

3D PRINTING AS A DIAGNOSTIC TOOL TO MANAGE COMPLEX CASES

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Aim: 3D printing technology is useful during planning phase of complex surgical cases. It is an additive fabrication technology which allows the physical reconstruction of anatomic structures viewed in the radiographic exam. This article's aim is to highlight the importance of such technology in the preoperative planning phase of complex surgical cases.

Methods: 28 patients were selected, and their treatment plans were programmed with 3D printing support. We report a case clinic of a 52-year-old patient who came at our attention complaining diffuse pain at the right maxilla. An orthopantomography exam is requested and it showed signs of diffuse parodontopathy and opacity of nasal fossa. Consequently, a CBCT of cranial massif showed a sclerotic area in the right nasal fossa. We sent

the Dicom file to the 3D department of the Leone S.p.A. for the realization of an anatomical duplicate made of a bicolor resin.

Results: the virtual tridimensional reconstructions and the anatomical duplicate made of a bicolor resin clearly highlights the presence of a supernumerary ectopic tooth in the nasal fossa surrounded by granulation and bone tissue.

Conclusions: the present study demonstrates that 3d printing is a valid technology to support the clinic and radiological diagnosis tools in the diagnostic process of severe cases. It's important to highlight 3D printing's role and application in interdisciplinary relationships, in the educational route of surgical specialization as well as in patient-doctor communication, finalized to the acquisition of the informed consent.

IMPLANT SURGERY WITH MAGNETODYNAMIC TECHNOLOGY

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Aim: the purpose of this study is to evaluate the possibility to perform a sinus lift surgical procedure with an electromagnetic device.

Methods: a clinical case of a crestal sinus lift in area 1.5-1.6 replacing osteotomes with the electromagnetic device is reported. Concurrently with sinus lift, two implants were inserted using a submerged technique (length of 10 mm with diameter of 4.0 mm in site 1.6 and length of 8.5 mm with a diameter of 4 mm in site 1.5).

Results: the surgical procedure resulted in a bone height increase of 3.5 mm in both sites. After 15 weeks from the surgical time, all the implants were osteointegrated.

Conclusions: the electromagnetic device can facilitate the bone condensation during sinus lift surgical procedure, helping the operator with better control and precision during osteotomy. The procured trauma by the suggested technique is well tolerated and is able to avoid the onset of BPPV (Benign Paroxysmal Positional Vertigo).

REHABILITATION OF AN EDENTULOUS PATIENT WITH N1 IMPLANTS: CASE REPORT AT 3-YEAR FOLLOW-UP

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Aim: the present study aims to demonstrate the possible use of the N1 Concept System (Nobel Biocare) for the rehabilitation of a total edentulous patient following the All-on-4[®] protocol.

The N1 method involves the use of a drill (OsseoShaper) that, rotating at low speed, expands the initial osteotomy made by the pilot drill (OsseoDirector), avoiding osteocyte necrosis, preserving bone clot and promoting peri-implant bone production. The tri-oval shape of N1 System allows the formation of high strain zone, which increase primary stability, and low strain zone where the osteogenic potential is preserved.

Methods: the maxillary and mandibular arch of a 65-year-old woman were rehabilitated with the All-on-4[®] protocol, placing two tilted and two axial Nobel Biocare N1™ implants in the upper and lower jaw.

Due to the good primary stability, it was possible to load the implants on the day of surgery with 10-unit provisional prosthesis, while the 12-unit definitive prosthesis were delivered 6 months after surgery.

The patient was re-evaluated at regular intervals in order to detect possible prosthetic and implant complications, including bleeding index at probing, plaque index and marginal bone level.

Results: during both the operative phases and the follow-up period, no complications were found.

The survival-rate of all fixtures at 3-year follow-up was 100%, and no signs of peri-implant pathology were detected.

Conclusions: this case report demonstrates the possible use of the N1 implant method in total rehabilitations.

BONE AUGMENTATION IN MAXILLARY SINUS LIFT TECHNIQUE WITH LATERAL APPROACH: A CASE REPORT

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Aim: rehabilitate the posterior area of quadrant one in a patient with the presence of little alveolar bone in the area of 1.6 and 1.7, with a lateral sinus lift technique and subsequent insertion of implants and finalization with dental crowns.

Methods: a 63-year-old female patient presented to rehabilitate the areas of 1.6 and 1.7. Cone Beam Computed Tomography (CBCT) was performed to evaluate the bone in the area of 1.5-1.6-1.7 elements. It was detected that the area is strongly atrophic with a vertical height of about 3-4 mm. The sinus lift was performed through a lateral approach. A full-thickness vestibular flap and osteotomy were performed to create a lateral window in the sinus and, after having detached the Schneiderian membrane, heterologous bone and a fibrin

sponge were affixed. The flap was sutured, and antibiotic and anti-inflammatory therapy was prescribed to the patient, showing a complete healing of the soft tissues after 15 days. After 4 months from the surgery, 1.5 was extracted because it presented a periapical lesion.

Results: after 5 months from the sinus lift, the bone was evaluated with CBCT in the regenerated area, ranging from 10 to 8 mm. So, it was performed implants rehabilitation of the areas of 1.5, 1.6 and 1.7.

Conclusions: the lateral approach for sinus lift and the use of heterologous materials, as filler, had given excellent results in the vertical bone regeneration and the implant rehabilitation with dental crowns was successful.

GUIDED FULL-ARCH MAXILLARY REHABILITATION WITH IMMEDIATE LOADING: A CASE REPORT

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Aim: evaluation of the use of digital technologies for the rehabilitation of an edentulous upper jaw in a patient with severe residual vestibulo-palatal bone atrophy.

Methods: design of the implant positioning in native basal bone of 2 tilted implants in the canine-premolar region and 2 straight implants in the pre-maxilla is carried out using dedicated software and three-dimensional CBCT. Furthermore, prosthetic support components are inserted, such as digital abutments, associated with a virtual diagnostic wax-up with CAD technology of the rehabilitation project for immediate loading. The insertion of the implants is realized using a surgical template with mucosal support, the abutments are inserted and through modeling carried out on the same software as the implant design, the pre-built immediate load is positioned and

screwed through retentive turrets. The correct integration of 4 implants is evaluated and 3 months after loading, the provisional is replaced with the definitive prosthesis, made with a titanium mesostructured and ceramicized zirconia veneer.

Results: after checks, correct healing of the surgical wound, correct position and occlusion of the screwed provisional prosthesis are found.

Conclusions: the digital project for full-arch rehabilitations with immediate loading, through dedicated software, allows: maximum use of the residual bone volume, pre-surgical choice of the implants to be used, pre-visualization of the prosthetic connections and pre-construction of the provisional prosthesis, extremely reducing the risk of mistakes and operating times.

A SIMPLE SURGICAL APPROACH TO PERIAPICAL PERIMPLANTITIS: A CASE REPORT

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Abstract: a rare case of peri-implantitis affecting the apical region of an implant is presented.

Methods: a 54-year-old male patient was treated at the Oral Surgery Unit of Umberto I Hospital in Rome with a two-stage implant rehabilitation of the 2.5, nine months after extraction due to tooth fracture. The implant was placed using a surgical template. After a 2-month healing period, the implant was uncovered using the roll flap technique, with the insertion of a healing screw. Two weeks later, the final abutment and an acrylic temporary crown were applied. During follow-up, normal soft tissue healing was observed, but a radiolucent area appeared around the periapical region of the implant. It was therefore decided to revise that area. A full-thickness flap was

elevated, followed by curettage of the bone cavity and debridement of the implant surface using a metal brush and a suture thread. A histological examination of the removed tissue revealed fibrous connective tissue containing a dense chronic inflammatory infiltration and signs of aseptic bone necrosis without cellular atypia. Radiographic follow-up was initiated every 6 months until the periapical region returned to normal. Final restoration was then performed.

Results: the simple but accurate surgical cleaning of the periapical area has shown to be sufficient in obtaining complete healing.

Conclusions: early diagnosis and prompt treatment appear to be critical for resolving peri-implantitis.

ALL-ON-FOUR PROTOCOL IN SEVERE BONE ATROPHY: CASE REPORT WITH 16 YEARS FOLLOW-UP

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Aim: to demonstrate the efficacy of treating an edentulous patient with severe bone atrophy through implant-prosthetic rehabilitation of the upper and lower jaws using the All-On-Four method, with a 16-year follow-up.

Methods: after thorough medical history, examination, and data collection a 63-year-old man was treated with an immediate load implant-supported rehabilitation.

4 NobelSpeedy Groove implants were placed in the upper arch and 4 in the lower arch, following the All-on-4 protocol. The tilted implants were inserted with variable angulation between 30° and 45°, while the two mesial implants were inserted axially. The temporary prosthesis were delivered the same day of surgery.

During the follow-up period of 16 years both clinical and radio-

logical evaluations were annually executed in order to assess implant and prosthesis survival, possible complications and average values of marginal bone loss.

