

DENTAL IMPLANT REHABILITATION IN SUBJECTS AFFECTED BY CHRONIC KIDNEY DISEASE: A SYSTEMATIC REVIEW OF THE LITERATURE AND CASE REPORT

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Aim: the severe form of Chronic kidney disease-mineral could produce bone disorder and renal osteodystrophy accompanied by deficits of bone mineralization and electrolytes/hormonal disbalance. The aim of the present investigation was to evaluate the implant rehabilitation in subjects affected by chronic kidney disease through a systematic review and case report.

Methods: the literature screening was performed in accordance with the criteria of the PICO guidelines on PubMed/Medline, EMBASE, Google Scholars electronic databases. A male patient affected by chronic kidney disease undergoing treatment with hemodialysis was treated with upper and lower immediate implant-prosthetic rehabilitation.

Results: the screening showed a total of 54 manuscripts and one paper identified through the manual search. A total of 45 papers were excluded and 9 articles were considered for the descriptive synthesis.

No complications or events were reported during the surgery and the post-operative healing. The clinical course reported no significant inflammation or symptoms with a follow up of 1 year.

Conclusions: the study findings showed that the immediate implant rehabilitation reported a successful prognosis and could be considered also for severe chronic kidney disease and subjects under haemodialysis treatment.

A NEW WEDGE-SHAPE DENTAL IMPLANTS FOR NARROW BONE RIDGE: REX PIEZOIMPLANT, A CASE REPORT

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Aim: the progressive resorption of the alveolar ridge after tooth extraction may lead to maxillary or mandibular atrophy, resulting in reduced horizontal or vertical dimensions of the bone crest or in a combination of them. Insufficient bone volume could compromise the insertion of the traditional implant. The purpose of this study was to report the surgical protocol used in implant prosthetic rehabilitation with a new wedge-shape dental implant in a case of insufficient bone volume with a 40 months follow-up.

Methods: this case report documents the insertion of a REX PiezoImplant type TL1.8 (Rex TL, Rex Implants, Columbus, OH, USA) in a patient with a horizontal bone width between 2.66 mm and 3.29 mm. Piezoelectric instruments and a speci-

fic sequence of inserts were used for the preparation of the implant sites. The implants were inserted with the REX IPD magnetic hammer (Implant Placement Device, Mectron S.p.A).

Results: in this case report, the follow-up evaluation performed at the time of suture removal, on day 10, and after 1,24 and 40 months showed no complications, no residual radiolucency and revealed a good osteointegration of the inserted implants.

Conclusions: according to our results, the use of REX PiezoImplants can be considered a valid minimally invasive surgery technique in atrophic bone crests, which do not allow the insertion of traditional implants without bone regeneration procedures.

MECHANICAL DEBRIDMENT WITH PDT IN PERI-IMPLANT DISEASE IN SMOKERS: A NARRATIVE REVIEW

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Aim: to evaluate the efficacy of mechanical debridement in combination with adjunctive photodynamic therapy in peri-implant disease treatment in smoking patients.

Methods: peri-implant diseases are pathologic inflammatory conditions that include peri-implant mucositis and peri-implantitis. Routine treatment modality in preventing and controlling these conditions is thorough mechanical removal of the deposits. Recently, the use of photodynamic therapy (PDT) centered on the premise that a photoactive substance offers benefits in the resolution of peri-implant diseases has gained attention.

Three perspective studies assessing the effect of PDT in smoking patients were included.

The follow up period generally ranged from 6 months to 1 year.

The clinical outcome parameters considered were: implant probing depth (PD), plaque index (PI), bleeding on probing (BoP).

Results: Alqahtani found no statistically significant difference in all parameters at all-time intervals in smokers, while Al Deeb reports a significant reduction in PI, PD and a reduction of BoP in smokers at six months follow-up. Javed found no statistically significant difference in BoP at 6-12 months of follow up compared with baseline, while significant reduction in PD was reported.

Conclusions: PDT seemingly offers short-term benefits as an adjunct to mechanical debridement in the treatment of peri-implant diseases.

To conclude emphatically about the role of PDT in peri-implant diseases may be difficult due to varying study designs and data sets. However, the data reported are encouraging and further study should be carried out to evaluate the benefits of this treatment.

CUSTOM-MADE ADDITIVELY MANUFACTURED SUBPERIOSTEAL IMPLANT: A CASE REPORT 2-YEARS FOLLOW-UP

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Aim: recently, several Authors suggested a revival of subperiosteal implants as an alternative to regenerative procedures. The purpose of this case report was to describe the clinical application of custom-made additively manufactured subperiosteal implant for fixed prosthetic rehabilitation of edentulous maxilla.

Methods: plaster models of the upper and the lower arch were scanned, as well as the mock-up. DICOM data obtained from CBCT were processed through the thresholding procedure. The design of the subperiosteal implant was drawn on the stereolithographic model and scanned. Once the digital project of the subperiosteal implant was completed, it was sent to additive manufacturing. After the surgery, the patient

was strictly monitored for up to 2 years. The outcomes were assessed based on the incurrence of biological and mechanical complications, postoperative complications, and implant survival.

Results: the patient did not suffer from postoperative complications. Neither biological nor mechanical complications occurred during the follow-up period. At the end of the study, the implant was still in function.

Conclusions: custom-made subperiosteal implants could be considered as an alternative to regenerative procedures for the rehabilitation of severe bone atrophy. Further studies are needed in the future to confirm the positive outcome.

CLINICAL, RADIOGRAPHIC AND BIOCHEMICAL EVALUATION OF TWO-PIECE VS ONE-PIECE SINGLE IMPLANT

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Aim: the aim of this study was to compare the clinical and radiographic conditions and the expression of proinflammatory cytokines in peri-implant crevicular fluid (PICF) of two-piece/bone level (TP/BL) versus one-piece/tissue level (OP/TL) single implants with a laser-microgrooved collar after at least 5 years of functional loading.

Methods: for this study 20 systemically and periodontally healthy patients were selected. Each patient received 2 implants, both with a laser-microgrooved collar surface, with a split-mouth design: one TP/BL implant and one OP/TL implant. Levels of IL-1 β , IL-1RA, IL-6, IL-8, IL-17, b-FGF, G-CSF, GM-CSF, IFN, MIP-1 β , TNF- α , and VEGF were assessed in PICF using the Bio-Plex 200 Suspension Array System. Plaque index (PI), probing depth (PD), bleeding on probing (BOP), and gingival reces-

sion (REC) were recorded. Radiographic crestal bone levels (CBL) were assessed at the mesial and distal aspects of the implant sites.

Results: the mean PI, PD, BOP, and REC values had no significant differences in either group. TP/BL implants showed a significantly higher CBL value. The levels of IL-1 β , IL-6, IL-8, GM-CSF, and MIP-1 β and TNF- α were higher at TP/BL implants than at OP/TL implants. However, only IL-1 β , IL-6, and TNF- α values presented significant differences between the groups.

Conclusions: after 5 years of loading single TP/BL and OP/TL implants with a laser-microgrooved collar surface presented similar good clinical conditions, a higher proinflammatory state and higher crestal bone loss were detected for TP/BL implants.

OUTCOMES OF TISSUE-LEVEL IMPLANTS IN FULL-ARCH REHABILITATIONS: AN OBSERVATIONAL STUDY

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Aim: tissue-level implants with a convergent collar have been recently introduced. While different studies have investigated their application in single and multi-unit implant rehabilitations, no observational studies are currently present on their usage in full-arch rehabilitations. This observational study aims to examine the use of tissue-level implants in immediate loading full-arch rehabilitations with different variables associated.

Methods: 20 Patients were recruited. Each patient underwent an immediate loading full-arch rehabilitation with four trans-mucosal tissue-level implants. The following variables were recorded: implants' diameter and length, and jaw distribution. The following outcomes were evaluated: implants survival rate, marginal bone loss (MBL), Plaque index (PI), Bleeding on Probing (BoP), Probing

Depth (PD). Descriptive statistical analysis was reported, and univariate linear regression models were built to assess a significant correlation between MBL and the different implant related factors.

Results: at the one year follow up visit no implants failed resulting in an implant survival rate of 100%; the overall MBL was 1.19 \pm 0.30 mm, PI 0.48 \pm 0.50; BoP 0.43 \pm 0.50 and PD 2.07 \pm 0.65 mm. No statistically significant difference ($p < 0.05$) was highlighted among any of the subgroups analyzed.

Conclusions: despite different variables associated, tissue level implants seem to represent a valid option when applied in immediate loading full-arch rehabilitation. Further research and longer observational periods are encouraged to confirm the result.

INTRASULCULAR LEVEL AS PROGNOSTIC VALUE OF THE SUBSEQUENT ONSET OF PERI-IMPLANTITIS

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Aim: the aim of this retrospective study was to investigate the role of the amount of early bone remodeling, the marginal bone loss (MBL) progression and the peri-implant sulcular fluid concentration of MMP-8 in the incidence of peri-implantitis during 5 years of implant function.

Methods: a total of 80 patients receiving 80 implants [39 with a laser-microtextured collar surface (LMS) and 41 with a machined one (MS)] were included. Clinical and radiographic documentation at implant placement (T0), at restoration delivery (TR) at 6 months (T1), at 2- (T2) and at 5-years (T5) post-loading were collected. MBL levels/rates (MBLr) and peri-implant sulcular fluid levels/rates of MMP-8 were assessed at TR, T1, T2, and T5. Implants were divided into two groups: group 1 with peri-implantitis (P+) and group 2 without peri-implanti-

tis (P-). A multi-level simple binary logistic regression, using generalized estimation equations (GEE), was used to assess the association between each independent variable and P+. Receiver Operating Characteristics (ROC) curve was used to evaluate a cut-off point of T1 MBL degree and MMP-8 level to discriminate between P+ and P- implants.

Results: 24 implants (6 with LMS, and 18 with MS) were classified with P+. No statistically significant association was found between the amount of early bone remodeling, MBL progression, MBLr and incidence of P+. Implants with MMP-8 levels >15.3 ng/mL at T1 presented significant influence on the onset of P+.

Conclusions: high MMP-8 levels, 6 months after loading, could have the discriminant ability to predict P+.

CUSTOM-MADE TITANIUM SUBPERIOSTEAL IMPLANTS OF MAXILLARY JAW: A CASE REPORT

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Aim: subperiosteal implants were introduced around 1940 and indicated in patients with huge jaws atrophies to avoid invasive reconstructive surgeries. Due to the lack of precision and stability they were progressively abandoned. The introduction of digital technologies in implantology allowed the development of new custom-made subperiosteal implants. The aim of this study is to show the surgical protocol and the 2 years follow-up results of these new devices.

Methods: two custom-made subperiosteal implants were placed in a complete maxillary edentulous patient with a Cawood-Howell class III. The implants were designed on the 3D bone reconstruction with CBCT and the STL files obtained from a digital scanning, then produced with Selective Laser Melting technique. A guided osteoplasty was realized and then the

implants were fixed with osteosynthesis screws in the midfacial pillars (nasal, zygomatic and pterygoideus pillars). An immediate loading with a provisional prosthesis was made. The final prosthesis realized with composite on a titanium bar was delivered after 6 months.

Results: after 2 years follow-up the implants were clinically and radiographically stable. Radiographs did not show significant marginal bone loss; no clinical or prosthetic problems were detected, and the patient is fully satisfied with the treatment.

Conclusions: with the introduction of digital technologies in implant dentistry the new custom-made subperiosteal implants can be considered a valid treatment in huge bone atrophies as alternative to invasive reconstructive surgery or in case of their failure.

FULL-ARCH REHABILITATION WITH STACKABLE GUIDE-PRELIMINARY DATA ON ACCURACY

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Aim: this study aims to compare the accuracy of implants positioned through utilization of stackable guides to that of traditional teeth-supported guides in patients with terminal dentition who are candidates for implant-supported provisional immediate loaded full-arch prosthesis.

