abutments.

Results: The patient was followed up and examined at 13 months, 28 months, 49 months and 56 months. He felt comfortable and was completely satisfied with the esthetics and function of the implant rehabilitation. There are no other changes in bone or soft tissue around the implants and the restoration.

Conclusions: Digital strategic implant placement and immediate loading approach with CAD/CAM technique provides minimally invasive and accurate short-term treatment, and can be used to treat varying degrees of edentulism with reliable long-term prognoses.

213. The application of CAD/CAM customized ceramic abutment and ceramic cantilever fixed bridge in the aesthetics zone

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Objective: To evaluate the clinical effects of CAD/CAM customized all-ceramic abutment and all-ceramic cantilever fixed bridge in the aesthetics zone.

Method: A 25-year-old girl who was congenital anodontia of bilateral anterior maxillary teeth and need restoration.

Clinical examination: Bilateral maxillary retained deciduous canine, lateral incisor missing, mesial and distal space was about 8 mm, labial surface bone defect, the left alveolar bone was about 7.3 mm high, the right alveolar bone was about 7.9 mm high. Treatment process: extracted the bilateral maxillary retained deciduous canine and placed two straumann® SP.RN Ø 4.1*10 mm implants, with simultaneous localized management of sinus floor elevation and GBR. 6 months later, CAD/CAM ustomized ceramic abutment and ceramic cantilever fixed bridge were installed. The aesthetics effect was ideal in the reexamination after 3 months.

Result: CAD/CAM customized ceramic abutment and ceramic cantilever fixed bridge were used in repairing the aesthetics zone in this case. The gingiva on the labial surface coronally migrated about 1 mm after 1 year, obtaining good soft tissues reshaping effect. The aesthetics effects were ideal in the 4-years follow-up, but the long-term effect of CAD/CAM customized all-ceramic abutment still requires further clinical observation.

Conclusion: In the present case, adjacent two teeth were missing in the aesthetics zone, implants was placed simultaneously following the sinus floor elevation. CAD/CAM customized ceramic abutment and ceramic cantilever fixed bridge efficiently maintains the profile and form of soft tissues, and provides clinical evidences for long-term stability of soft and hard tissues.

214. Tissue reconstruction and implant restoration after mandibular tumor resection

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Objectives: Implant restoration after mandibular reconstruction is one of the most challenging cases in implant restoration. These patients are not only accompanied by severe vertical and horizontal bone deficiencies, but also associated with attached gingival loss. In this case, the patient´s left mandible was partial resected due to squamous cell carcinoma and reconstructed by free fibula flap. 5 years after the surgery, the patient would like to restore the missing teeth. A multidisciplinary treatment approach, including vertical distraction osteogenesis, attached soft tissue reconstruction with acellular dermal matrix graft and dental implants restoration, was employed to restore the patient's contour of mandible and the function of chewing.

Methods:

1. Vertical distraction osteogenesis: the distractor was placed at the middle of the survivable fibula. A vertical defect distraction osteotomy had done through a horizontal incision. The procedures of vertical distraction osteogenesis are as follow: waited 5 days after device placement, then distracted the fibula 0.2mm 4 times a day for 0.8mm total daily. After 8 weeks, the distraction device was removed.

2. Insert implant assisted by surgical template: After 4 months, 4 implant sites were designed with integration of radiation guide data and CBCT data, then create a simple surgical guide to assist implant insertion. 4 implants(Straumann®) were routinely implanted at the edentulous area. Following a healing period of 6 months, the osseointegration was achieved completely.

3. Soft tissue reconstruction: A crestal incision was made at the alveolar ridge and the vertical incisions were made on either side of the horizontal incision. Partial thickness flap was thoroughly raised on the periosteal bed to the base of vestibules. Then the patient was operated with acellular dermal matrix(ADM) heterograft (Heal-all®, Yantai, China) according to the manufacturer's instruction. The ADM grafts was firmly placed on the periosteal bed and secured to the periosteum and surrounding connective tissue. After the surgery, the temporary abutments were screwed to the dental implants and three holes were drilled on the temporary denture (a removable partial denture) at the sites that were opposed to the abutments. Take the denture in place and employ self-curing resin to fill the gap between the abutment and the denture. When resin was solidified completely, the denture was attached to the abutment as a unit. unscrew the abutment screws. remove the unit and polish, then resin splint was completed. Finally, iodoform gauze was fixed on the surface of ADM grafts by the resin splint.

4. Prosthesis: 4 weeks later, we got the impression and designed a final screw-retained prosthesis, which contain milling pure titanium stent internal, artificial resin teeth on the surface of metal stents and a channel was reserved between abutments. All these procedures were employed by CAD/CAM technology.

Results: After 3-years follow-up, the denture is intact, mucosal inflammation is not obvious, radiographic examination shows that there is no bone resorption. The patient is satisfied with the denture.

Conclusion: The multidisciplinary treatment approach contributes to the success of complex cases. Vertical distraction osteogenesis contributes to restore the severe bone deficiency. ADM can be used to reconstruct the attached gingival without additional trauma. CAD/CAM technology could improve the precision of implant prosthesis.