Results: at 16 years the survival rate of implant fixtures was 100% with no complications related to the surgical intervention and to the prosthesis. No signs of mucositis or peri-implantitis were observed. In terms of marginal bone resorption, no variation was detected compared to physiological ranges.

Conclusions: the All-on-Four protocol represents a valid therapeutic alternative. This technique not only allows for functional and aesthetic rehabilitation of the patient in a shortened timeframe through immediate loading but also provides clinical advantages such as reduced clinical time and fewer complications due to the fewer number of implants placed.

TOTAL REHABILITATION WITH TRANSCRESTAL IMPLANTS: A CASE REPORT WITH 14 YEARS OF FOLLOW-UP

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Aim: the aim of this case report was to evaluate the placement of trans-crestal tilted implants as a possible therapeutic alternative in the presence of edentulous ridge with reduced bone thickness with 14 years of follow-up.

Methods: one patient aged 62 years with insufficient mandible ridge thickness was rehabilitated by inserting 4 NobelSpeedy Groovy implants (2 axial and 2 tilted) following the All-On-Four Protocol with a diameter of 4 mm and with a torque of at least 35 Ncm. The distal implants were placed with a trans-crestal approach.

Primary outcome measures were failures of the implants and of the prostheses, and any biological or biomechanical complication. The second outcome was marginal bone loss. The baseline radiograph was at the delivery of the provisional pros-

thesis. Follow-up radiographs were constantly taken during the follow-up period. The patient was included in a hygiene maintenance and monitoring program every 6 months

Results: at the 14-year visit, all implants were stable according to the opposing instrument pressure test. No implant was lost, and no prosthetic failure occurred, leading to a 100% implant and prosthetic survival rates. The average annual bone loss satisfied the criteria of success.

Conclusions: the insertion of transcrestal implants in the All-on-Four method in presence of edentulous ridges with reduced thickness at the sites of insertion could allow not to use implants with a reduced diameter, to optimize the cortical layers, to reduce vestibular dehiscence and to obtain a greater share of keratinized such as to promote aesthetics.

FULL-ARCH REHABILITATION WITH TREFOIL PROTOCOL: A CASE REPORT WITH 5 YEARS OF FOLLOW-UP

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Aim: the aim of this study is to analyze the effectiveness of the Trefoil™ protocol, a revision of the 1990s Brånemark Novum protocol, as an alternative for immediate load implant-prosthetic rehabilitation of the mandible with 5 years follow-up.

Methods: a 67-year-old patient in need of mandibular rehabilitation was selected for this case report. Inclusion criteria were evaluated with clinical and radiological examinations and included crestal width of at least 7 mm, mandibular body height of 13 mm, distance from the mental foramen of at least 3 mm and mouth opening of 40 mm. Three Nobel BioCare Trefoil (5 mm diameter) axial implants were placed with a minimum torque of 35 N/cm. The prosthesis was delivered 3 hours after suturing. Implant and prosthetic failures were examined to-

gether with marginal bone loss. Follow-up radiographs were conducted immediately after prosthesis delivery and thereafter at intervals of 3 months.

Results: no complications were encountered during the surgical or prosthetic phases for the 3 implants inserted and monitored for at least 5 years. The mean marginal bone loss was coherent with the expected loss. At 5 years, all implants survived without any prosthetic complications and the patient was satisfied.

Conclusions: the Trefoil™ implant-prosthetic rehabilitation could be considered as a valid alternative for patients with compromised mandibular dentition. This study demonstrates its efficacy, both aesthetically and functionally, with a follow-up of 5 years.

GUIDED IMPLANT PLACEMENT AND SOFT TISSUE MANAGEMENT IN A PATIENT ON ANTIRESORPTIVE THERAPY

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Aim: this report shows that guided rehabilitation in a patient on antiresorptive therapy can be a valuable method to recover posterior edentulous sites in the jaw.

Methods: a 70-year-old patient with osteoporosis treated with alendronic acid for 4 years, comes to our attention complaining about her incapacity to chew food correctly on the lower left jaw. Clinical examination revealed element 3.6 as hopeless and 3.5 missing. Six months after extraction of element 3.6, a careful anamnesis analysis was made, supporting a fixed rehabilitation. After providing the proper prophylaxis protocol and given the proximity of IAN observed on CBCT, we opted for a digitally and prosthetically planned surgery, and a guided implant placement. Two tilted implants provided with multi-unit abut-

ment were placed using a surgical template. Soft tissues were managed through two volume-stable collagen matrices positioned lingually and buccally to the site to ensure proper tissue thickness. Vertical bone regeneration was not performed.

Results: prosthetically guided implant placement associated to a soft tissue thickness increase was a successful option for the rehabilitation of a patient on therapy with bisphosphonates, without vertical regeneration needed.

Conclusions: guided implant surgery allows higher precision and control of the treatment plan, respecting noble structures and patient's systemic conditions. Collagenous matrices are a valuable alternative to connective tissue grafts while reducing invasiveness and morbidity.

A CASE STUDY OF SYSTEMIC IMPLICATIONS IN A PATIENT AFFECTED BY TITANIUM-HYPERSENSITIVITY

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Aim: the purpose of this report is to document the diagnostic and clinical management of a metal-allergic patient whom, following the placement of titanium implants, manifested significant consequences systemically.

Methods: a patient comes to the clinic after being convinced to place 12 titanium implants despite her known polyallergy to metals. She developed local allergic reaction immediately after, and the occurrence of diffused itchy skin lesions at 10 months. She was diagnosed with many dermatologic conditions that were later disproved by specific examinations or failure to respond to therapies. As her condition worsened, she began to perform many diagnostic tests, generally positive for autoimmune components. She was prescribed a massive drug therapy to no avail, rather leading to very important iatrogenic

consequences. At the institute she underwent MELISA® testing for titanium hypersensitivity. As she tested positive, all titanium fixtures were removed.

Results: after 2 months the patient reported complete remission of her symptoms. Further proof that the issue was solely due to titanium occurred when the patient began using a hand moisturizer containing Titanium Dioxide and observed a mild reappearance of symptoms. Discontinuation of such topical use was sufficient for their remission.

Conclusions: although in daily practice it is not yet possible to examine each patient's titanium sensitivity, it would be mindful not to be misled by the hypoallergenic characteristic that has been described about titanium, and for similar allergies to be considered at the history stage.

PIEZOELECTRIC SURGERY IN ZYGOMATIC IMPLANTOLOGY: A CLINICAL CASE

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Aim: the aim of this work is to show the application of piezoelectric instrumentation in implantology, examining a case of maxillary rehabilitation with the Hybrid Zygoma technique: two zygomatic implants and 4 implants in the premaxilla. It focuses on the effectiveness of dedicated inserts to improve surgical precision and achieve optimal results in patients with maxillary atrophy, promoting an advanced and safe approach to implant surgery.

Methods: firstable the sites for the 4 traditional implants were prepared with a dedicated insert, the implant site in the zygomatic bone is prepared using the piezoelectric handpiece. The insert has depth markers to monitor length. Moreover, the piezo device allows selective preparation of bone tissue, avoiding damage to surrounding soft tissues. Subsequently,

the emergency profile of the zygomatic fixture is verified with an angled pin and the fixtures are inserted. Once all the implants are placed, Transfer abutments are then positioned, followed by a control orthopantomography. Finally, an impression is taken, and chewing is recorded to screw in the temporary prosthesis four hours after the surgery.

Results: the case report demonstrates that piezoelectric instrumentation, with new dedicated inserts, is effective in zygomatic implantology.

Conclusions: the piezoelectric procedure is effective in zygomatic implantology because it is less invasive and safer for selective preparation on the bone tissue, providing better visibility due to the cavitation effect of the piezo.

PERI-IMPLANTITIS TREATMENT WITH SUBGINGIVAL APPLICATION OF A XANTHAN AND CHLOREXIDINE GEL

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Aim: mechanical control of biofilm is considered the standard of care for peri-implant diseases. The additional application of local antiseptics to prevent biofilm formation appears to increase the response to treatment. The aim of this case report is to describe the treatment of a peri-implant disease using a gel based on Xanthan and Chlorhexidine (XAN-CHX) and to carry out a narrative review on the most recent evidence regarding the additional therapies of peri-implant diseases.

Methods: a 54-year-old patient, non-smoker, has 2 implants in sites 15 and 25, with a maximum Probing Pocket Depth (PPD) of 6 mm. Bleeding on Probing (BoP) and Plaque Index (PI) at the implant sites were 100%. The patient underwent non-surgical peri-implant therapy and an additional application of XAN-CHX gel. The application of XAN-CHX gel was performed

30, 60, and 90 days after the non-surgical treatment. The re-evaluation was performed at 6 months and 1 year.

Results: 90 days after non-surgical therapy, both implants showed an improvement of BoP, which was reduced by 100% for the implant in the site 15 and by 83% for the implant in site 25. This improvement remained stable 6-months and 1 year after non-surgical treatment. For the narrative review, 6 articles were selected.