Methods: five patients with terminal dentition have been rehabilitated with provisional full-arch prosthesis. Both implants and prosthesis have been placed with the aid of a stackable guide. This device is positioned in the oral cavity onto the remaining teeth and fixed in place with pins. After removal of the teeth-supported component and extraction of teeth it allows the guided placement of implants according to the pre-operative project. At this point the guide is used to fix the prosthesis to the implants

according to the pre-operative tridimensional position. The accuracy has been verified by comparing the position of the implants obtained by scanning the scan-abutments positioned after surgery and their position in the surgical plan.

Results: 26 implants have been analysed in terms of coronal horizontal deviation, apical horizontal deviation, apical vertical deviation and angular deviation. The data were then compared to the literature.

Conclusions: preliminary data on accuracy suggests stackable guides are as accurate as standard surgical guides and are really useful for the adaptation of prefabricated provisional prosthesis with minimal occlusal corrections needed, according to other cases reported in literature.

EVALUATION OF HGFS ADHESION ON INNOVATIVE TITANIUM SURFACES: AN *IN VITRO* STUDY

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Aim: evaluate the vitality, cytotoxic response and collagen secretion released by primary Human Gingival Fibroblasts cultured onto 2 innovative Fuchsia colored titanium Grade 5 surfaces treated with ytterbium laser compared to machined.

Methods: after surgical tooth extraction HGFs were isolated from gingival tissue biopsies obtained from healthy donors and seeded on the seven titanium disks that have been chosen. MTT Assay, Lactate Dehydrogenase Cytotoxicity Assay and ELISA Immunoassay for the release of human collagen type 1 were performed. Fibroblast growth was evaluated by stereoscopic and electron microscopy.

Results: Fuchsia and Dark Fuchsia samples were selected for the study and MTT, LDH and Elisa Immunoassay were compared with Machined control surface. The MTT Assay (spectro-

photometric reading at 540 nm) show a better response from the cells attached to the dark fuchsia disk (0,52) than Machined control surface (0,42). The Fuchsia and Dark Fuchsia samples show a statistically significant reduction in the release of LDH (spectrophotometric reading at 490 nm and 690 nm and normalized with MTT assay values) in the culture medium (0,926 and 1,008) compared to the Control sample (1,293). The cells attached to the Fuchsia surface are those that have released more collagen, creating more adhesion with the surface.

Conclusions: the *in vitro* results confirmed the innovative physical titanium improvements due to laser treatment and represent interesting perspectives in order to obtain esthetic in dental implants innovation and more predictable esthetic use.

MAGNETODYNAMIC IMPLANT SITE PREPARATION: PRIMARY STABILITY ANALYSIS OF TWO IMPLANT SHAPES

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Aim: our study aims to evaluate the primary implant stability (PS) of different implant shapes (*Five* Ø4.1x10 mm and *TiSmart* Ø4.0x10 mm; Leader Medica, Padua) performing traditional and magnetodynamic osteotomy in low-density bone. We analyzed peak of insertion torque (PIT), implant stability quotient (ISQ) and peak of removal torque (PRT).

Methods: four groups of 34 implant each were identified in accordance with the surgery and implant shape: T5 (*Five*), osteotomy using dedicated drills; M5 (*Five*), osteotomy using Magnetic Mallet (Osseotouch, Gallarate, Italy); TT (*TiSmart*), osteotomy with dedicated drills; and MT (*TiSmart*), magnetodynamic osteotomy. Each fixture was placed in porcine ribs scanned on CBCT with low bone density ($750 < HU$). PIT and PRT were digitally recorded in Ncm with a torque gauge device. ISQ was recorded using Osstell IDX (Osstell, Sweden).

Results: mean of PIT were $25,04 \pm 4,4$ T5, $30,62 \pm 3,81$ M5, $30 \pm 3,74$ TT and $32,05 \pm 3,55$ MT. Mean of ISQ were $68,11 \pm 3,86$ T5, $71,41 \pm 3,69$ M5, $70,88 \pm 3,08$ TT and $73 \pm 3,5$ MT. Mean of PRT were $16,47 \pm 4,56$ T5, $26,02 \pm 4,03$ M5, $23,91 \pm 3,28$ TT and $26,93 \pm 3,96$ MT. Our data (t-test $\alpha = 0,05$) showed a significant difference in PIT between TT-T5 ($p < 0.0001$), M5-T5 ($p < 0.0001$), MT-TT ($p = 0.02$).

ISQ showed a significant difference between TT-T5 ($p = 0.001$), M5-T5 ($p < 0.001$), MT-TT ($p = 0.01$). PRT evidenced a significant difference between TT-T5, M5-T5 and MT-TT ($p < 0.0001$).

Conclusions: our findings showed good PS values for both implant shapes. In particular, magnetodynamic technique seems to achieve a better performance in terms of PS values in low-density bone.

GUIDED IMPLANT SURGERY, APPLICATIONS AND LIMITS

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Aim: computer aided implant surgery is a widespread and consolidated technique also accessible to the general dentist. Conventional freehand implant placement could be challenging by difficult interpretation and secondary transfer of 2D radiographic diagnostics into the 3D clinical situation plus a limited visualization of the operative field of interest. Digital aids are gradually entering the routine of all dental professionals.

However, computer-assisted workflows with 3D imaging and virtual simulations offer powerful instruments for treatment planning, further surgical placement and prosthetic rehabilitation with respect to both anatomic as well as restorative parameters.

The purpose of this work is to review the main indications for guided surgery, while providing which are the clinical advantages

and disadvantages of computer guided implant placement compared to conventional treatment protocols.

Methods: narrative review on guided implant surgery was performed using PubMed Library. A series of cases was treated using static guided surgery. The cases were selected with the aim of filtering the most relevant indications.

Results: data on indications, advantages and disadvantages are summarized in the tables and the clinical cases are presented.

Conclusions: although guided surgery can simplify complex cases, it should still be considered a tool to be used, in the opinion of the authors, in selected cases. Moreover, it should be reserved for already experienced surgeons able to deal with the complications of implant surgery and the limits of the technique itself.

EVALUATION OF IMPLANTS WITH INCLINED NECK IN IMMEDIATE LOADING FULL-ARCH REHABILITATIONS

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Aim: co-axial implants with an inclined neck might overcome the problems of angulation of the implant axis. The aim of this research is to compare traditional and co-axial implants in immediate loading full-arch rehabilitations of the upper jaw.

Methods: 4 external hex tapered implants (Southern Implants) were placed in each patient: 2 traditional axial implants on which angled abutments were screwed, and 2 co-axial implants at 12° and 24° on the other hemi-arch on which straight conical abutments were screwed. The surgeons filled up a questionnaire to evaluate how the morphology of the coronal implant platform influenced the surgical and prosthetic phases. Peri-implant bone level was recorded radiographically at T0, and at 3, 6 and 12 months of healing and then annually. Plaque index, probing depth, and bleeding on probing

were also evaluated. Implant survival rate was calculated, and biological or technical complications recorded.

Results: the preliminary data collected did not show significant differences in peri-implant tissues health between the two implant types. No implants failed and both implants proved to be favorable for full-arch rehabilitation using tilted implants. Co-axial implants facilitated the prosthetic procedures. However, a learning curve is required in order to optimize their insertion.

Conclusions: both implants proved to be reliable and suitable for achieving clinical success in full-arch immediate loading rehabilitations but further research with longer follow-up and larger sample size is needed to confirm these preliminary outcomes.

CLINICAL OUTCOMES OF DENTAL IMPLANTS WITH TWO DIFFERENT INTERNAL CONNECTION CONFIGURATIONS

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Aim: the aim of the present study was to highlight clinical and radiographical differences among implants sharing the same macro-geometry but with two different prosthodontic connections.

Methods: patients requiring at least 2 implants in the posterior area of the jaw were randomly divided into two groups (Conical (CS) and Internal Hexagonal (IH) connection). At implant surgery (T0), insertion torque, implant stability quotient (ISQ values recorded by resonance frequency analysis, RFA), and soft tissue thickness (STH) were assessed. A 1-abutment/1-time protocol was applied, and the prosthesis was realized following a fully digital workflow. At the 36-month follow-up periapical x-rays were taken. In order to statistically analyze differences among the two groups and the different variables, paired T-test was used. Linear regression analysis was conducted to analyze how mar-

ginal bone loss (MBL) was affected by other independent variables. A neural network created to predict the success (good or not good) of the implant itself was implemented.

Results: 30 out of 33 patients (14 males, 16 females, mean age: 68.94±13.01 years) (32 CS and 32 IH) were analyzed. No implants failed. Marginal bone loss at the 3-year time-point was 0.33±0.34 mm and 0.43±0.37 mm respectively for CS and IH with a significant difference between the two groups ($p = 0.004$). The presence of keratinized gingiva ($p = 0.034$) significantly influenced MBL.

Conclusions: both the implant connections investigated presented optimal clinical outcomes with minimal marginal bone loss; however, CS implants and implants with the presence of a greater width of keratinized tissue presented significantly lower MBL.

COMPARISON OF HGFS ADHESION ONTO 2 LASER AND MACHINED TITANIUM SURFACES: AN *IN VITRO* STUDY

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Aim: evaluate the vitality, cytotoxic response and collagen secretion released by primary Human Gingival Fibroblasts cultured onto 2 different Gold titanium Grade 5 surfaces treated with ytterbium laser compared to Machined.

Methods: after surgical tooth extraction HGFS from gingival tissue biopsies were isolated from healthy donors and cultured onto Gold, Deep Gold and Machined titanium disks. MTT Assay, Lactate Dehydrogenase Cytotoxicity Assay and ELISA Immunoassay for the release of human collagen type 1 were performed. The fibroblast growth was evaluated by stereoscopic and electron microscopy.

Results: the MTT Assay show a better response from the cells attached to the yellow and dark yellow disks compared to Machined and showed a statistically significant reduction in LDH release in the culture medium compared to the Control. The Deep Gold samples showed a several cells adhesion and higher value of collagen release compared to Gold and Machined samples.

Conclusions: the *in vitro* results confirmed innovative physical titanium improvements due to laser treatment and represent interesting perspectives in order to obtain esthetic clinical enhancement in dental implant rehabilitations and predictable success in maxillary esthetic sites.

INNOVATIVE BONE QUALITY INDEX (BQI) IN THE BONE EVALUATION DURING OSSEOINTEGRATION

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Aim: bone quality and the dental implants osseointegration in animal sheep model evaluation after 15-30-90-days.

Methods: in twelve implants were evaluated three chambers: chamber 1 (head of the implant) chamber 3 (implant body) and chamber 5 (implant apex) in which 4 zones were identified: A (the implant-bone interface), B (centre of the chamber) C (surgical thread) D (native bone, used as control). Twenty microanalyses SEM-EDX were performed for each chamber to evaluate bone quality index (BQI). The BQI was calculated as the percentage of Ca and P ions in relation to the control zone at specific sites in the chamber.

Results: at 15 and 30 days SEM-EDX analysis showed a BQI about 25% in zone A, slightly above 50% in zone B (except for P) and around 70% in zone C.

At 90 days zone A had a BQI always around 25%, while zones B and C had a BQI approximately 70% and 90% respectively.

Conclusions: the bone quality maturation showed higher values "at distance" (growth of native bone to the implant surface, observed later in the osseointegration process). After 3 months BQI = 25% in zone A, confirming that the healing and maturation process of the bone is not complete.

TREATMENT OF SEVERE ATROPHIC EDENTULOUS SITE USING GUIDED BONE REGENERATION CUSTOM MADE

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Aim: GBR is one of the most used techniques for bone regeneration. The constant evolution of CAD-CAM system enables to adapt custom made membranes closely to alveolar ridge of single patient. The aim of this study is to show the process we use to manage severe bone defect by using GBR custom made.

Methods: the protocol has been used on 8 patients (6F, 2M) enrolled in Oral and Maxillofacial sciences Department of Policlinico “Umberto I”, Rome. Custom made GBR planning includes the study of plaster models, diagnostic wax-up and provisional prosthesis functionalization. The pre-prosthetic project is necessary to define atrophic site missing bone and implants placement in CT evaluation. CAD software allows to decide mesh main features such as: mesh thickness, size and position of pores, membrane extension.