Conclusions: based on recent literature, the effectiveness of additional therapies for the treatment of peri-implant pathologies requires more studies. The clinical results of this case report suggest that the application of XAN-CHX gel can be effective in the treatment of peri-implant diseases in combination with non-surgical therapy.

A SAFE AND EFFECTIVE TECHNIQUE FOR RETRIEVING FRACTURED IMPLANT ABUTMENT SCREWS

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Aim: this study aimed to propose a novel and risk-free technique to retrieve broken abutment screws from inside implant internal connections. Although several approaches have been proposed in the literature, none of them have been universally approved. Therefore, the authors propose a more conservative approach as the first solution to this challenging complication.

Methods: the technique involves the use of a silicon restoration holder to twist the surface of the broken screw head counterclockwise. The success of this technique is dependent on ensuring a dry surface between the tip of the instrument and the titanium, as any loss of grip may occur. If this happens,

the instrument must be replaced, and the steps repeated.

Results: in a minimal case series, this technique proved to be 100% successful. To achieve successful clinical outcomes, however, the authors recommend that this approach should be the first one applied for this purpose. This is because more aggressive ones may cause damage to the connection, which could render this new technique ineffective.

Conclusions: therefore, using silicon restoration holders as a minimally invasive first attempt to retrieve broken screws, before considering other options, seems to be an effective and risk-free solution to treat this complication.

COMPUTER-ASSISTED SURGERY FOR IMPLANT-PROSTHETIC REHABILITATION IN FRAGILE PATIENTS

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Aim: the aid of guided surgery in prosthetic implant rehabilitations in fragile patients, allows to reduce the operating time, to ensure a lesser invasiveness and to predict the position of the implant so as to make the prosthetic product in pre-operative phase.

Methods: 3 patients were selected with sufficient amount of bone to perform all-on-4 and all-on-6 immediate loading with implants of length³ 8.5 mm and diameter 4 mm. Caregivers were included in an educational and preventive program to ensure patients' proper oral hygiene, appropriate nutrition, and elimination of risk factors for their oral health. In addition, in-

structions for the management of prosthetic restorations were provided.

Results: at 1-year follow-up, the prostheses are still stable and in place. No implant loss was observed, and patients/caregivers reported no painful episodes.

Conclusions: the prevention, treatment and rehabilitation of fragile patients through today's available technological innovation of surgical template, leads dentistry to be an inclusive medical discipline, following the UN and WHO 2030 Agenda Objectives 3 and 10 on sustainable development.

POLYNUCLEOTIDES FOR BONE REGENERATION IN HORIZONTAL ALVEOLAR DEFECTS: A CASE SERIES

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Aim: the aim of this study was to examine the use of polynucleotides mixed with hyaluronic acid (PNs-HA) in a gel form to promote bone regeneration in horizontal alveolar defects.

Methods: six adult patients underwent localized horizontal guided bone regeneration using xenogeneic bone substitute and a staged approach. The graft comprised a mixture of Deproteinized Bovine Bone Mineral (DBBM) particles and PNs-HA gel in a 3:1 ratio, respectively. The graft material was covered by a resorbable collagen membrane fixed with pins to the underlying bone. Implant placement was performed after 5 months healing period.

Results: healing proceeded uneventfully in all the cases, with the graft appearing well vascularized and firmly attached to the

recipient bone upon re-entry. Histologically, the regenerated bone exhibited high mineralization and well-organized lamellae, completely embedding residual biomaterial granules. Histomorphometric evaluations revealed that newly formed bone occupied an average of $41.2\% \pm 12.4\%$ of the analyzed samples. Linear measurements from CBCT scans indicated an overall linear horizontal bone gain of 4.91 ± 0.88 mm.

Conclusions: based on the safety of the mixture, absence of abnormal clinical and immunological responses in the regenerated areas, and macroscopic and radiological features of the regenerated bone were noticed. The present study supports the use of PNs-HA-based gel mixed with DBBM granules as grafting material for horizontal alveolar bone regeneration.

SOFT TISSUE CONDITIONING WITH CUSTOMISED HEALING SCREWS IN POST-EXTRACTIVE IMPLANTS

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Aim: the use of custom healing abutments for soft tissue conditioning aims to reduce postoperative discomfort (pain, swelling, bleeding) and pain during final crown placement, improve aesthetic integration, and decrease chair time.

Methods: this study is based on a sample of 12 adult patients. After minimally invasive dental element extraction, implant site preparation and post-extraction implant placement is performed. A shaped healing screw is created using flowable composite replicating the superficial shape of the post-extractive socket. Three months after surgical procedure, an impression of the implant position is made for direct fabrication of the final screw-retained crown. Pain after surgery, pain after the placement of the definitive crown, swelling and bleeding are collected using a questionnaire. MBL is measured on x-ray plates.

Results: the data collected from patients rehabilitated with this technique reveal a peak of post-operative pain of 2.3/10 after 6 hours and a peak of post-operative swelling of 3/10 after 48 hours. The survival rate of post-extraction implants in the posterior sectors is 98%, with MBL at 1 year less than 0.57 mm. Pain during the delivery of the final prosthetic crown, after 6 hours and after 24 hours, is close to zero.

Conclusions: the advantages of using the customized healing abutment include reduced post-operative discomfort, surgical site sealing, stabilization of the emergence profile, and predictability of the final prosthetic restoration. The study limitations are attributed to the small sample size and short-term follow-up.

GUIDED INLAY TECHNIQUE FOR VERTICAL BONE ATROPHY IN THE POSTERIOR MANDIBLE: A CASE SERIES

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Aim: after the tooth loss, a modification of bone morphology takes place. To guarantee implants' stability a sufficient volume of residual bone is needed; over the years different bone augmentation procedures were proposed. The Sandwich Technique was first introduced by Schettler in 1976 and, since it is performed at 5 mm of distance from the mandibular canal, its main complication is a temporary sensory disturbance of the inferior alveolar nerve. For this reason, a Digital Inlay Technique has been proposed, including the use of a surgical template.

Methods: two patients with vertical atrophy of the left posterior mandible were treated with the innovative Inlay Sandwich Technique using allogenic bone block and a mixture of mineralized and demineralized human bone allograft in putty form as

graft material. A horizontal osteotomy for lifting the osteotomized bone segment was guided by a customized template. The CAD-CAM process allows the virtual design and the milling of the template featuring the ideal osteotomies at 2 mm coronally and parallel to the alveolar canal.

Results: the horizontal osteotomy was performed safely close to the nerve structures according to the pre-operatively determined osteotomy line, through 3D-CT virtual reconstruction. There were no neurological complications in the first few days after the procedure and the 3-month healing phase proceeded without any complications.

Conclusions: radiographic evaluations and a complication-free clinical healing phase confirmed the effectiveness of this procedure in performing safe and precise inlay technique.

MINI CRESTAL SINUS LIFT IN SEVERE ATROPHY IS A GOOD ALTERNATIVE TO LATERAL SINUS LIFT?

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Aim: the present study evaluates the efficacy and clinical outcomes of crestal sinus lift techniques used to elevate the sinus floor simultaneously with bone grafting and implant placement as a possible and reproducible alternative to lateral sinus lift.

Methods: patients underwent different crestal sinus elevation techniques. The procedure was sinus lift by implant osteotomy and lifting by physiological water jet pressure (CasKIT, Ossstem), mechanical lifting with lifting tips (M.I.S.E., Sweden & Martina), by the Summers technique. The insertion of bone biomaterial and subsequent simultaneous insertion of bone-level implants (TSIII Osstem, T4 Tapered 3I Biomet, Blt Straumann BLX). Radiographic and clinical examinations were performed during follow-up.

Results: the sinus floor was augmented with an average height of 5 mm (range: 2.8-7.4 mm). The implants healed smoothly with healing screws. Peri-implant marginal bone was stable with a mean follow-up of 50 months (range: 33-71 mo). All procedures were successfully performed without any apparent perforation of the Schneider membrane. No complications were observed during the follow-up.

Conclusions: based on the limited data collected in this study, the new crestal sinus elevation approach can effectively raise the sinus floor and reduce the incidence of post-operative complications. Other cases with long-term follow-up are needed to confirm and improve this crestal sinus lift technique.

DIGITAL WORKFLOW FOR IMMEDIATE IMPLANT PLACEMENT USING A STACKABLE SURGICAL GUIDE

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Aim: the aim of the study was to evaluate a full-digital workflow for the fabrication of a stackable surgical guide and a provisional prosthetic restoration. The secondary aim was to evaluate the results in terms of clinical, radiographic, and aesthetic parameters.

Methods: patients requiring partial rehabilitation implant-supported in aesthetic areas were recruited; patients underwent CBCT and intraoral scanning. Prosthetic and surgical planning was done through dedicated software. The surgical guide consisted of two 3D-printed components: a primary component, anchored to the patient, and secondary components used for implant placement and connection

with the provisional prosthesis. After prosthetic loading, clinic parameters of peri-implant health (PPD, BOP, and GI), abutment stability, radiographic assessment, and aesthetic results (PES) were evaluated.

Results: stackable guides with direct implant visualization were reliable in implant placement. The anchor pin connection allowed for satisfactory stability of the surgical guide and the provisional fixed prosthesis. There were no prosthetic complications after loading, with a PES between 6 and 8.

Conclusions: a full digital workflow with stackable guides provides a reliable and reproducible protocol for immediate loading and provisional prostheses.

A NEW TYPE OF MODULAR TEMPLATE FOR GUIDED ZYGOMATIC SURGERY

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Aim: this text's aim is to describe how it's possible to rehabilitate complex cases of severe bone atrophy with surgical guides.

Methods: in this two clinical cases, it can be observed how surgical rehabilitation requires the use of axial implants, zygomatic implants, useful where maxillary atrophy doesn't allow the placement of axial fixtures, and pterygoid implants used as posterior support to give more stability, when the emergence of the zygomatic implant is anterior. The surgical guide observed is a modular template (P-Cube, Oxy Implant Biomec, Colico, Italy) which allows for both guidance and maximum external control during the surgery, thanks to the possibility of removing and repositioning it. It is also possible to insert only the relevant part of the template rather than the complete one,

thus reducing bulk and consequently increasing the working space. Attaching the prosthesis to the guide, it's also possible to observe if the implant emergences coincide with the prosthetic structure.

Results: the rehabilitation of severe bone atrophies can be complex and often unpredictable without an accurate project. The use of surgical guides allows for better predictability of outcomes, reducing the chance of error. The versatility of a modular template also allows for a faster and easier workflow for the clinician.

Conclusions: thanks to this new surgery, it's possible to propose surgical treatments safely, ensuring predictability between prosthetic design and achieved outcomes, making surgery safe, despite being more invasive due to severe atrophy.

NAVIGATED IMPLANT PLACEMENT BY DYNAMIC GUIDED SURGERY, A CASE SERIES

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Aim: the X-Guide® (Nobel Biocare®) is a dynamic computer-assisted implant surgery system that involves the acquisition of a 3D CBCT with a template modeled and personalized on the patient's dental arch. Thanks to the CBCT imaging is possible to realize a surgical planning of the surgery with X-Guide® software; it allows the visualization in real-time the position of both drills and the implant fixture in the three dimensions of space to anatomical structures. This system allows intraoperative changes of the plans during surgery. The purpose of this case series is to evaluate the advantages of dynamic navigation surgery.

Methods: thirteen partially edentulous patients requiring implant rehabilitations, referred to the Prosthodontics Department of the C.I.R. Dental School (Turin), were selected for the study. They were seven women and six men, with no major an-

amnestic issues. The implant surgery planning was based on CBCT acquisition. We planned the drill entry points, angles, paths and depths needed using the CBCT datasets in X-Guide®. Anatomical structures such as NAI, maxillary sinus and adjacent teeth were considered during virtual planning to avoid damaging them.

Results: all patients were rehabilitated with fixed prosthodontics and followed up monthly. The implant success and prosthodontics rate are 100%.

Conclusions: the advantages of dynamic guided surgery are the minimization of complications and guaranteed prosthetic and aesthetic success. Nevertheless, this system requires a certain learning curve, and further studies are necessary to evaluate its accuracy and precision.

INFLUENCE OF THE IMPLANT CONNECTION AND CROWN LENGTH ON THE INTERPROXIMAL BONE PEAK

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Aim: in this observational retrospective study, the bone-peak levels around implants, designed with a 5° conical connection (C1) and 45° internal-hexed connection (C2), were evaluated. Moreover, it was a topic of interest if this bone remodeling could be influenced by the prosthetic crown length.

Methods: this analysis was conducted on 182 dental implants positioned in 4 mouth sectors in 52 patients. All implants were positioned following the same traditional two-stage protocol. Then, intra-oral radiographs were taken to evaluate the distance from the Implant Shoulder to the first Bone-to-Implant Contact (IS-BIC) comparing the bone level at surgery time (T_0) and 1 year after (T_1). Even the interproximal Bone Peak to the corresponding Contact Point (BP-CP), and the Implant Shoulder to the most coronal point of the crown cuspids (IS-C) distances were considered at T_1 .

Results: in the beginning 93 patients were excluded. Then, the IS-BIC (C1) was $0,586 \pm 0,45$ mm with while IS-BIC (C2) was $-0,226 \pm 1,45$ mm. These were significantly influenced by the connection ($p = -0,338$).

Reducing the sample at 32 implants, the average BP-CP was 5,60 mm (SD 1,31) and 7,00 mm (SD 1,35) with C1 and C2. Finally, the relation ISh-BIC/ISh-C was graphically represented showing that it was inversely proportional with a 0,057 sig. (2-code) value.

Conclusions: the results suggested that the connection design and the crown length seemed to be relevant aspects to consider in surgical prosthetic planning to reach a stable and predictable treatment outcome due to the occurrence of a micro-leaking effect.

CRESTAL OR SUBCRESTAL IMPLANT? A RETROSPECTIVE EVALUATION OF MUCOSITIS AND PERI-IMPLANTITIS

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Aim: the objective of this study is to evaluate whether crestal or subcrestal implants placement can represent a risk factor for the onset of peri-implant disease.

Methods: this retrospective analysis based on clinical and radiographic data. Dental implants were divided into two groups: (i) positioned with the shoulder below the crest and (ii) placed at bone level. The follow clinical parameters such as: FMPS, FMBS, PII, BOP, and PD were evaluated for each patient at t_0 and at the 5-year mark.

Results: no statistically significant differences were noted in

terms of FMPS and FMBS in the two groups. On a patient-based analysis, implants placed with the shoulder at crestal level showed 25.6% peri-implant mucositis and 32.6% peri-implantitis, while those positioned subcrestally had rates of 19%. After 5 years, no significant differences were found between the groups ($P < 0.05$)

Conclusions: within the limitation of this study after 5 years observation time, the percentage of peri-implant mucositis and peri-implantitis was not statistically significant for both groups.

THE ACCURACY OF GUIDED IMPLANTOLOGY IN PARTIALLY EDENTULOUS PATIENTS: A RETROSPECTIVE STUDY

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Aim: Computer Aided Implant Surgery (CAIS) is a fully digital approach that guides the biological and prosthetic ideal implant position. The aim of this retrospective clinical study was to assess the accuracy of implant position by using CAIS and clinical outcomes, in partially edentulous patients.

Methods: twelve patients requiring at most two implants were recruited, from 2022 to 2024. For all patients 3D Cone-Beam Computed Tomographies (CBCT) and Intra-Oral Scans were obtained and superimposed, through the matching of resulting DICOM and STL data files in the BlueSkyPlan software to build the tooth-supported surgical guide. The technique's accuracy was measured as the deviation between the real implant position (mesio-distal deviation, depth error, axis deviation) obtained from the postoperative CBCT and the preopera-

tive planned implant position. Clinical outcomes were: biological complications, implant and prosthetic failure, aesthetic outcome and patient satisfaction.

Results: a total of 17 implants was analyzed. Mean results were: 0.3 ± 0.10 mm of mesio-distal linear deviation at the implant shoulder, 0.23 ± 0.08 mm of depth error, 1.2 ± 0.38 degrees of axis deviation. At 6 months, the healing was uneventful for all patients, no complications and no implant or prosthetic failures occurred. Implant-supported patients' functional and aesthetic satisfaction was high.

Conclusions: the guided implant placement can be considered an accurate and safety procedure in partially edentulous. However, further prospective studies with a wider sample are needed to confirm these results.

RADIOGRAPHIC EVALUATION OF MARGINAL BONE LEVELS AROUND FIXED BRIDGES ON SPLINTED IMPLANTS

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Aim: the aim of this study was to investigate whether central implants may suffer higher peri-implant Marginal Bone Level (MBL) compared to lateral implants in fixed splinted bridges supported by three or more implants.

Methods: the study involved partially edentulous patients with at least one fixed bridge supported by three or more implants. Radiographic assessment of Marginal Bone Level (MBL) was conducted using intraoral radiographs taken with phosphor plates and analyzed with specialized software. MBL was measured as the distance between the implant platform and the most coronal bone-to-implant contact.

Results: 90 patients underwent rehabilitation involving 130 splinted fixed bridges and 412 implants. The mean peri-implant MBL resulted statistically significantly higher in central

implants when compared to lateral implants ($p < .01$). Analysis of prosthesis-level variables revealed that cemented bridges were associated with a notable 0.82 mm increase in Marginal Bone Level (MBL) if compared to screw-retained bridges. Additionally, implant surface showed an association with MBL changes, although less pronounced than implant retention.

Conclusions: in case of ≥ 3 adjacent implants supporting splinted bridges, central implants showed a higher MBL, when compared to the lateral ones. Regarding the prosthetic factors, implants supporting cemented bridges were displayed a statistically higher MBL than those supporting screw-retained bridges. Furthermore, surface characteristics may impact the stability of MBL at the implant level.