Results: first surgical phase involves the membrane placement with homologous and heterologous bone. Then resorbable membrane is placed to cover the mesh. Second surgical phase involves mesh removal and implants placement. Depending on primary stability, third surgical phase consists of implants uncovering. Each patient was rehabilitated with fixed prosthesis.

Conclusions: despite severe bone defects, it's possible to rehabilitate patients by following a defined protocol. According to literature, custom made GBR allows to achieve successful results, thanks to many advantages: easy manipulation of mesh without the need for modelling or trimming; the surgical time reduction; regeneration major predictability; low risk of dehiscence and mucosal irritation thanks to rounded mesh angles.

BIOMECHANICAL EFFECTS OF MANDIBULAR FLEXURE ON IMPLANT-SUPPORTED FULL-ARCH REHABILITATIONS

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Aim: mandibular flexure is the deformation of the inferior jaw under stress occurring during the contraction of masticatory muscles and it's a crucial component that might affect the prognosis and outcome of several dental and implant therapies. The aim of this review is to evaluate its effects in different fixed implant-supported full-arch restorations.

Materials: an electronic search was conducted through databases: PubMed, Europe PMC, ResearchGate, and Google Scholar. The research was carried out by using the following keywords: “mandibular deformation” and “mandibular flexure”. Randomized and controlled clinical trials and prospective and retrospective case series were included.

Results: 12 articles were selected. The bone tension caused by the mandibular flexion has higher values in the cervical

area of distal implants of full-arch rehabilitations, especially in the molar region. There are two schools of thought about the stress connected to frameworks: for certain authors, the division of the superstructure at the level of the symphysis is recommended to reduce the greatest stress that occurs in this area of the framework; other studies show that one-piece implant-supported superstructure lessens the stress on the peri-implant bone that happens when using separate frameworks.

Conclusions: the biomechanical effects of mandibular flexure on fixed implant-supported full-arch restorations are debated. Prospective clinical and radiological observational studies should be carried out to assess the potential short-, medium-, and long-term consequences of mandibular flexure.

PRIMARY IMPLANT STABILITY EVALUATION BETWEEN PLATFORM LEVEL AND DIFFERENT ABUTMENT HEIGHTS

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Aim: our study aims to compare the primary implant stability quotient (ISQ) variation among implant platform, 1.75 mm high prosthetic abutment and 2.5 mm high prosthetic abutment performing resonance frequency analysis by Osstell IDX (Integrating Diagnostic AB, Göteborg, Sweden).

Methods: 45 implants (Nobel Parallel TiUltra, Nobel Biocare AB, Gothenburg, Sweden) Ø 4.3 x 10 mm long were placed into fresh bovine ribs. After implant placement, ISQ was recorded on/AT the implant platform (Group 1) and subsequently a prosthetic abutment with a height of 1.75 mm (Group 2) (On1 Base Xeal CC, Nobel Biocare AB, Gothenburg, Sweden) was screwed into the fixture. ISQ was recorded for Group 2 and the same procedure was performed for a 2.5 mm prosthetic abutment (Group 3). Each ISQ measurement was performed by the same opera-

tor, twice and in triplicate. The highest ISQ value was taken as the reference for the statistical analysis.

Results: the mean average ISQ values recorded in G1 were 75.9 (+/- 1,65). The mean values of ISQ of G2 were 67.7 (+/- 2,21); and for G3 were 66,9 (+/- 2,01), showing a significant difference ($\alpha = 0,05$) between G1 and G2 and between G1 and G3.

Conclusions: the measurements obtained from resonance frequency analysis were notably affected by the height of the abutment.

When the transmucosal abutment height was increased, the implant stability quotient value decreased. In clinical settings, it is recommended that the ISQ values obtained from the abutment should not be compared to those obtained from the implant platform.

COMPARISON OF FRAMEWORKS OBTAINED FROM DIGITAL AND CONVENTIONAL IMPRESSION: CLINICAL STUDY

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Aim: the aim of the present study was to investigate the accuracy of a new digital impression system, comparing it to the plaster impression technique in the realization of full-arch implant-supported metal frameworks.

Methods: we took 11 scans (8 of the upper maxilla and 3 of the lower jaw) on a sample of nine patients previously rehabilitated with fixed full-arch screw-retained prostheses following the Columbus Bridge Protocol (CBP) with four to six implants (total: 51) since at least 4 months. Two impressions were taken for each dental arch: one analogic plaster impression using pick-up copings and an open tray technique and a second one using an intra-oral scanner. Two milled metal substructures were realised. The precision and passivity of the substructures were clinically analysed through the Sheffield test and endo-oral radiographs.

Laboratory scans of the plaster casts obtained from an intra-oral scanner (IOS) and of the plaster casts obtained from traditional impression were compared with the intraoral scans following Hausdorff's method and an industrial digital method of optical detection to measure discrepancies. A Mann-Whitney test was per-

formed in order to investigate average distances between surfaces after the superposition.

Results: the Sheffield test demonstrated an excellent passivity of the frameworks obtained through both the digital and the analogic method. In 81.81% of cases ($n = 9$) both substructures were found to have a perfect fit with excellent passivity, while in 18.18% ($n = 2$) of cases the substructures were found to have a very slight discrepancy. From the radiographic examination, no gaps between the frameworks and the implant heads or multiunit abutments were observed, with 100% accuracy. By superimposing digital files of scans according to Hausdorff's method, a statistically significant discrepancy ($p = 0.006$) was found between the digital scans and the digital models obtained from plaster impressions. Three-dimensional optical detection found a mean discrepancy of 0.11 mm between the analogic cast and the cast derived from the digital impression.

Conclusions: the present study clinically demonstrates that milled implant-supported full-arch frameworks obtained through a digital scan and the herein described technique have an accuracy comparable to those obtained with traditional plaster impression.

TRANSMUCOSAL HEIGHT VS IMPLANT CONNECTION: A COMPARATIVE CLINICAL STUDY

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Aim: the aim of this study is to compare representative parameters of peri-implant soft tissue remodeling in relation to four different implant connections, looking for a significant correlation between different components and the clinical results obtained regarding tissue height.

Methods: a database containing information on peri-implant tissues remodeling was created for a total of 297 implants, with four different implant connections of different manufacturers, each associated with a Connection Code. For the analysis of soft-tissue remodeling, arch models were scanned and matched to their analogue with 3D-imaging software GeoMagic at 3 sequential times (post-surgery, provisional and definitive crown delivery), and finally, measurements of the height of the soft tissues in the buccal side were obtained with 3D-ima-

ging software GOM. The data obtained were tabulated and the statistical investigation was conducted.

Results: the vestibular height value resulted significantly correlated with the type of connection used ($p < 0.001$ in Kruskal Wallis test). In particular, different values were observed among the connections studied, with averages data ranging 2.2-3.8 mm. Some connections solutions appeared to be more performing in terms of the potentially achievable height in soft tissue healing.

Conclusions: the results obtained demonstrated various performances of potential development and maturation of peri-implant soft tissue in a vertical direction during the healing phase. The importance of these results lies in the primary role that soft tissue plays in the aesthetic relevance of the treatment.

PERI-IMPLANT SOFT TISSUE RESPONSE TO DIFFERENT ABUTMENT MATERIALS. A MOLECULAR HUMAN STUDY

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Aim: to evaluate the response of human peri-implant soft tissue on different healing abutment materials 24 hours after positioning, by assessment the expression of genes related to the connective tissue wound healing response.

Methods: experimental abutments of 4 different materials (A: grade 4 titanium, B: grade 5 titanium, C: zirconia and D: PEEK) were mounted on installed implants in 5 patients, four different abutments each ($n = 20$). Before implant placement, a gingival biopsy (control-CT) was obtained using a 2 mm diameter punch. After 24 hours, peri-implant gingival biopsies were collected using a specifically designed circular custom-made cutting device. Real time polymerase chain reaction was performed to analyze the expression of the following genes: COL-I, COL-III, MMP-1, TIMP-1 (collagen turnover); TGF-b1, FN, ITGA4, ITGA5, ITGB1 (ECM remodeling); RAC-1, COL-IV,

aSMA (fibrosis-related mechanisms) and IL-6, CXCL-1 (inflammatory response).

Results: gene expression analysis showed some differences between CT and abutment of different materials. COL-I was significant down-regulated in groups A and C compared to CT. MMP-1 and TIMP-1 increased in all the experimental groups, although at a lower extent in group A. FN, RAC-1, COL-IV, aSMA were down-regulated, especially in group A, in which IL-6 and CXC-1 showed the lower expression.

Conclusions: the results of grade 4 titanium and also zirconia abutments seem to be promising, since a lower expression of genes related with inflammation, myofibroblasts activation and ECM remodeling was observed when compared with grade 5 titanium and PEEK, without triggering a pro-fibrotic response in the early phases of gingival repair.

COMPUTER-GUIDED VS FREEHAND PLACEMENT OF IMMEDIATELY LOADED DENTAL IMPLANTS: 10-YEAR RCT

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Aim: to evaluate the 10-year clinical and radiographic outcomes of partially or fully edentulous patients that received implants placed with or without surgical template, after virtual implant planning.

Methods: patients requiring at least two implants to be restored with a single prosthesis, having at least 7 mm of bone height and 4 mm in bone width were consecutively enrolled. Patients were randomised according to a parallel group study design into two groups, basing on the use of not of a dedicate surgical template. Implants were immediately loaded. Outcome measures were: implant and prosthesis failures, any complications, marginal bone levels, number of treatment sessions, duration of treatment, post-surgical pain and swelling, consumption of pain killers, surgical and prosthetic time, time required to solve complications, and patient satisfaction.

Results: fourteen patients with 50 implants were analyzed (7 patients with 27 implants in the template-guided group and 7 patients with 23 implants in the conventional group). At the 10-year follow-up examination, no prostheses failed in both

groups. Three implants failed in the free-hand group (13.04%) vs none in the computer-guided group ($P = 0.1576$). Although there was not statistically significance, a RR of 8.16 was found for the free-hand group. Eleven patients (5 in the free-hand group and 6 in the template-guided group) experienced 12 minor complications (5 in the freehand group and 7 in the computer-guided group), that were successfully solved chairside. Difference between groups for was not statistically significant ($P = 0.6504$). Ten years after loading, the mean marginal bone loss was $1.01 \text{ mm} \pm 0.51$ (95% CI: 0.64 to 1.39 mm) in the computer-guided group and $1.54 \text{ mm} \pm 0.36$ (95% CI: 1.28 to 1.81 mm) in the freehand group. The difference was statistically significant (difference $0.53 \text{ mm} \pm 0.49$; 95% CI: 0.16 to 0.89; $P = 0.0451$).

Conclusions: both approaches achieved successful results over the 10-year follow-up period. Statistically higher post-operative pain and swelling were experienced at sites treated freehand. Less marginal bone loss (0.5 mm) was observed in the computer-guided group.

TRANSCRESTAL VS LATERAL SINUS LIFT AT SITES WITH 3-6 MM OF BONE: 6-YEAR RESULTS OF A RCT

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Aim: to comparatively evaluate the 6-year outcomes of transcrestal and lateral sinus floor elevation (tSFE and ISFE, respectively).

Methods: the *per-protocol* population of a randomized trial comparing implant placement with simultaneous tSFE vs ISFE was invited to participate in the 6-year follow-up visit. Study assessments included: peri-implant marginal bone level at the mesial (mMBL) and distal (dMBL) aspects of the implant; proportion of the entire implant surface in direct contact with the radiopaque area (totCON%); probing depth; bleeding on probing. Peri-implant tissue conditions were classified according to the 2017 case definitions from the 2017 World Workshop.

Results: twenty-one patients treated with tSFE and 22 treated with ISFE participated in the 6-year visit. Implant survival was 100%. At 6 years, median totCON% was 96% in tSFE group and 100% in ISFE group ($p = 0.036$). No significant inter-group difference in patient distribution according to diagnosis was observed. Median dMBL was 0.3 mm and 0 mm in tSFE and ISFE group, respectively ($p = 0.024$).