PLATFORM SWITCH AND LASER MICRO-GROOVED SURFACE ON SHORT IMPLANTS: A RETROSPECTIVE STUDY

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Aim: the aim of this retrospective multicenter study was to analyze 132 short laser micro-grooved dental implants with platform change used for prosthetic rehabilitation of atrophic posterior maxilla, evaluating crestal bone remodeling, implant success, complications, and implant/patient-related risk factors.

Methods: five private dental clinics were involved in this study through a review of medical records. Variables such as age, gender, cigarettes consumption, periodontal disease, systemic diseases, medications, anatomic position, implant diameter and length, crown-to-implant ratios and type of placement were collected. 132 short implants placed in 84 patients followed for 3/5 years (mean time 4.2 ± 0.8 years) were examined.

Results: there were eight cases of implant failure, 62.5% of which were due to periimplantitis. The implant success rate was 93.9%, while the patient success rate was 95%. The mean crestal bone loss was 0.385 ± 0.7 . Univariate regression models revealed that the following characteristics, female sex, cigarettes consumption and periodontal disease, were significantly correlated with short implant and patient success.

Conclusions: Platform Switch and laser micro-grooved short implants in the atrophic alveolar ridge of the posterior jaw showed high success rates after 3 to 5 years of function with stable crestal bone levels.

DEPROTEINIZED BOVINE BONE WITH CALCIUM SULPHATE FOR SOCKET PRESERVATION: A 4-MONTH STUDY

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Aim: the purpose of this retrospective study was to compare the histomorphometry of post-extractive sites previously grafted with deproteinized bovine bone, with or without the association of a calcium sulphate preparation.

Methods: 20 patients were selected for the extraction of one or more mono-radicular tooth, followed by an implant-prosthetic rehabilitation. Post-extractive sites were randomly assigned to Test or Control group, respectively if deproteinized bovine bone was used in association with a calcium sulphate preparation or alone. In both cases a collagen membrane was employed to cover the grafted area. After four months a biopsy of regenerated bone was taken from all grafted sites and then processed for histomorphometric analysis.

Results: of 24 samples analyzed 4 months after extraction, vital bone was present in 62,5% of cases for the Test group and in 31,25% for the Control group. Acellular bone was respectively found in 5% of cases for the Test group and in 32,91% for the Control group. Both these differences were statistically significant ($p < 0.05$) between groups.

Conclusions: calcium sulphate in association with deproteinized bovine bone seems to promote a proper vital bone formation, with less acellular bone compared to deproteinized bovine bone used alone. Findings of the present study offer clinicians a predictable protocol in post-extraction sites, with the use of specific osteoconductive materials, able to preserve and improve the vital bone, slowing down the resorption process at the same time.

SINGLE LOCKING-TAPER IMPLANTS IN THE AESTHETIC UPPER MAXILLAE: A RETROSPECTIVE STUDY

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Aim: the purpose of this study was to retrospectively evaluate a procedure of immediate implants placement in fresh extraction sockets, with immediate non-functional provisional restorations.

Methods: patients were treated for the replacement of maxillary central or lateral incisors, or cuspid teeth with a single-crown locking-taper implant. Clinical and photographic records were compared between the teeth prior to extraction (T_0), and restorations one year after prosthetic loading (T_1). Outcomes were analyzed using the Pink Esthetic Score (PES), according to patient's phenotype (THIN/THICK), with or without the use of Connective Tissue Graft (CTG).

Results: overall mean PES of 25 implants treated was 9.24 ± 2.36 at T_0 and 9.60 ± 1.70 at T_1 . Comparison of groups between T_0 and T_1 revealed significant PES variations ($p = 0.04$), with the best and the worst ones respectively registered for THIN+CTG group (from 7.50 ± 1.91 to 9.75 ± 2.87) and THIN group (from 11.33 ± 2.33 to 10 ± 0.89); moderate increases were assessed for THICK group (from 8.44 ± 2.40 to 9.44 ± 2.12) and THICK+CTG group (from 9.50 ± 1.04 to 9.33 ± 0.81).

Conclusions: immediate implant rehabilitation for aesthetic areas of upper maxilla can be assumed as a safe protocol. Concomitant use of CTG seems to provide beneficial effects in thin phenotypes, not any additional value in thick phenotypes.

UNILATERAL ZYGOMATIC REHABILITATION: UP TO 8 YEARS CLINICAL FOLLOW-UP EVALUATION

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Aim: the aim of this preliminary study is to evaluate survival rate of unilateral rehabilitation with zygomatic implants. The evaluation was based on the type of prosthetic rehabilitation of the patients, i.e. whether they have axial or pterygoid implants associated with the zygomatic implant.

Methods: the study sample consists of 17 patients who underwent surgery for the placement of zygomatic implants starting from the year 2016. The patients were divided into four groups: one zygomatic implant associated with a single axial implant, multiple axial implants, a pterygoid implant or a combination of these. A Microsoft Excel table was created with patients, number of zygomatic implants, number of axial implants, diameters, lengths, bone en-

agement of the zygomatic implant and complications or failures.

Results: a preliminary comparison was made which shows that the survival rate of zygomatic implants is 100%, while axial implants have shown a survival rate of 97%. Additionally, axial implants have shown a higher number of complications such as sinusitis and periodontal abscesses.

Conclusions: this is still a preliminary study that requires a larger number of patients in order to better compare long-term survival rates. In the meantime, we can hypothesize that it appears more appropriate to place multiple axial implants to counteract the lateral movement of the zygomatic implant and reduce overload on traditional implants.

PROMISING PERFORMANCE OF TRANSFER LEARNING IN THE PREDICTION OF PERI-IMPLANTITIS ONSET

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Aim: this study aims to test different transfer learning approaches applied to Convolutional Neural Networks (CNN) for predicting Peri-Implantitis (PI) onset based on 2D intraoral radiographs taken after prosthetic insertion, through the use of pre-trained models on a large dataset, so as to improve predictive models in implant practice and provide the basis for customized interventions.

Methods: a retrospective study was conducted at the University of Michigan and King's College London, analyzing implants placed from 2001 to 2023. The transfer learning process allowed pre-trained CNN models, such as ResNet50, DenseNet, VGG-16, Inception V3 and EfficientNet, to 'transfer' their previously acquired experience to the prediction of PI occur-

rence from 2D radiographs. The models were evaluated for classification accuracy, AUC, sensitivity and specificity.

Results: radiographs of 195 dental implants in 108 patients were included in this study. Among all the architectures and transfer learning approaches used, the results show that the best performance was achieved by the Non-Hybrid Feature Extraction approach with ResNet-50, which achieved an accuracy of 95%; an AUC of 1.00; a sensitivity of 100% and a specificity of 94.4%.

Conclusions: the excellent results suggest a promising application of AI in the field of diagnostic dentistry for the prediction of IP from 2D intraoral radiographs taken at the time of prosthesis insertion.

DENTAL IMPLANTS IN PATIENTS AFFECTED BY SYSTEMIC DISEASES: RETROSPECTIVE CLINICAL STUDY

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Aim: the objective of this study was to evaluate implants survival rate, marginal bone loss and surgical complications in patients affected by systemic diseases.

Methods: patients suffering from systemic diseases receiving full-arch implant-prosthetic rehabilitation at a follow-up of at least 7 years were included in the study. Medical records and follow-ups, performed at one-week intervals, six months and once a year thereafter, were considered to assess implant survival rate, marginal bone loss and surgical complications.

Results: 301 patients were considered for a total of 1204 implants. The implant survival rate was 95.02%. In comparison with healthy patients, no statistically significant differences in peri-implant marginal bone loss were found in the systemic patients. Although no significant differences were found be-

tween healthy and ill patients, a higher incidence of intra- and post-operative bleeding was reported in diabetic and cardiovascular patients.

In patients suffering from cardiovascular disease, intra- and post-operative bleeding was higher in patients taking Oral Anticoagulant Therapy (OAT) such as warfarin, compared to New Oral Anticoagulants (NAOs) such as rivaroxaban.

In HIV patients, a statistically significant linear correlation was found between early implant failure and viral load, and the CD4/CD8 ratio was significantly correlated with late implant failure.

Conclusions: full-arch implant-prosthetic rehabilitations can be performed safely in patients with systemic diseases, provided they are controlled and compensated.

ACCURACY OF FULL-ARCH INTRAORAL SCANS: A SYSTEMATIC REVIEW WITH A STANDARDIZATION PROPOSAL

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Aim: the aim of this systematic review was to evaluate *in vivo* studies comparing the accuracy of Intraoral Scanners (IOS) versus conventional impressions used in full-arch implant-rehabilitated patients.

Methods: Medline, Cochrane, and Scopus databases were electronically screened by two reviewers according to the following focused question: What is the accuracy of full-arch digital implant impressions compared to traditional impressions in patients undergoing full-arch implant rehabilitation? The primary outcome analyzed was the accuracy of the digital impression measured on the STL file through the Root Mean Square value (RMS) or linear distances. Secondary outcomes included prosthesis marginal fit and Sheffield test. Pairwise Meta-Analysis (NMA) was conducted.