Conclusions: at 6 years, implants placed concomitantly with tSFE and ISFE showed similar conditions of peri-implant health/disease. On average, peri-implant bone support was high in both groups but was significantly lower in tSFE group due to a higher peri-implant marginal bone loss at the distal aspect.

RESIN-BASED CAD-CAM IMPLANT-SUPPORTED CROWNS: STRESS AND STRAIN ANALYSIS. A 3D-FEA STUDY

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Aim: this study intended to calculate the influence of block resin-based CAD-CAM implant-supported materials on posterior crown restoration stress and strain concentrations.

Methods: a 3D implant model already use in past investigations was edited to receive a cement-retained posterior crown manufactured with different CAD/CAM resin-based materials (Estelite P Block and Estelite Block II). Each solid model was transferred to the computer-aided engineering software and submitted to the finite element analysis of stress and strain. Material properties were assigned to each solid with isotropic and homogeneous behavior according to the manufacturer information. A vertical load of 600 N was applied in the occlusal region of the crown, via a simulated food bolus, and stress was

calculated in Von Misses (σ_{VM}) for the implant, abutment and screw, Maximum (σ_{MAX}) Principal Stresses for the crown and microstrain for the bone.

Results: all simulated materials showed acceptable stresses levels with a similar stress pattern among the models. At the crown intaglio region and cement layer, however, differences were observed: Estelite P Block showed a lower tensile and shear stresses magnitude when compared to the other resin-based materials with lower elastic modulus.

Conclusions: the stress effect of different resin-based CAD-CAM implant-supported crowns is predominant in the crown and cement layer, with Estelite P Block showing 7.4% versus 9.3% for Estelite Block II of crown failure risk.

CASE REPORT: POST EXTRACTIVE IMPLANTS IN THE AESTHETIC AREA

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Aim: the aim of this study is to describe the aesthetic and functional value of post extractive implants, with flapless technique, non-immediate loading and two- step immediate provisionalization in the maxillary central incisors.

Methods: a 46 years old, no smoker, healthy (ASA I) man presents a grade 3 mobility of the maxillary central incisors, 1.1 and 2.1. The decision is to remove both teeth atraumatically and to position two implants immediately after, with the use of piezosurgery and flapless technique, to reduce the prosthetics time and to improve patient's compliance. The gap between the fixtures and the bone is filled with bovine bone biomaterial. The provisionalization is obtained from the use of a dental mask to not interfere with the osteointegration process by char-

ging fixtures with load. After 4 months, two screw-retained temporary resin crowns are connected to the fixtures for the soft tissue conditioning for 3 months. Later, definitive ceramic crowns are screwed.

Results: images at the baseline and after time shows an aesthetically satisfying result. Clinical and radiographic follow up after 3 years shows no bone loss and good parodontal and implant maintenance.

Conclusions: the use of postextractive implants in aesthetic area represent an optimal alternative to the classic differite method, with excellent results and a high aesthetic value, if the bone is maintained, to reduce the prosthetic and loading process time.

CLINICAL OUTCOMES AFTER IMPLANT SURGERY WITH DYNAMIC NAVIGATION SYSTEM: CASE SERIES

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Aim: X-guide (Nobel Biocare®) is a dynamically assisted guided surgery system, which allows surgeon to guide the insertion of the fixture, having real-time references about the position and depth of drills and fixture, in the three planes of space, during surgery. Compared to traditional free-hand technique, dynamic surgery allows greater accuracy in positioning the fixture in respect of the anatomy, for prosthetic and therefore aesthetic purposes. The great advantage of dynamic surgery, in addition to offer a flapless approach, is the possibility of making real time intraoperative changes; it still requires a learning curve for the clinician but can offer advantages to not experienced operators.

Methods: 6 single implants were placed in 4 patients with intercalated edentulism; the implants were all placed through X-guide system. The patients underwent a CT scan with an oc-

clusal jig, then implant planning was obtained with DTX Studio™ software. The surgical phase was carried out with X-guide handpiece, by the same skilled surgeon; then patients followed-up clinically and radiographically, at 1 week and 3 months, when the prosthetic phase began.

Results: all cases showed complete healing without postoperative complications, only one patient reported slight oedema and mild postoperative pain. All the implants were prosthetically finalized, showing optimal occlusal and aesthetic adaptation.

Conclusions: dynamic guided surgery seems to be a real alternative to the traditional surgical guide, with possible use in difficult cases. A formed surgeon can take full advantages, minimizing postoperative complications and guaranteeing prosthetic success for the patient.

EVALUATION OF SURGICAL TECHNIQUES FOR CRESTAL SINUS LIFT

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Aim: the aim of this study is to review and evaluate the available techniques for sinus lift procedures in posterior edentulous maxillae, with a focus on the crestal approach.

Methods: the authors conducted a literature search of randomized controlled studies on sinus lift techniques and materials for implant rehabilitation with clinical follow-up. The review included 10 articles that represented the evolution of sinus lift techniques.

These include the crestal approach, the Sincrest technique and the more recent Iraise system.

Results: the literature showed that the crestal approach is less invasive, reduces postoperative edema, and preserves autologous bone and the Schneiderian membrane than the classic lateral approach, which is considered the gold standard. The Sincrest and the Iraise system have shown improvements in success rates and reduced morbidity.

Conclusions: overall, the crestal approach appears to be a valid option with a lower rate of perforation and morbidity compared to the lateral approach, although further studies are needed to confirm the efficacy of the newer techniques.

USE OF BIOMATERIALS IN POST-EXTRACTIVE IMPLANTS: A CASE REPORT

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Aim: the aim of this case report was to provide further scientific evidence on the efficacy and methods of application of post-extractive implants and biomaterials.

Methods: in this case report an implant, from Megagen implant house, with a diameter of 4.5 mm and a length of 8.5 was performed after the extraction of the fractured tooth (46). After the curettage of post-extraction socket, it was used a biomaterial called THE Graft™ produced by Purgo Biomaterials. The site was closed with a 4/0 monofilament suture. At the end of procedure, according to the protocol, the patient was given some information such as avoiding chewing in the area of implant fixture and following home oral hygiene instructions in or-

der to promote optimal tissue healing. Antibiotic therapy was prescribed for 6 days while steroid anti-inflammatory drugs were not prescribed.

Sutures were removed after 8 days, and the patient was visited every 10 days.

Results: one and a half months after surgery, it could be observed a correct position of the implant, the absence of infection and damaging micromotions, and an optimal healing of peri-implant tissues.

Conclusions: this case report analyzes the possibility of using post-extractive implants as an effective and reliable alternative to traditional implantology.

USE OF STACKABLE SURGICAL GUIDES IN FULL ARCH COMPUTER-GUIDED IMPLANT SURGERY

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Aim: this prospective cohort study aims to present titanium-reinforced stackable surgical guides for full-arch rehabilitations, that were designed with the aim of improving accuracy, simplifying and reducing errors both in guided surgical and prosthetic procedures.

Methods: in this study, 10 full-arch rehabilitations were performed. The ideal position of the implants was virtually planned into the 3D-guided surgery planning software by using a digital wax-up. The stackable templates used are composed of a fixed component, base template, and a removable component. The fixed component once secured with bone housing pins is no longer removed. The removable components include in this order, a tooth or mucosal supported template, an implant placement template, and the provisional prosthesis.

The interim prosthesis was fixed to the base template with screws and connected to the abutments with a self-polymerizing composite resin.

Results: in this study, no surgical complications occurred. 3 late prosthetic complications were recorded, consisting of 2 unscrewings of the provisional prosthesis and 1 fracture of PMMA overstructure. The implant survival and success rates were 100% in a minimum follow-up period of 6 months.

Conclusions: in the cases included in the protocol, when the provisional prosthesis was connected to the base template, no modifications of the abutments and of the titanium framework of the provisional prosthesis were required. A good level of accuracy of implant placement compared with the digital design is then demonstrated.

ADJUNCTIVE METHODS FOR THE NON-SURGICAL TREATMENT OF PERI-IMPLANTITIS: A META-ANALYSIS

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Aim: the aim of this systematic review (SR) was to evaluate the clinical efficacy of different adjunctive methods/therapies to the non-surgical treatment (NST) of peri-implantitis.

Materials and methods: the protocol of the review was registered in PROSPERO database (CRD42022339709) and was designed according to PRISMA statement. Electronic and hand searches were performed to identify RCTs comparing non-surgical treatment of peri-implantitis alone versus NST plus any adjunctive method/treatment. The primary outcome was probing pocket depth (PPD) reduction.

Results: fifteen RCTs were included. Only 2 out of 1075 implants were lost and follow-up ranged from 3 to 12 months. PPD reduction across the studies varied from 0.17 to 3.1mm,

while defect resolution from 5.3% to 57.1%. Systemic antimicrobials were associated to higher PPD reduction (1.56 mm; [95% CI 0.24 to 2.89]; $p = 0.02$) with high heterogeneity, and treatment success (OR = 3.23; [95% CI 1.17 to 8.94]; $p = 0.02$), compared to NST alone. No differences were found with adjunctive local antimicrobials and lasers for PPD and bleeding on probing (BoP) reduction.

Conclusions: non-surgical treatment with or without adjunctive methods may reduce PPD and BoP even if complete resolution of the pocket is unpredictable.

Among possible adjunctive methods, only systemic antibiotics seems to provide further benefits, but its usage should be considered with caution.

INTER AND INTRA-EXAMINER AGREEMENT OF BONE QUALITY ASSESSMENT AMONG EXPERIENCED CLINICIANS

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Aim: this study analyzed inter- and intra-examiner agreement in bone quality assessment performed on CBCT cross-sectional images by experts in oral implantology, including private practitioners (PP) and university teachers (UT) from different areas of Italy.

Methods: twenty-six experienced clinicians (13 PP; 13 UT) assessed bone quality of 45 CBCT cross-sectional images according to Lekholm & Zarb (L&Z) and Vercellotti & Vercellotti (V&V) classifications (T0). The same images, put in a different order, were re-evaluated by the same clinicians after 4 weeks (T1). Intra- and inter-examiner agreement analysis was performed using Cohen's kappa coefficient (CK) and Fleiss' kappa coefficient (FK), respectively.

Results: intra-examiner analysis showed weak agreement between T0 and T1 for both classifications [CK for L&Z: median 0.515, IQR 0.253 (total); 0.447 (PP); 0.516 (UT) - CK for V&V: median 0.530, IQR 0.213 (total); 0.556 (PP); 0.542 (UT)]. Inter-examiner analysis highlighted minimal agreement among examiners for both classifications at both time points [FK at T0 for L&Z: 0.273 (total); 0.274 (PP); 0.281 (UT) - FK at T0 for V&V: 0.319 (total); 0.342 (PP); 0.293 (UT); FK at T1 for L&Z: 0.243 (total); 0.217 (PP); 0.256 (UT) - FK at T1 for V&V: 0.370 (total); 0.364 (PP); 0.370 (UT)].

Conclusions: the need for an objective method to assess bone quality is emerging, as subjective evaluation based on the current classifications appears not reliable and repeatable.

TISSUE-LEVEL IMPLANTS WITH OR WITHOUT ABUTMENT IN FULL-ARCH: AN OBSERVATIONAL STUDY

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Aim: many studies highlight the possible bacterial contamination of the interfaces implant-abutment and abutment-prosthesis. Hence, they are indicated as potential risk factor for peri-implant complication. Recently introduced are tissue-level implants with convergent collars. This study investigates the clinical outcomes of full-arch rehabilitations using tissue-level implants with or without abutments.

Methods: 20 patients with terminal dentition were enrolled. Their treatment was a full-arch rehabilitation following the Columbus Bridge Protocol. Each patient had four implants inserted: two anterior, straight and connected to the prosthesis; two distal, tilted and connected to angulated abutments. Parameters evaluated were implant survival rate, marginal bone loss (MBL), plaque in-

dex, bleeding on probing, probing depth. Correlations between MBL and the presence or absence of the abutment were assessed.

Results: 80 implants were inserted: 40 tilted distal with abutment; 40 straight anterior connected directly to the prosthesis. After one year, the implant survival rate was 100%. The mean MBL with and without abutment was 1.20 ± 0.32 mm and 1.16 ± 0.28 mm. No statistically significant difference ($p < 0.05$) was found.

Conclusions: within the limitations of this study, immediate loading full-arch rehabilitations using tissue-level implants with convergent collars proved to be a viable treatment option, with and without abutments. Further research with longer follow-up is needed to confirm results.

HYBRID ZYGOMA TECHNIQUE AND USE OF A HETEROLOGOUS CORTICAL MEMBRANE: A CLINICAL STUDY

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Aim: a clinical study of 5 patients with extreme upper jaw atrophy was conducted to investigate whether the use of a heterologous cortical membrane could stabilize the soft tissues around the zygomatic implants and whether there could be a reconstruction of the previously instrumented maxillary wall for zygomatic implant placement.

Methods: in the cases treated, one zygomatic implant was inserted on each side. in the anterior sector instead two or three traditional implants have been inserted as force breakers. In one of the two zygomatic implants, an equine cortical membrane was inserted to achieve regeneration of the lateral wall of the maxillary bone and limit the formation of bone dehiscence and decubitus of the soft tissues. The membrane was stabilized with titanium pins. In the other side, instead a collagen matrix was placed around the implant.

Results: after six months, another CBCT was performed to check for new bone tissue.

In one of those cases, the formation of a small band of bone was noted.

Clinical checks were also performed to verify the condition of the soft tissues. These controls showed good soft tissue health on both sides.

Conclusions: these results allow us to understand that in addition to the possible materials used, other important factors take over in soft tissue stability, such as the position of the zygomatic implant relative to the maxillary wall.

The clinical results of this study however show very encouraging results, that need more investigation with a larger number of cases and with different types of heterologous materials.

ZYGOMATIC IMPLANTS WITH THE NEW FLAT DESIGN: ONE YEAR FOLLOW-UP

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Aim: the purpose of this report is to show the one-year follow-up of three different clinical cases treated respectively with the quad zygoma technique, the hybrid zygoma technique, and a case of partial edentulism. In all cases was used a new implant design.

Methods: all three cases were treated with the new implant design that provides a flat vestibular surface at the smooth portion of the implant and a pre-angled head available with two different angles: 52,5° and 45°. Patients were checked periodically for soft tissue condition, OPTs were also performed to assess bone tissue condition.

Results: follow-up at one year showed good soft tissue health, which appeared pink, toned, and dehiscence-free around

the zygomatic implants. The bone tissue also shows good health around the implants where there seems to be no resorption. The purpose of this new design is to stabilize the soft tissues and to avoid decubitus and recession of the alveolar mucosa in the genial region. The absence of the abutment also limits the risk of unscrewing due to lateral loads, which allows the prosthesis to be screwed in with a higher torque. The absence of the microgap at the prosthetic connection promotes less peri-implant bone resorption.

Conclusions: zygomatic implantology has proven a durability over time, is an evolving technique, but unfortunately, clinical data are still scarce, so more RCT are needed to provide the best evidence-based clinical indications.

COMPARATION OF CHEMICAL COMPOSITION AND SURFACE ROUGHNESS BETWEEN DENTAL BONE DRILLS

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Aim: osseointegration is essential in dental implants success, but it can be affected by the heat created by bone drills that induces the formation of a necrotic layer which can compromise the dental implant therapy. The aim of this study was to analyze the chemical composition and the surface roughness of five different manufactured implant drills, in order to expect the potential heat released during surgical implant placement.

Methods: five implant drills of approximately 2.0 mm in diameter (Straumann, NobelBiocare, Xive implant System, Global D, Sweden & Martina) were used. Their microstructural and chemical features were analyzed with SEM and compared considering the external surface at the distance of 1 mm from

the cutting edge after ultrasonic cleaning. Vickers microhardness was analyzed using a CV 2000 tester.

Results: the chemical composition of the drills was typical of martensitic stainless steel (MSS), while chromium, molybdenum, silicon and manganese represented minor ligands. The surfaces of the implant drills presented different roughness in relation to their producing process and coating.

Conclusions: different treatments were used to improve the hardness of drills external surface. Hot worked drills showed a higher hardness that could lead to a greater amount of heat. Machined drills showed lower hardness, but their accurate shapes could also guarantee a lower heat release.

FIXED REHABILITATION OF AN EDENTULOUS ATROPHIC MANDIBLE: A MINIMALLY INVASIVE APPROACH

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Aim: to evaluate long-term reability of a complex case of a totally edentulous mandible treated with an implant-prosthetic rehabilitation through a minimally approach to avoiding the complications and morbidity associated with bone augmentation techniques.

Methods: an ASA1 71-year-old man was referred presenting a Class VI (Cawood & Howell, 1988) mandibular atrophy without adequate bone volume to place any implants in the posterior areas and with 4 mm of available vertical bone in the interforaminal zone and rehabilitated with a removable full denture. A minimally invasive rehabilitation consisting of 4 ultrashort 4 mm-long implants into the interforaminal region was planned and a 5-units provisional acrylic reinforced prosthesis was delivered after 24 hours.

Results: the patient was radiographically examined just after implant placement and 8 months later and clinically every week for the first month, every 2 weeks through the fourth month, and monthly until the eighth month. The final follow-up is at 1 years after immediate implant loading. Peri-implant marginal bone levels and the clinical prosthetic result stable at 1 years after loading.

Conclusions: within the limitations of this case report, 4 mm-long ultrashort implants placed in the interforaminal area used to immediately rehabilitate a fully edentulous class VI mandible could reduce operative times, costs, complications, and postsurgical morbidity compared to bone augmentation procedures and achieve a similar final esthetic result. However, RCTs with long follow-ups are needed to evaluate whether this could be a preferable option.

INTERNAL VS EXTERNAL CONNECTION IN IMMEDIATE LOADING FULL-ARCH REHABILITATION

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Aim: evaluate the hard and soft peri-implant tissues conditioning in relation to the different morphology of the implant-abutment connection.

Methods: the multi-center study included twenty patients requiring a fixed implant full-arch immediate load rehabilitation. Four to six implants with identical macro- and micro-topography were inserted in each patient: external hexagon implants (EHC) in one side of the dental arch and internal hexagon implants (IHC) in the other side.

Primary outcome measures were the success rates of the implants and prostheses.

Secondary outcome measures were: peri-implant marginal bone loss (MBL), Plaque Index (PI), probing depth (PD) and bleeding on probing (BoP), evaluated at implant insertion and at 12, 36 and 48 months, post-loading.

Results: 43 EHC and 40 IHC implants were inserted in 20 patients. No patients dropped out. One IHC and one EHC failed in two different patients. The overall implant survival rate was of 97.7% for the EHC and of 97.5% for the IHC. The prostheses success rate was 100%; at the last follow-up (48 months), a mean MBL of 1.75 ± 0.61 mm was recorded for the EHC, while a mean MBL of 1.93 ± 0.60 mm was recorded for the IHC. The overall MBL was not significantly different between the two treatment groups (EHC vs IHC; $p > 0.05$). All the implants showed good periodontal health at the 4-year-in-function visit, with no statistically significant differences between groups.

Conclusions: according to the results, after 48 months in function, both implants provided good clinical outcomes, without statistically significant differences.

MULTI-CENTER EVALUATION OF ONE- AND TWO-STAGE TECHNIQUE USING EXTRA-SHORT IMPLANTS

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Aim: evaluate the differences in peri-implant tissues behavior using extra-short implants inserted with one-stage or two-stage technique. The secondary aim is to assess extra-short implants' survival rate 18 months.

Methods: 19 subjects were enrolled. They needed to receive two adjacent implants. Two adjacent distal implants (extrashort BTI) were inserted: one has been connected with a MUA and the other one has been submerged. After three months (T3) the second stage surgery was performed; then both of the implants were loaded with screw-retained splinted rehabilitation. Follow up and measurements were carried out up to T18. ISQ values were acquired using Ostell; peri-implant bone loss was evaluated on intraoral radiographs; peri-implant probing depth (PPD), plaque index (PI), bleeding on probing (BOP), mobility and pain were evaluated.

Results: 38 implants were inserted. The ISQ results showed a non-significant difference between one and two-stage group at T0 and also at T18. ISQ values increased in both the two groups after 18 months follow-up.

The bone loss at T18 had a mean of 0,45; the second-stage group had a mean of 0,47; the use of mixed generalized models showed a non-significant relationship with bone loss' increase. The study showed a non-significant difference for the plaque between the two techniques. There was no significant difference for the mean of probing depths. Implant survival rate after 18 months was 100%.

Conclusions: at 18 months, no statistically differences between the two groups have been shown. Extra-short implants' survival rate was 100%.

LITERATURE EVALUATION ABOUT CERAMIC IMPLANTS

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Aim: this work's aim is to analyze surface characteristics, advantages, disadvantages and clinical indications about ceramic fixture comparing with titanium ones.

Methods: zirconia implants are best choice for a metal-free rehabilitation, necessary in case of titanium allergy. The studies show a low bacterial adhesion on the surface of zirconia implants, which is a protective factor against the development of peri-implantitis. There are no significant differences in osseointegration and bone implant contact (BIC) between zirconia and titanium, except in the first few weeks, where the biomechanical capacity of zirconia is slightly inferior to titanium. The esthetic appeal of zirconia implants makes it easier to manage recessions and patients with thin phenotype. Currently, one-piece or two-piece zirconia im-

plants are available, which can be used in various clinical situations. The introduction of the two-piece fixtures has allowed clinicians to choose submerged healing and consequently deferred loading, a necessary choice when it is not possible to use one-piece ones.

Results: the placement procedure for zirconia fixture is similar to titanium implants, which allows clinicians to integrate these new implants into treatment plans without learning new procedures.

Conclusions: zirconia implants are a valid alternative to the use of titanium. The literature now demonstrates how the survival and success rate of this fixture can allow them to be considered safe and to provide excellent results both aesthetically and functionally.

SINGLE IMPLANT PLACEMENT WITH COMPUTER-AIDED SURGERY: THE ADVANTAGES OF A MODERN PROTOCOL

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Aim: computer-aided implant surgery has become an important therapeutic tool in modern dentistry. The aim of the present case report is to emphasize the advantages of using a modern computer-aided implant surgery protocol for the rehabilitation of edentulous patients.

Methods: a 40 years old man with 1.4 edentulous was selected for an implant surgery. After the CBCT evaluation, a dedicated software was used to elaborate the surgical template and to plan the ideal implant position in depth, inclination and mesio-distal distance between natural teeth. The digital system also allowed the clinician to plan an individual permanent Zirconia/Alumina abutment which immediately fits the soft tissues using the CAD/CAM technology. The surgery was performed choosing a flapless approach after a keratinized tissues

and alveolar bone clinical evaluation. An immediate loading protocol was chosen for the case.

Results: the surgery was performed rapidly and free of obstacle. A good primary stability of the implant was achieved. The Zirconia/Alumina abutment well fitted to the soft tissues, and it guaranteed a good healing. The patient referred an acceptable postoperative pain and swelling.

Conclusions: the computer-guided “flapless” surgery for implant placement represents a very safe and predictable rehabilitation compared with conventional surgery. The present protocol ensures less invasiveness, accuracy of implant placement, less surgical discomfort and reduced time required for definitive rehabilitation, although an adequate learning curve is needed.

“TRABECULAR-METAL” ZIMMER IMPLANTS: A LITERATURE ANALYSIS

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Aim: this work aims to describe the main qualities and novelties introduced by “trabecular-metal” implants. The focus is on the mid-portion of the fixture, which is designed for external and internal bone growth.

Methods: trabecular-metal implants have some of the most typical characteristics of tapered screw-vent implant design, making them compatible with classic Zimmer instrument kits. The type of internal connection and coronal microgrooves are designed to preserve crestal bone. In a preliminary study on canine mandibular models published in 2017, internal bone growth was observed two weeks after implant placement.