Results: nine studies were included. Four studies investigated the accuracy of IOS through the evaluation of prosthesis fit obtained from the digital and conventional workflows, with optimal results achieved with both techniques. Six studies assessed accuracy through STL data comparison. Three studies analyzing RMS were included in the quantitative analysis. Random-effects meta-analysis resulted in a pooled mean difference of 165.93 (95% C.I. = 54.97-276.89, p-value = 0.003).

Conclusions: the use of intraoral scanners in dental implant full-arch rehabilitations appears to result in accurate dental impressions with satisfactory accuracy similar to conventional impressions. However, it is important to note the significant heterogeneity among the techniques used.

POLYDEOXYRIBONUCLEOTIDES PRE-CLINICAL FINDINGS IN BONE HEALING: A SCOPING REVIEW

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Aim: the present scoping review aimed to analyse how Polydeoxyribonucleotides (PDRN) affect bone healing. PDRN is a linear DNA-derived polymer that exhibits therapeutic properties and is used in the management of cutaneous and connective tissue injuries. Recent *in vitro* and animal studies demonstrated the favorable effects of PDRN on the process of bone healing, either as a standard treatment or in combination with other regenerative agents.

Methods: for the screening procedure both prospective and retrospective Randomized controlled Clinical Trials (RCTs) were included. Articles were found using the MeSH terms: polydeoxyribonucleotide, bone and regeneration. The following database were investigated: PubMed (MEDLINE), Scopus, EMBASE, Web of Science and Google Scholar.

Results: at the beginning, on the databases 228 articles were found. Following the review process, only eight studies were analysed. Two from those were *in vitro* studies, five were carried out on living organisms, and the last one considered both laboratory and animals studies. A quantitative descriptive approach was used to expose the data extracted from the selected studies.

Conclusions: PDRN could improve bone healing and regeneration. It can be combined with grafting materials and biocompatible scaffolds. Future human studies are needed to evaluate the correct clinical application of PDRNs on bone regeneration and the uncertain results achieved from animal studies and *in vitro* studies.

WIDE VS REGULAR DIAMETER IMPLANTS IN LONG-TERM SURVIVAL RATE: A SYSTEMATIC REVIEW

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Aim: use of dental implants is nowadays a predictable procedure to rehabilitate total or partial edentulism. This review's aim is to evaluate the differences between the use of wide and regular diameter implants in terms of Cumulative Survival Rate and Marginal Bone Loss.

Methods: PubMed, Scopus and Cochrane Library databases have been explored up to 30th March 2024 and only clinical studies were included. The wide-diameter implants have been defined as implants with diameter higher than 4,5 mm. The outcomes evaluated were survival rate, peri-implant soft tissues recession, implant stability and marginal bone loss. The methodological quality of the included studies was assessed according to the recommendations of the Joanna Briggs Institute Critical Appraisal tool.

Results: sixteen studies meeting the inclusion criteria were included in the qualitative synthesis. In short-term period, regular-diameter implants have shown a higher survival rate, while the marginal bone loss was similar in two groups. In mid-term period, the difference in survival rate was higher and also the difference in marginal bone level becomes significant, with a higher marginal bone loss in the wide-diameter group. Also, in the long-term period the differences were statistically significant.

Conclusions: since studies included in the review have shown a higher survival rate and less marginal bone loss for the regular-diameter implants, we can suggest that the use of wide-diameter implants is not recommendable. Further studies are needed to confirm the results of the current review.

WEAR EVALUATION OF PROSTHETIC MATERIALS IN IMPLANT REHABILITATIONS

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Aim: this systematic review aims to evaluate and synthesize current research on the wear characteristics of various dental materials to guide clinical decision-making.

Methods: a comprehensive search of PubMed and Embase was conducted for studies published up to January 2024. The study was performed following PRISMA guidelines.

Inclusion criteria were original research articles that assessed the wear properties of dental materials in clinical environments. Quality assessment and data extraction were performed independently by two reviewers.

Results: a total of 18 studies met the inclusion criteria. The materials reviewed included composite resins, ceramics and

novel polymeric materials. Significant differences were observed in wear resistance, with ceramic materials showing the least wear followed by composite resins. Older polymeric materials demonstrated higher wear rates. Factors influencing wear included material composition, particle size in composites, and occlusal stress conditions.

Conclusions: the wear resistance of dental materials varies significantly across different types, with ceramics showing superior performance. These findings suggest that material selection should consider specific clinical conditions, and patient needs to optimize dental restorations' longevity and effectiveness.

FULL ARCH REHABILITATION WITH TRANS-SINUS IMPLANT: A SYSTEMATIC REVIEW

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Introduction: traditional implants aren't always suitable for immediate loading in maxilla, especially in significant atrophy. In Bedrossian's classification, zygomatic implants are proposed for zone I in those cases. However, this method is invasive and can lead to complications. Malò et al. proposed trans-sinus implants as an alternative, reducing risks but also presenting complications. This review evaluates the indications and contraindications of trans-sinus rehabilitation.

Methods: this article follows PRISMA guidelines, focusing on studies describing rehabilitation using trans-sinus implants. The implant length, number of implants per patient, prosthetic loading type, or surgical protocol were not restricted by us. Only articles in English were considered. The search string entered: (((“Maxillary Sinus/surgery”[Mesh]) OR “Maxilla”[Mesh]

AND “Dental Implants”[Mesh])) AND “Atrophy”[Mesh]. The Joanna Briggs Institute (JBI) critical appraisal tools were used to assess risk.

Results: the results show qualitative data comparison of 11 articles: Malò (2013), Aalam (2023), Agliardi (2014), Grandi (2019), Jensen (2012, 2015), Lazarov (2020), Testori (2013), Zaninovich (2020, 2022), Gravers (2011).

Discussions: the trans-sinus technique achieved a success rate of 97.2%, surpassing the 95% average of all-on-4. However, potential complications may still occur despite the high survival rate of implants.

Conclusions: trans-sinus implants are a viable alternative for full arch rehabilitations. More randomized clinical trials comparing different surgical techniques are needed.

INFLUENCE OF THE IMPLANT PROSTHETIC JOINTS ON MARGINAL BONE RESORPTION: A NMA

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Introduction: the aim of the present systematic review was to investigate the influence of implant-prosthetic joint with the MBL and mechanical failure.

Methods: the screening was conducted using the PubMed/MEDLINE, EMBASE and Google Scholars databases. The eligibility and risk of bias were tested. For the present investigation, RCTs have been considered for statistical analysis. A series of pairwise meta-regressions for continuous variables has been conducted considering the mean differences and 95% CI at two different timepoints: baseline and 1-year follow-up. The meta-analysis was performed comparing the following groups: internal conical prosthetic joint with index (IC), external hexagon bone level position (EI), internal tri-channel connection bone level position (ITC), internal hexagon 1 mm below the bone level (HI), internal hexagon bone level position (HI crest), cone morse 1 mm below the bone level (CM), cone

morse bone level position (CM crest) and internal octagon bone level position.

Results: a total of 247 original articles were screened and 241 were assessed considering the full text. The process excluded 209 articles, and 32 studies were considered for the data synthesis and statistical assessment. At the baseline, the CM showed a more effective efficiency and reduced MBL compared to IC, EI, ITC, internal hexagon, cone morse and internal octagon ($p < 0.05$). CM showed the lower rate of prosthetic complications and structural device failure including abutments and joint components under the loading compared to other joint types.

Conclusions: within the limits of the present study, CM reported a more consistent reduction of MBL follow-up. Despite the low rate of cumulative complications of the implant groups considered, CM joints seem to be less subjected to prosthetic failure at early and medium-term follow-up.

THREE-DIMENSIONAL EVALUATION OF THE MALAR BONE IMPLANT ENGAGEMENT IN 93 ZYGOMATIC IMPLANTS

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Aim: the aim of this cohort study was to assess the amount of Bone Implant Engagement (BIE) of Zygomatic Implants (ZIs) at the malar bone level and its correlation with the Zygoma Anatomy-Guided Approach (ZAGA) classification.

Methods: in 28 patients underwent full-digital rehabilitation with custom-made bone supported guide, 93 ZIs were placed. All cases were pre-operatively classified according to ZAGA classification. A three-dimensional analysis of post-operative Computed Tomography (CT) scans was performed using the software 3DSlicer. After automated CT orientation and standardized landmarks identification, linear measurements involved medial and lateral BIE (mBIE; lBIE) in the malar bone, and the mean value between them (mvBIE). Considering the type of rehabilitation, BIE was differentiated comparing anterior,

posterior, and single implants (AI; PI; SI). Descriptive statistics, bivariate and multivariate analysis were performed setting $\alpha = 0.05$.

Results: the mBIE was 12.45 ± 3.84 for AI, 9.85 ± 3.33 for PI and 12.63 ± 4.19 for SI. Significant differences were obtained between AI and PI, and between PI and SI ($p < 0.05$). The lBIE was 12.55 ± 4.17 for AI, 13.03 ± 4.72 for PI and 16.12 ± 4.32 for SI. The mvBIE was 12.50 ± 3.82 for AI, 11.44 ± 3.03 for PI and 14.37 ± 3.50 for SI. lBIE and mvBIE of SI were significantly higher than AI and PI ($p < 0.05$). No statistical correlation was found between ZAGA classification and BIE ($p > 0.05$).