Results: since studies on humans with these types of implants only began in 2010, long-term follow-up data are not yet avail-

able in the literature. However, the results suggest that trabecular-section healing may be able to achieve greater secondary stability in shorter times compared to conventional implant surfaces currently available on the market.

Conclusions: trabecular-metal implants offer several advantages in terms of bone incorporation and growth, which can lead to improved implant stability. However, additional clinical studies are necessary to confirm these benefits, particularly in patients with low bone density. Furthermore, the long-term success and survival rates and possible complications still require further analysis. Overall, trabecular-metal implants represent a promising innovation in dental implantology that requires further investigation and evaluation.

POST-EXTRACTIVE CORTICAL IMPLANTS: A CASE REPORT

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Aim: the purpose of this case report is to describe the surgical management of a post-extractive implant-prosthetic rehabilitation using post-extractive cortical implants.

Methods: a 47 years old patient presented at our clinic with a poor prognosis for a second upper molar. The dental element was extracted atraumatically. Subsequently, a post-extraction implant (SDI) was inserted, and the defect was filled with bio-material. The implant was left in place and loaded after 3 months.

Results: post-extraction implants have allowed both treatment times and the number of interventions a patient must undergo to be reduced. The Cortical implants produced by Noris Medical consist of a conical internal helix that allows for

self-perforation, self-tapping, and self-bone condensation. All of these properties allow the clinician to have greater control during insertion, thus achieving high primary stability.

These advantages allowed to reach a good primary stability and to avoid complications during the check-up performed one month after implant loading.

Conclusions: post-extraction implant therapy presents several advantages, such as a reduction in treatment times and the number of interventions. Additionally, this technique allows for greater conservatism towards hard and soft tissues. Both primary stability and bone density are of fundamental importance for implant survival, as they allow for immobilization of the implant, guaranteeing healing.

TWO PIECE ZIRCONIA IMPLANT NEW DESIGN WITH IMMEDIATE LOAD: A CASE REPORT

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Aim: this report's aim is to explain the clinical management of a rehabilitation with a particular two piece zirconia implant, built with a 3.3 mm deep 3C connection to cement a glass fiber customizable abutment.

Methods: male patient comes for an implant-prosthetic metal-free rehabilitation of the element 4.5. OPT, CBCT and oral 3D scan were done before the surgery. It was decided to place a 4.1x9 mm two piece zirconia implant (PATENT, ZIRCON MEDICAL MANAGEMENT AG, Altendorf, Switzerland). Surgery started with a crestal incision in the area and the detachment of a full-thickness flap. Specific drills used to prepare the implant sites and place the fixture with torque higher than 35 Ncm. An endobuccal x-ray and an oral 3D scan were done immediately after surgery. The abutment prepared by the odt laboratory ce-

mented a week later permanently to the implant, while a temporary crown was cemented temporarily out of occlusion. After 7 weeks a new oral 3D scan was done and a week later the permanent crown is cemented.

Results: thanks to its design, the shape of margin of the implant helps oral hygiene, and it ensures long-term oral health. The endosseous part of the implant, threaded with rough surface, permits great primary stability and good osteointegration.

A 2.5 mm tall transgingival collar allows healing of the soft tissues.

Conclusions: zirconia implant permits excellent results in stability, aesthetic and health of peri-implant tissues. The customizable abutment replicates traditional restorative procedures without the need for extensive components, simplifying the clinics day-to-day use.

BIOMARKERS FROM PICF AS PREDICTORS OF PERI-IMPLANT BONE LOSS: A SYSTEMATIC REVIEW

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Aim: the aim of the present systematic review is to summarize current knowledge regarding the analysis of biomarkers extracted from peri-implant crevicular fluid (PICF) as predictors of peri-implant bone loss (BL).

Methods: an electronic search was conducted on three databases, PubMed/Medline, Cochrane Library, and Google Scholar, to find clinical trials published until 1 December 2022 suitable to answer the following focused question: in patients with dental implants, are biomarkers harvested from PICF predictive of peri-implant BL? The initial search yielded a total of 158 entries. After a full-text review and application of the eligibility criteria, the final selection consisted of nine articles. The risk of bias

in included studies was assessed using the Joanna Briggs Institute Critical Appraisal tools (JBI).

Results: according to the present systematic review, some inflammatory biomarkers harvested from PICF (collagenase-2, collagenase-3, ALP, EA, gelatinase b, NTx, procalcitonin, IL-1 β , and several miRNAs) seem to be correlated with peri-implant BL and may assist in the early diagnosis of pathological BL, that characterizes peri-implantitis. MiRNA expression demonstrated a predictive potential of peri-implant BL that could be useful for host-targeted preventive and therapeutic purposes.

Conclusions: PICF sampling may represent a promising, noninvasive, and repeatable form of liquid biopsy in implant dentistry.

PERI-IMPLANT BONE LOSS IN FULL-ARCH REHABILITATION: A RETROSPECTIVE RADIOGRAPHIC ANALYSIS

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Aim: the aim of the study was to assess the existence of peri-implant bone loss of distal implants in implant-supported full-arch mandibular restorations through radiographic investigations (OPTs). A comparison between full-arch implant-supported rehabilitations performed in the intra-foraminal region and full-arch rehabilitations that include implant insertion distal to the mental foramen was done.

Methods: a retrospective observational analysis of 17950 OPTs from 2010 to 2020 was conducted. The presence of fixed implant-supported prostheses in a fully edentulous mandible was the inclusion criteria of the study. OPTs were divided into three groups according to the number (4, 6, 8 implants) and position of the implants (mesial or distal to the mental foramen).

Results: a total of 51 OPTs were included in the study, of which 19 showed peri-implant bone loss. In particular, 16 belonged to the 6-implant rehabilitation group and 3 to the 8-implant rehabilitation group; none of the 4-implant supported rehabilitations were affected by peri-implant bone loss. In all rehabilitations affected by peri-implant bone loss, the distal implant was the most involved, especially the implants in positions 36 and 46.

Conclusions: implants distal to the mental foramina are more susceptible than mesial implants to bone resorption in full-arch fixed implant-supported prostheses. This significant difference should be more investigated for the presence and synergy of biomechanical factors that could act predominantly in this area, such as mandibular flexure and occlusal loading.

CONVENTIONAL AND DIGITAL WORKFLOWS FOR FULL-ARCH IMMEDIATE LOADING REHABILITATIONS: A RANDOMIZED CLINICAL TRIAL

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Aim: digital impression provides several advantages in the clinical workflow in implant prosthodontics, however its use in full-arch rehabilitations, especially immediately after surgery, has still to be validated. The aim of this study is to compare the fit of immediate full-arch prostheses realized using conventional impressions or digital impression.

Methods: patients requiring a full-arch immediate loading rehabilitation were recruited and randomly divided in 3 groups: T1 (digital impression taken immediately after surgery), T2 (guided surgery and delivery of a prefabricated temporary bridge), C (conventional impression taken immediately after surgery). Immediate temporary prostheses were delivered within 24 hours. Rx were obtained at the time of prosthesis delivery and at the 2-year follow-up. The primary outcomes were cumulative survival rate and prosthesis fit, radiologically evaluated as the distance between the bar and the abutment. Secondary

outcomes were marginal bone level (MBL) and patients' satisfaction evaluated with a questionnaire. Kaplan-Meier was used to evaluate implant survival. T-test and Mann-Whitney U test were used to compare medians of the 3 groups for patient satisfaction.

Results: 150 patients were treated from 2018 to 2020, 50 in each group. Seven implants failed during the observation period. The CSR was 99% for T1, 98% for T2 and 99.5% for C. A statistically significant difference in prosthesis fit was found among T1 and T2 vs. C, with worst outcomes in C. A statistically significant difference was found in MBL between T1 and C.

Conclusions: the outcomes of the present randomized clinical trial suggest that digital impression is a viable alternative to traditional protocols for the realization of full-arch immediate loading prostheses.

SERS ANALYSIS OF SULCULAR FLUID IN THE SCREENING OF PERI-IMPLANT PATHOLOGIES

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Aim: this study aims to define a possible screening method for peri-implant pathologies through Surface-Enhanced Raman Scattering (SERS), based on the evaluation of specific molecules in the peri-implant sulcular fluid (PISF).

Methods: PISF was collected with sterile Periopaper® strips inserted in the peri-implant sulcus for 30 seconds. Strips were processed by the addition of colloidal solution of silver nanoparticles, centrifuged at 800 rpm for 10 minutes and then analyzed by SERS.

Results: 331 samples were collected and 54 were discarded due to plaque or blood contamination. 277 samples (111 patients; 45M/66F) were included in the final analysis (90 healthy, 95 mucositis and 92 peri-implantitis). Spectral analysis through the Principal Component Analysis (PCA) did not allow sam-

ples classification in the three classes, due to a large intra-class variability. Therefore, it was decided to combine, through a low-level data fusion, spectral variables with clinical data (PPD, IP and BOP), dividing the dataset using the Kennard-Stone algorithm. Excellent results were seen in classifying "healthy" samples, whilst the predictive value for "mucositis" and "peri-implantitis" was only discrete; furthermore, little specificity regarding the class "peri-implantitis" was shown.

Conclusions: SERS analysis of PISF seems not directly usable in the screening of peri-implant pathologies. Spectral variables associated with clinical data may be used to build a multiclass model with reliable results in revealing healthy condition, with a pretty high number of false positives for peri-implantitis.

ROUGH IMPLANTS: PHASE-CONTRAST MICROSCOPY AND HOME HYGIENE PROTOCOL IN PERI-IMPLANTITIS

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Aim: literature shows that the exposition to the oral cavity of rough surface implants leads to the propensity of peri-implantitis than roughness or minimally rough implants. The aim of this study was to examine two different kinds of rough implant surface and to estimate their tendency to peri-implantitis disease, with a follow-up of more than 10 years and a continuous microbiological control.

Methods: 500 implants with Ti-Unite surface and 1000 implants with Ossean surface, both inlaid in native bone or regenerated bone, were collected. All patients accepted the following maintenance protocol: sonic brush with vertical movement (Broxo), interdental brushes, and oral irrigators (Broxo) at least two times every day. We recorded incidence of peri-implantitis and other causes of implant failure. For all patients,

we evaluated subgingival plaque samples by phase-contrast microscopy every 4 months for a period of more than 10-years.

Results: implants with Ti-Unite surface underwent peri-implantitis in eight implants (1.6% of the total amount of implants) and implants with Ossean surfaces underwent peri-implantitis in 15 implants (1.5% of the total amount of implants). The total percentage of implant lost was 4% for Ti-Unite surfaces and 3.6% for Ossean surfaces.

Conclusions: implants under strict control of plaque leads to low percentage of peri-implantitis even for rough surfaces dental implants. The use of phase-contrast microscopy could help in early detection of microbiological pathologic conditions with an increase of Gram-negative micro-organisms.

COMPARATIVE EVALUATION OF TWO CEMENTS ON SINGLE IMPLANT RESTORATION: A SPLIT MOUTH STUDY

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Aim: cement-retained implant restorations still represent a widely used prosthetic solution due to their simple execution, the possibility to correct implant axis according to dental axis, and an extremely satisfactory aesthetics. The use of original and custom abutments with varying inclinations and heights further expands the possibilities of using this solution.

Methods: the objective of this study is to determine whether resin-based cements are more aggressive towards peri-implant tissue than zinc-oxide cements. In the present split-mouth designed study, 18 patients (8 males and 10 females) were included and examined. The follow-up period after delivery of the cement-retained single crown is a maximum of 48 months, during which 36 implants were monitored. Clinical

and radiographic tests were conducted with constant re-evaluation in case of prosthetic or biological problems that brought the patient back for a visit.

Results: the results for both cements were in line with the manufacturers' indications. No implant failed during the observational period, resulting in a 100% survival rate for all 36 implants.

Conclusions: the number of de-cementations for cement-retained crowns cemented with zinc-oxide non-eugenol cement was higher, but not statistically significant. In contrast, biological complications and marginal bone loss (MBL) were significantly higher in cement-retained crowns cemented with resinous cement.

SOCKET SHIELD TECHNIQUE IN POST-EXTRACTIVE IMPLANTS IN AESTHETIC REGION: A REVIEW

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Aim: the review's aim was to examine the current results of the socket shield technique (SST), focusing on its applications in the aesthetic area. The aim has been developed referring to the PICO question: P, Adult patients of any gender and ethnicity; I, Patients undergoing socket shield technique in post-extractive implants in the aesthetic region; C, post-extractive implants in the aesthetic region with or without any other regenerative technique; O, Gingival architecture, bone height and width, implant success or loss.

Methods: the Medline used for PubMed research was "Socket Shield technique" and "SST". The inclusion criteria for the articles' selection were: adult patients, post-extractive implants in aesthetic region, no restrictions regarding type of stu-

dy, year of publication 2017-2023. Exclusion criteria were: no post-extractive implants, treatment of posterior region only. The team evaluated 123 abstracts of which 16 corresponded to eligibility criteria. Therefore, they were fully read and then included.

Results: SST can offer numerous advantages for post-extractive implant placement. Unfortunately, the procedure is rather complex and requires greater surgical competence.

Conclusions: SST may represent a valid option for post-extractive implants in the aesthetic area, ensuring excellent results of implant survival rate and aesthetics. However, further long-term studies are required to evaluate the effectiveness and durability of the technique and to define its pro and cons.

TRANSCRESTAL MAXILLARY SINUS FLOOR ELEVATION WITH INJECTABLE XENOGENIC BONE IN GEL FORM

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Aim: the purpose of this retrospective study was to measure bone tissue augmentation by transcrestal sinus floor elevation with injectable xenogenic bone substitute in gel form with simultaneous implant placement. This procedure allows atraumatic elevation of the sinus floor and reduces the risk of Schneider's membrane perforation, one of the most common complications of the transcrestal approach procedure described by Summers.

Methods: patients need of unilateral sinus floor elevation, with a residual crestal height of 2 mm to 5 mm and requiring at least one implant-prosthetic rehabilitation in the posterior maxillary area were enrolled. Sinus elevation was measured postoperatively and 6 months later with a CBCT. Mean values were calculated for each measurement.

Results: a total of 52 patients participated in the study; 46 implants were placed simultaneously while 6 were placed after 4 months due to lack of primary stability.

All placed implants, with follow-up varying from 3 to 5 years after loading, successfully osseointegrated with a 100% survival rate.

The mean preoperative bone height was 4.2 mm, whereas after intervention, the mean value achieved was 10.1 mm with a mean value of new bone gain of 6.43 mm.

Conclusions: transcrestal sinus floor elevation with injectable xenogenic bone substitute in gel form showed complete osseointegration of all implants and significant gain in height of new bone through a minimally invasive procedure.

CLUSTERING OF RADIOMIC FEATURES FOR THE QUANTITATIVE CLASSIFICATION OF EDENTULOUS RIDGES

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Aim: the aims of the present study were: i) to extract radiomic features from cone beam computed tomography three-dimensional images of edentulous bone crests; ii) to group analyzed images with clustering methods in order to obtain a quantitative bone grading and compare it with Lekholm and Zarb classification.

Methods: CBCTs of 110 patients were analyzed. Three-dimensional regions of interest (ROI) were selected on 3D images at partially edentulous sites. ROIs were analyzed using LيفةX software to extract radiomic features of the alveolar bone. Three different clustering methods were then applied to the extracted features: K-means, Hierarchical and Fuzzy C-means. Finally, the same areas were grouped by ten experienced clinicians according to Lekholm and Zarb classification.

Results: basing on radiomic features similarities, the clustering analysis revealed the presence of three distinct groups within the dataset. The three different clustering methods applied in the present analysis aggregated the three groups in the same manner. Hence, the relationship between radiomics clusters and Lekholm and Zarb bone classification was investigated. “Cluster 0” was mainly represented in upper jaw (87.5%), corresponding to bone types 3 and 4 according to LZ (75%); “Cluster 1” and “Cluster 2” had homogeneous distribution in the mandible and maxilla, corresponding to bone types 2 and 3 of LZ classification (70%).

Conclusions: based on the present findings, coupling radiomics with clustering methods seems to be a very promising approach for a quantitative classification of edentulous bone crests.

IMPLANT-PROSTHETIC REHABILITATION IN PATIENT WITH ECTODERMAL DYSPLASIA

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Aim: the Ectodermal Dysplasia (ED) is a group of an autosomal dominant or recessive nature which determines malformations of the structures deriving from the ectodermal layer. The most common type is hypohidrotic (1:100,000) while the anhidrotic form affects only a few hundred people worldwide.

In this paper we present a patient with rare case of severe maxillary atrophy with edentulism in both deciduous and permanent dentition, approached, during adolescence, with autologous bone graft unfortunately failed and currently retreated with a zygomatic implant rehabilitation.

Methods: a 32 years-old male came to our observation with a condition of anodontia, bone atrophy and hyposcaldia. Further pathological signs are alopecia, anhidrosis and nasal dryness.

The patient was treated under general anesthesia due to invasiveness of the surgery and computer-guided surgery procedure was followed, using a stereolithographic model and surgical template.

Results: the surgery was performed in February 2023. Currently no complications have been reported despite the poor bone quality and the increased intraoperative bleeding tendency.

Conclusions: various therapeutic alternatives are available for patients with ED. The current choice was based on the failure of the previous rehabilitation with autologous graft and the possibility of a new therapeutic approach with zygomatic implants.

FROM MULTIPLE TOOTH EXTRACTION TO PROSTHETIC-IMPLANT REHABILITATION: A CASE REPORT

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Aim: a multidisciplinary approach, from oral surgery procedures to an implant-supported prosthetic rehabilitation, is presented here.

Methods: a 61 years-old male patient was referred to the Oral Surgery Unit of the Umberto I Hospital of Rome. From the clinical and radiographic examination, impaction of 2.3 and 3.8, a 2.6 fixture beyond the sinus floor and an improper prosthetic restoration on 2.1, 2.4 and 2.5 were detected. The fixed bridge was removed with the extraction of teeth 2.1, 2.4 and 2.5 and, through a full thickness flap and ostectomy, the surgical extraction of both the impacted 2.3 and the fixture in the site 2.6 was carried out. Surgery was completed with the application of hemostatic material and sutures. The patient came back after 7 and 14 days to check the wound healing and remove the

sutures. After 16 months, 3 fixtures were inserted in the place of the teeth 2.1, 2.4, 2.5. Second stage surgery was performed 4 months later, and a resin provisional prosthetic restoration was applied after the composite esthetic direct rehabilitation of the mesial side of the teeth 1.1, to give the symmetrical dimension to the central incisors and close the initial diastema. The definitive restoration was applied 2 years later due to the COVID-19 pandemic.

Results: clinical and radiographic post-operative examinations reveal a satisfying aesthetic result and a good integration of the fixtures.

Conclusions: the success of any multidisciplinary rehabilitation depends on the correct planning, timing and execution of the single operative phases.

SPLINTING DEVICE FOR DIGITAL IMPRESSIONS IN FULL-ARCH IMPLANT REHABILITATIONS

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Aim: the aim of the present *in vitro* study was to evaluate the influence of a novel auxiliary geometric device (AGD) on the accuracy of digital full-arch impressions made with 3 different IOSs.

Methods: an edentulous maxillary model with 4 internal connection implant replicas was used. Three different intraoral scanners (IOS) were used: iTero Element 5D (iT) (Align Technology, Tempe, AZ, USA), Trios 4 (Tr) (3Shape A/S Holmens Kanal 7 1060 Copenhagen Denmark) and Carestream 3700 (Cs) (Carestream Dental, Atlanta, USA). Twenty scans were made with each IOS, 10 with an AGD with a dedicated design in place and 10 without the AGD. A digital master model (MM) was created using an industrial structured light optical scanner (ATOS compact Scan 5M, GOM GmbH, Braunschweig, Germany), A

surface comparison was performed, and deviation labels exported for each scan body in order to evaluate the 3D deviation. Statistical analysis was performed using linear regression methods.

Results: when evaluating tridimensional deviation without AGD, the use of different IOSs resulted to have an impact over measurements. The use of AGD using Cs scanner did not impact measurement. On the other hand, the use of AGD induced significant differences for Tr scanner on the y and z axes, and for It scanner on the z axis.

Conclusions: the use of AGD showed not to be effective *in vitro*, not influencing scanners performance. Further clinical *in vivo* investigations are needed when digital impression is more challenging (saliva, tissues, etc.).

CAD/CAM ABUTMENTS IN THE ESTHETIC ZONE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Aim: computer aided design and computer aided manufacturing customized abutments are increasingly being used in every day clinical practice, especially in the aesthetic zone. The main aim of this systematic review and meta-analysis was to compare the soft tissue outcomes of prefabricated (stock) versus customized (CAD/CAM) abutments.

Methods: the present review was registered with PROSPERO and the protocol was developed according to PRISMA statement. Electronic search was performed on four databases (PubMed, Web of Science, Cochrane Central and Embase). Hand searching was performed on related journals up to February 2021.

Results: three Randomized Controlled clinical trials (RCTs) and three Controlled clinical trials (CCTs) (number of patients =

230; number of dental implants = 230) with a follow-up comprised between 12 and 36 months were included. RCTs were judged at unclear risk of bias whereas CCTs were judged at high risk of bias. The meta-analysis was performed on 12-month data. No statistically significant differences were observed among abutment groups: Overall Pink Esthetic Score (PES) (SMD -0.43; 95% CI -1.21, 0.35; P-value = 0.28); Interproximal Papilla (SMD 0.12; 95% CI -0.10, 0.34; P = 0,28) facial peri-implant mucosal recession (ML) (SMD -0.14; 95% CI -0.36, 0.08; P = 0.21).

Conclusions: no significant differences were observed between prefabricated (stock) versus customized (CAD/ CAM) abutments regarding midfacial mucosal recession, interproximal papillae and pink aesthetic score (PES) after 12 months.

FIXED-ON-2 CROSS-ARCH IMMEDIATELY LOADED PROSTHESES IN FRAIL PATIENTS: A COHORT STUDY

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Aim: evaluate the clinical outcome of two implants supporting a cross-arch prostheses in frail patients.

Methods: eighty patients with fully edentulous mandibles were enrolled in a private dental clinic (Pavia) to receive fixed mandibular prostheses supported by only 2 implants. Seventeen patients showed signs of frail and comorbidity as: oral bisphosphonates, heart attack, cardiac bypass, hypertension, Hepatitis C, Diabetes Type-II, prostate carcinoma, uterus carcinoma, breast carcinoma, chronic bronchitis, and Parkinson's disease. Forty-six received laser-welded titanium frameworks and 34 received cast silver-palladium frameworks. Outcome measures at 1(T1) - 3(T2) - 5 (T3) years evaluated surgical and prosthetic complications, marginal bone loss (MBL), ISQ values and implant failure.

Results: in T1 were showed 5 surgical and prosthetic complications, 4 in T2 and 22 in T3. All complications were successfully treated. At T1 only one implant failure occurred in 2 different patients. At T1 were recorded 2 prostheses failures, 1 in T2 and 7 in T3. At baseline, the mean marginal bone level was 0.04 mm, the mean MBL was -0.30 mm at T1, -0.39 mm at T2 and -0.69 mm at T3. At baseline the mean ISQ value was 75.4, 72.5 at T1, 75.3 at T2 and 73.8 at T3.

Conclusions: after a 5-years follow-up the results obtained confirmed the immediately loaded cross-arch prostheses supported by only two implants as a predictable treatment. However, a higher cluster of patients and a longer follow-up will be needed to confirm this therapeutic approach in frail and healthy patients.

INNOVATIVE INHIBITION TREATMENT IN MAXILLARY DENTAL IMPLANT PLACEMENT: A CASE REPORT

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The alveolar ridge undergoes changes in both horizontal and vertical ridge dimensions following extraction, Alveolar Ridge Preservation (ARP) techniques are used to counteract bone resorption after tooth extraction, including periosteal inhibition and modified periosteal inhibition techniques.