Conclusions: for all ZIs, mBIE was lower than lBIE. SI showed higher BIE values than AI and PI. A lack of association between BIE and ZAGA classification was observed.

IMPLANTS IN THE MAXILLARY TUBEROSITY (D4 BONE) AS A THERAPEUTIC OPTION TO SINUS LIFTING

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Aim: the limited vertical bone thickness of the rear maxillary sectors due to the damage caused by periodontal disease and by the pneumatization of the maxillary sinus makes the use of implant support prostheses particularly difficult. The sinus lifting procedure is a regenerative therapeutic option, but it is not always practicable. The aim of this study is to assess the use of implants inserted into the tuberosity region (usually type D4 bone) as an alternative therapy to the sinus lifting.

Methods: our experience involves a retrospective study of 1253 Exacone (Leone) implants sample inserted between November 2002 and November 2005 in the Dentistry Department of Gubbio hospital.

Results: the total survival rate of the implants we positioned was 98.5%. Our clinical results show a high percentage of successful implants, even for those inserted in D4 quality bone, confirming the data reported in literature. These percentages although inferior to those obtained for better bone quality (D2, D3), in our opinion represent a satisfactory result. In fact, the therapeutic alternatives offered by procedures of reconstruction and regeneration of the maxillaries, would not have led to improved results in terms of implants survival (90%).

Conclusions: the success rate for implants clearly proves that the positioning of implants in the maxillary tuberosity is an excellent strategy as an alternative to sinus lifting.

EXPRESSION OF IL-1 , IL-6, TNF- , MMP-8 IN SITES WITH AN HEALTHY STATUS AND PERI-IMPLANT DISEASES

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Aim: this study evaluates the expression of IL-1 β , IL-6, TNF- α and a-MMP-8 in gingival crevicular fluid and peri-implant sulcular fluid in sites with a healthy status vs sites affected by peri-implantitis or periodontitis.

Methods: in 112 patients, sites with periodontal health, periodontitis, peri-implant health and peri-implantitis were considered; in each group PPD, PI, GI, BoP were investigated in addition to the expression of interleukins IL-1 β , IL-6, tumor necrosis factor, TNF- α and active metalloproteinase, aMMP-8. In each sample IL-1 β , IL-6, and TNF- α were quantified by ELISA-Duoset[®] kit in combination with Ultramark[®] micro-ELISA digital reader; a-MMP-8 concentration was analyzed by a chairside

test (Perio/ImplantSafe[®]) in combination with a digital reader (ORALyzer[®]).

Results: interleukins IL-1 β , IL-6, TNF- α and MMP-8 concentrations were higher in sites with peri-implantitis and with periodontitis than in sites in healthy conditions ($p < 0.05$); statistically significant higher concentrations of IL-1 β and a-MMP-8 were found in peri-implantitis than in periodontitis sites ($p < 0.05$), while IL-6 and TNF- α didn't differ in each group.

Conclusions: interleukins IL-6 and IL-1 β , TNF- α , a-MMP-8 showed increased levels in sites with peri-implantitis and periodontitis, only the concentration of IL-1 β and a-MMP-8 were significantly higher in peri-implantitis than in periodontitis sites.

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 after 1-2-4 years.

Methods: fifteen patients with fully edentulous mandibles were enrolled in a private dental clinic (Pavia) to receive fixed mandibular prostheses supported by only 2 implants. Alzheimer's Disease, heart attack, cardiac bypass, hypertension, stroke, Diabetes Type-II, prostate carcinoma, breast carcinoma, major depressive disorder and Parkinson's disease were observed as a comorbidity in these frail patients. Surgical and prosthetic complications outcome and marginal bone loss (MBL), aesthetic satisfaction and implant failure were evaluated at 1(T₁) - 2(T₂) - 4(T₃) years.

Results: in T₁ only one implant failure occurred in 2 different

patients were observed. In T₂ was detected 1 prosthetic failure and in T₃ one peri-implant disease was showed. All complications were successfully treated. Two patients dropped out in T₃ after death. At baseline, the mean global marginal bone level was 0.04 mm, the mean MBL was -0.25 mm at T₁, -0.32 mm at T₂ and -0.60 mm at T₃.

Conclusions: after 4-years follow-up the results confirmed the cross-arch prostheses supported by only two implants as a predictable treatment in edentulous frail patients with important comorbidity. Further studies with larger cluster of patients and a longer follow-up will be needed to confirm this therapeutic approach in frail and healthy patients.

INFLUENCE OF ALVEOLAR RIDGE PRESERVATION ON MARGINAL BONE LOSS: A COHORT COMPARATIVE STUDY

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Aim: Alveolar Ridge Preservation (ARP) procedures aim at preserving the alveolar ridge volume while avoiding the need for additional bone grafting procedures at implant placement. The survival rate of implants placed in ARP-treated sites have been reported to be similar to implants placed in spontaneously Healed (SH) Sites. Smoking, parafunctional habits and the emergence angle of prosthetic restorations has been advocated to influence Marginal Bone Loss (MBL). The aim of this study was to assess MBL of implants placed in ARP vs SH sites, and to evaluate possible variables affecting their clinical outcomes.

Methods: a retrospective, cohort comparative study was conducted on patients treated with two implant-supported, single-tooth rehabilitations; one implant placed in an ARP-treated

site (ARP), and one implant placed in a spontaneously Healed Site (SH).

Results: 28 patients (23 females, 82.1%) with 56 implants were included in the study. The mean follow-up at the time of recall was 100 [73.2;133.5] months. A statistically significant difference ($p = 0.032$) was found for the MBL parameter between ARP (0.40 [0.00;1.00]), and SH (1.00 [0.25;1.62]) groups. No statistically significant influence of smoking ($p = 0.946$), parafunctional habits (0.084), and mean prosthetic emergence angle ($p = 0.690$) was observed on MBL.

Conclusions: ARP can significantly reduce bone remodeling around dental implants as compared to SH, and smoking, parafunctional habits and mean prosthetic emergence angle don't seem to affect MBL over time.

ACCURACY OF DIGITAL PLANNING AND CUSTOM ZYGOMATIC IMPLANT GUIDES: A RETROSPECTIVE STUDY

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Aim: this study aimed to assess the accuracy of Zygomatic Implant (ZI) placement using customized bone-supported laser-sintered titanium templates, by assessing linear and angular tridimensional displacements.

Methods: pre-surgical CT of each patient was used to create a surgical virtual plan, which was export ad .stl file. Bone-assisted surgical guides were printed using 3D technology (SLM Technology Sisma MySint 100 Titanium Degree23). A CT was obtained 6 months post-surgery and the segmentation of ZIs were perform. To assess implants placement, 3D analysis was conducted on 3DSlicer software, comparing the planned and placed ZIs: linear and angular displacements were measured at the apex and base of each model.

Results: results of 91 models indicated minimal linear dis-

placement between the planned and placed ZIs. Mean linear displacements at the apex were 0.57 ± 0.49 mm (X-axis), 1.1 ± 0.6 mm (Y-axis), and 1.15 ± 0.69 mm (Z-axis) for the anterior ZI and 0.51 ± 0.51 mm (X-axis), 1.48 ± 0.9 mm (Y-axis), 1.34 ± 0.9 mm (Z-axis) for posterior ZI. Basal displacements for the anterior ZI were 0.33 ± 0.25 mm (X-axis), 0.66 ± 0.47 mm (Y-axis), 0.58 ± 0.4 mm (Z-axis), and 0.39 ± 0.43 mm (X-axis), 0.42 ± 0.35 mm (Y-axis), 0.66 ± 0.4 mm (Z-axis) for posterior ZI. The angular displacements recorded significative differences between the anterior (pitch: 0.52 ± 0.45 ; roll: 0.57 ± 0.44) and posterior ZI (pitch: 1.3 ± 0.78 ; roll: 1.28 ± 1.1) ($p < 0.05$).

Conclusions: the study underscores the accuracy of fully guided surgery in zygomatic implant placement, suggesting its involvement in the decision-making process.

BIOLOGICALLY ORIENTED ALVEOLAR RIDGE PRESERVATION: CLINICAL AND HISTOMORPHOMETRIC OUTCOMES

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Aim: the primary objective is to compare the volumetric outcomes of Biologically oriented Alveolar Ridge Preservation (BARP), with spontaneous socket healing after tooth extraction. The secondary objective is the collection of histological and histomorphometric data to evaluate sites treated with BARP.