Aim: the aim of the present study was to describe the first rehabilitation of a post-extraction dental implant in the maxilla using the innovative Alveolar Ridge Preservation (ARP) procedure via a modified periosteal inhibition (MPI) technique. The goal of the technique is to protect the vestibular cortical bone from pre-osteoclastic aggression, which can cause bone resorption.

Methods: after the extraction, the clot was left in place and after achieving stability, a single customized screw-type abutment

T3, 3i implant with a diameter 4.1 mm was inserted and screwed in place. The implant was oriented in palatal position and temporary cemented, following a delayed loading. The technique involves the use of a 0.5 mm cortical lamina to mechanically protect the vestibular cortical bone from pre-osteoclastic aggression, thus preventing vestibular cortical bone resorption and increasing its thickness without the need for biomaterial insertion.

Results: the technique was positively evaluated through a CBCT scan performed 12 months after implant placement, showing an increase of 0.5 mm.

Conclusions: although only one case was used, the one-year follow-up results are promising, and further studies will be necessary to confirm the technique's effectiveness.

GUIDED IMPLANT SURGERY WITH STACKABLE GUIDES: A CASE REPORT

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Aim: the development of digitally guided surgery has allowed for better optimization of resources and greater patient comfort. The stackable guides are its direct evolution and contain all the information needed to achieve the ultimate goal, a planned prosthetic placement. The report's purpose is to describe the clinical steps of this procedure.

Methods: the patient comes to our attention with an upper prosthesis anchored to 11, 21, and 22 and implants in positions 24 and 25. The treatment plan involves the fabrication of an implant-supported full-arch upper denture. Digital diagnostic wax-up combined with CBCT defines the ideal position of implant fixtures. A base guide with dental-mucosal support is created. After the guide's placement, the upper portion is removed, and the part remaining in place is the reference point for all the

next prosthetic-surgical steps. A periosteal-mucosal flap is performed after the extraction of teeth 11, 21 and 22 and implants at the second quadrant. An implant guide is attached to the base guide for implant placement at positions 15, 12, 22, and 25; the prosthetic components are placed with the provisional prosthesis attached to the base guide. Finally, alveolar Ridge Preservation and first intention suturing were performed.

Results: the screw-retained prosthesis reproduces the initial design, and radiographic inspection shows the procedures succeeded.

Conclusions: the use of digital tools for the study of surgical and prosthetic solutions provides a real advantage in terms of accuracy, less invasiveness and reduced operative time.

ASSESSMENT OF BONE REMODELING OF THE ALVEOLAR RIDGE: A LITERATURE REVIEW

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Aim: the aim of this review is to evaluate dental literature to assess the average dimension changes of hard tissues in the alveolar ridge, both vertically and horizontally, after tooth extraction.

Methods: a search was conducted on major databases such as PubMed, Cochrane Library, and Medline. The bibliographies of review articles were checked. The search was performed to identify randomized controlled clinical trials and prospective cohort studies that only evaluate human bone healing.

Results: in human hard tissue, horizontal dimensional reduction was higher than vertical reduction at 3 months, measured

from the buccal wall, and after 6 months of healing. The percentage of vertical dimensional variation is considered to be 11-22% at 3 months and between 29 and 63% at 6-7 months.

Conclusions: studies show a rapid reduction in the first 3-6 months, followed by a gradual reduction in dimensions. The horizontal reduction in the coronal area of the alveolar ridge is much more prominent than in the apical part, which maintains the same size, and horizontal variations are also more accentuated than vertical ones, which are still more concentrated on the buccal wall. Although the lingual wall undergoes inevitable changes, this area of the crest seems to be much better preserved than the buccal area.

ONE PIECE ZIRCONIA FIXTURES MANAGEMENT: APPLICATIONS OF TISSUE LINE VS ALVEO LINE

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Aim: the aim this report is to evaluate zirconia one piece implants, comparing tissue line and alveo line fixtures, to analyze strengths and weaknesses, to understand the indications involving the use of two types.

Methods: one piece zirconia implant is defined as monocomponent because of a single structure consisting of an abutment and implant body. Both implants have an important thread, a quadrangular anti-rotational head, a 4.5 mm high abutment with 2 faces for fixing the temporary prosthesis. To better understand we evaluate two clinical cases with both fixtures, from the implant placement, to the site healing, finally to observe how the choice of the different fixtures can guide the result.

Results: fixture's choice is essential to obtain the expected results. One piece zirconia implants guarantee good osseoin-

tegration, similar to titanium ones. Tissue Line implant is used when a small diameter is required and it allows for good healing, even in cases of thin gingival phenotype, where the use of titanium could lead to transparency issues and cause bad esthetic results. Alveo line implant has an important shoulder with which you can fill the cavity, that's why it's used in case of a post-extraction site.

Conclusions: one piece zirconia implants are an excellent rehabilitation option, as they can give excellent results over time both in terms of stability and health of the peri-implant tissues. The introduction of alveo line implants fills all those limits imposed by the tissue line ones and extending the use of one piece zirconia fixture to a greater number of clinical situations.

BONE TO IMPLANT CONTACT ANALYSIS IN ZYGOMATIC IMPLANTOLOGY

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Aim: the aim of this study is to evaluate the BIC (Bone to Implant Contact) of zygoma implants in several maxillary atrophy treated with unilateral zygoma, Hybrid approach and Quad technique.

Methods: we have been studied 50 subjects treated from 2016, 95 zygomatic implants have been performed, 32 patients have been categorized as Hybrid rehabilitations, 15 as unilateral zygoma rehabilitations and 3 as Quad zygoma rehabilitations.

Thanks to the use of 3D rendering software (Real Guide Software, 3DIEMME srl, Como, Italy), we analyzed the post-operative CBCT scan, and the clinicians had the possibility to measure the BIC of the zygomatic implants.

Data have been organized in a Microsoft Excel (Microsoft, Redmond, Washington DC) table for statistical analysis.

Results: the clinicians have evaluated the BIC on the internal and external cortical bone thanks to the use of 3D software reconstruction of dicom file.

Different evaluations on post-operative CT have been taken for each zygoma fixture. Two CT planes have been chosen for this preliminary study: sagittal and coronal plane.

The average BIC of the external cortical (16,3629 coronal plane, 16,1760 sagittal plane) was higher than the internal cortical (9,7582 coronal plane, 10,1344 sagittal plane) for most of the data measured.

Conclusions: preliminary evaluation of the Data showed a wide difference between the BIC of the internal and external cortical for unilateral zygoma, Hybrid and the Quad technique. Indeed, the Quad uses longer implants and with a greater average angle of insertion and this could lead to an increase of BIC.

ZIRCONIA IMPLANT, AVAILABLE ALTERNATIVE IN CASE OF HYPERSENSITIVITY TO TITANIUM

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Aim: the purpose of the following report is to describe a clinical case related to a patient who experienced an allergic and hypersensitivity reaction to titanium and what are the possible therapeutic alternatives.

Methods: the patient presented to our observation for significant pain at the third quadrant where two titanium implants had been placed just 10 days earlier. Following anamnestic investigations and objective examination where an endoral radiograph was taken in which peri-implant bone resorption was seen, a possible allergic reaction to titanium was considered, in fact, the Melisa test was positive. The implants were then removed, and following an adequate healing period, two single-component zirconia implants were placed in area 3.5 and 3.6. The inserted implants were immediately protected

with a resin splint that remained outside the occlusion. Provisional resin crowns were then placed at a distance of 4 months, a final zirconia crowns were placed after another 4 months.

Results: after the placement of zirconia implants, the patient did not refer to any symptoms or problems, and after 8 months from surgery, the clinical-radiographic exams showed the success of the metal-free implant prosthetic rehabilitation.

Conclusions: titanium Hypersensitivity is uncommon in the population, but recent data suggest an increased incidence of hypersensitivity to titanium for patients with dental implant and orthopedic arthroplasties. This can be an important motivation for further research into zirconia implants, which has shown excellent results even in the long term.

OSSEOINTEGRATION AND IMPLANT SURFACES

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Aim: this study aims to review the available literature on the topography and osteointegrative capacity of different dental implant surfaces, with a particular focus on zirconia and laser-treated surfaces.

Methods: the study searched for some relevant terms in literature databases. The study reviewed the outcomes of follow-up studies on dental implants made of different materials and with different surface treatments.

Results: dental implants made of both titanium and zirconia showed good osteointegration with good bone-to-implant contact, particularly in titanium implants with SLA surfaces. Short-term survival rates and marginal bone loss in zirconia implants stabilized with yttrium oxide support single crowns and fixed dental prostheses after 1 year are increasing and

comparable to those of biphasic titanium implants, as reported by a systematic review. While there is limited clinical evidence on laser-treated surfaces, laboratory studies suggest that they produce a surface roughness superior to that achieved through subtraction, without thermal and structural alterations.

Conclusions: zirconia implants with SLA surfaces are the gold standard in implant rehabilitation, while a different approach should be adopted in the treatment of zirconia implants. These show excellent biocompatibility, aesthetics, and low bacterial colonization. Laser-treated surfaces have limited clinical evidence, but the surface treatment is very controlled and precise, creating a specific topography that is well-suited for implant rehabilitation.

THE ROLE OF IMPLANT POSITION IN THE PREDICTABILITY OF SOFT TISSUE DEVELOPMENT

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Aim: the aim of the study is to find a significant correlation between peri-implant soft tissue remodeling, through compliance with the Nozawa ratio in the post-surgical healing phases, and different areas of implant positioning.

Methods: for this study, the oral cavity was divided into sextants. A sample of 341 implants from six different manufacturers was examined. For the analysis of soft tissue remodeling, arch models were scanned and matched to their analogue with 3D-imaging software GeoMagic at three sequential points in time (post-surgery, provisional and definitive crown delivery), and measurements of soft tissue thickness and height in the buccal portion were obtained with GOM software. The Nozawa ratio was calculated as the ratio between thickness and height of the

soft tissues on the buccal side. The data obtained were tabulated and the statistical investigation was conducted.

Results: the results obtained generally showed a greater tendency to comply with Nozawa ratio (tissue thickness/height ratio = 1.5) in posterior sectors, i.e. in sextants 1, 3, 4, 6. In the aesthetic sectors, on the opposite, the ratio was unfavorable, with a mean value of 1.0. This correlation resulted statistically significant ($p = 0.039$) in the Kruskal-Wallis test.

Conclusions: it has been shown that there is a significant correlation between the tendency to comply with the Nozawa ratio and the different areas of implant insertion in the oral cavity. In fact, while the posterior areas ensure greater compliance, there are still criticalities in aesthetic sextants.

CORRELATION BETWEEN VERTICAL/HORIZONTAL TISSUE DEVELOPMENT AND IMPLANT PLACEMENT POSITION

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Aim: the aim of the study is to look for a significant correlation between peri-implant soft tissue remodeling, in particular vertical and horizontal development, and different areas of implant placement.

Methods: for this study, the oral cavity was divided into sextants. A sample of 341 implants from different manufacturers was examined. For the analysis of soft-tissue healing and remodeling, arch models were scanned and matched to their analogue with 3D-imaging software GeoMagic at 3 sequential times (post-surgery, provisional and definitive crown delivery), and finally, measurements of soft-tissue thickness and height in the buccal portion were obtained with GOM software for the evaluation of peri-implant vertical and horizontal

maturation. The data obtained were tabulated and a statistical investigation was conducted.

Results: both vertical and horizontal tissue remodeling resulted influenced by the position. In posterior sextants the vertical development resulted on average higher ($p = 0.025$ in Kruskal-Wallis test); the buccal thickness of the tissue showed major development, on average, in the maxilla than in the mandible ($p = 0.312$).

Conclusions: the analysis conducted showed that, in the large sample examined, horizontal and vertical tissue maturation and remodeling do not necessarily have the same predictability in the different sextants of placement, due to several factors.