Methods: patients presenting a hopeless single tooth surrounded by an intact alveolus with a thin buccal plate (<1 mm) were included. In Test group the socket was filled with a resorbable collagen sponge up to 4-5 mm from the most coronal bone margin. Then, bone substitute, was placed over the sponge to fill the residual portion of the socket until the coronal bone margin and a further layer of resorbable collagen sponge was placed to cover the xenograft. Tooth extraction with no

additional procedures was performed in the control group. Digital impressions, taken with an intra-oral scanner before surgery and after 6 months of healing were compared with a 3D metrology software. After the healing period, implant bed preparations in sites treated with BARP were prepared using a trephine bur allowing the collection of bone samples.

Results: significant volumetric differences were demonstrated between the two groups. Mean vertical bone resorption in mesial, distal and buccal aspects and horizontal resorption of the test sites was significantly lower than in control sites ($p < 0.05$).

Conclusions: this study showed that BARP is an effective technique in preventing horizontal and vertical bone resorption of the alveolar ridge following tooth extraction when compared to unassisted healing.

VACUUM PLASMA TREATMENT DEVICE TO ENHANCE FIBROBLAST ACTIVITY ON TITANIUM SURFACES

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Aim: this study was conducted to compare the effects of a plasma surface treatment device on titanium disks with two different surface topographies [machined (MAC) and moderately rough (SL)].

Methods: 200-MAC and 200-SL titanium disks were used. Each group of disks was divided into 4-subgroups of 40 samples each, subjected to five different tests. Among these, 150-MAC and 150-SL were considered as test group, and they were treated with plasma for 15, 30 and 60 s after being removed from the sterile packaging. 50-MAC and 50-SL were considered as control group and were removed only from the sterile plastic vials. Samples were analyzed to evaluate the capability of plasma treatment to influence protein adsorption, cell adhesion, proliferation and microbial growth on the test group disks compared to untreated disks.

Results: protein adsorption was significantly enhanced after 20 minutes of plasma treatment for 15 and 30 s on MAC and SL disk. Plasma treatment for 15 and 30 s significantly increased the level of adhesion in both treated samples after 30 min. Furthermore, MAC samples show a significant increase in cell adhesion 4 hours after plasma treatment for 15 s. The SEM analysis highlighted that on the treated samples, especially on the MAC disks, the cells with a polygonal and flat shape prevailed, while fusiform and globular shaped cells were rare.

Conclusions: the encouraging results obtained further confirm the effectiveness of plasma treatment on cell adhesion. This plasma device did not alter the sterility of the disks, and it can be considered a valid device to use for the daily abutment decontamination process.

USE OF ELECTRICAL FIELD IN BIOFILM IMPLANT REMOVAL

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Aim: to evaluate the use of an electric field for biofilm removal from implants using a novel implant surface decontamination device.

Methods: three implants suffering from peri-implantitis, an open defect with more than 80% bone loss, purulent exudate, and positive bleeding on probing, with a pocket depth > 6 mm, were selected, although without presenting mobility.

The XIMPLANT machine (LED S.P.A., Aprilia, Italy), acted through the "PERIMPLANTITIS" protocol, in which Alternating Current (AC) flows through the unipolar electrode with a sine wave at 625 kHz, 260 Vpp peak-to-peak voltage and 15 W power, with an amperage of 180 mA, at a temperature of 37°C. Then, the surfaces, appropriately fixed and placed on the supports for SEM observation, using the BSD4 probe, are

observed with scanning electron microscopy (SEM - GEMINISEM 500, Carl Zeiss Microscopy GmbH, Oberkochen, Germany), with increasing magnification (500×, 1.000× e 2.000×).

Results: all three samples showed the absence of microbial biofilm in the application area, while the rest of the observed surface was covered with microbial biofilm, with an intensely thickened bacterial population.

Conclusions: the promising results, together with the data available in the literature, open a new window on therapeutic options for the prevention and treatment of peri-implantitis, with new electrolyte devices acting on both the microbial population and the adhesion of biofilm to the implant surface, with promising results for a new and viable therapeutic option.

SEM-EDX ANALYSIS OF METAL PARTICLES FROM SURGICAL BURS AFTER GIS PROCEDURES

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Aim: the preparation of the implant site in guided surgery procedure takes place without irrigation. This could lead to the formation and release of metal particles, that could represent a trigger for macrophage activity, and consequent implant loss. According to the guided surgical protocol, the study aimed to evaluate the presence of metal particles deposited during implant site preparation.

Methods: the study involved the use of 50 sections of ribs obtained from a 15-month-old pig, surgical guides in plexiglass and a guided surgery drill kit TKD-GUIDED T8C (AB Dental, Ashdod, Israel). This same kit was used 50 times to prepare 50 different implant sites and evaluated at different edges and number of preparation (T₀-neutral edge, T₁-1 full preparation,

T₂-10, T₃-20, T₄-30, T₅-40, T₆-50) by SEM-EDX to assess the presence of any metal deposition.

Results: the presence of metal residues in the implant site increased according to the cycles of use of the drills. We have observed that in the first three groups there is no presence of metals, but it is evident in groups T₃ and T₄. Moreover, the geometry of the preparation of the last 2 groups tends to be more irregular due to the reduced cutting efficiency of the cutters.

Conclusions: the study highlighted how the lack of irrigation in the work site leads the deposition of metal particle and the reduction of the drill's efficiency. These factors alter the shape of the prepared site and reduce the primary stability of the implants.

CROWN STIFFNESS AND PROSTHETIC SCREW ABSENCE. STRESS IN IMPLANT-SUPPORTED RESTORATION

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Aim: this in-silico investigation evaluated the mechanical impact of Morse tape implant-abutment interface and retention system (with and without screw) and restorative materials (composite block and monolithic zirconia) by means of a three-dimensional Finite Element Analysis (3D-FEA).

Methods: four models for the lower first molar was designed. A dental implant was digitized and exported to computer-aided design software. Four different models were generated with the same Morse-type connection, but with a different locking system (with and without active screw) and a different crown material made of composite block and zirconia. Each acquired model was then imported into the Finite Element Analysis (FEA) software as STEP files. The Von Mises equivalent strains were calculated for

the peri-implant bone and the Von Mises stress for the prosthetic structures.

Results: the highest strain values in bone tissue occurred in the peri-implant bone interface and were comparable in the four implant models. The stress peak in the zirconia crown (64.4 MPa) was higher than in the composite crown (52.2 MPa) regardless of the presence of the prosthetic screw. The abutment showed the lowest stress peaks (99.71-92.28 MPa) when the screw was present (126.63-114.25 MPa).

Conclusions: based on this linear analysis, it is suggested that the absence of prosthetic screw increases the stress inside the abutment and implant, without effect on the crown and around the bone tissue. Stiffer crowns concentrate more stress on its structure, reducing the amount of stress on the abutment.

A MORPHO-IMMUNOHISTOCHEMICAL STUDY ON THE GBR WITH NOT RESORBABLE MEMBRANE

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Aim: to evaluate the quality of the regenerated bone in term of histology and immunohistochemical analysis.

Materials: 7 patients were selected and underwent a combined horizontal and vertical GBR technique. 6/7 cases were treated with 50% autologous bone and 50% thermally deantigenated heterologous bone of bovine origin, 1/7 case was treated with 50% autologous bone and 50% heterologous bone of bovine origin enzymatic deantigen. Hematoxylin and eosin staining sections were analyzed to evaluate the bone matrix in terms of thickness and number of trabeculae as well as for the presence of bone cells. Immunohistochemical analysis was performed to study the expression of molecules involved in bone metabolism such as BMP-2, BMP-7 and PTX3 in all samples.

Results: Haematoxylin and eosin analysis showed new matrix formation in all biopsies analyzed. Specifically, in 4/7 patients bone tissues were well formed with neither sign of degeneration nor presence of inflammatory infiltrate. In 2/7 patients bone matrix was well structured but the new bone was less present than in previous cases. Lastly, less new bone matrix was observed in 1/7 patients. Immunohistochemical reactions showed an association between the expression of molecules capable of inducing bone matrix deposition.

Conclusions: the novelty of this study is in the immunohistochemical research related to BMP-2, BMP-7 and PTX3 proteins. In conclusion, the GBR technique with PTFE membranes and underlying graft of AB and ABBMT is able to vertically regenerate a new bone suitable to support implants.

SEM ANALYSIS OF ADHESION PATTERNS OF TITANIUM AND PTFE HEALING SCREWS

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Aim: the long-term maintenance of the implants depends on many factors, including the patient's biotype where the presence of a significant thickness of keratinized gingiva should ensure the presence of a real biological seal, whose formation is also influenced by a healing screw. The latter is normally made of titanium and its cost induces the dentist to use it improperly with more than one patient. The aim of this clinical study is to analyze new PTFE healing screws by exploiting their chemical-physical characteristics and their economic advantages.

Methods: the study was based on 10 patients and 2 implants were inserted in each of them. During the second phase, a tita-

nium healing screw and a PTFE healing screw were placed in. After 7 days, they were removed to be analyzed using an electron microscope.

Results: SEM analysis of the screws showed that the PTFE surface has the ability to accumulate much less organic material than the titanium control screws. Furthermore, PTFE healing screws have been shown to reduce the level of inflammation induced by reuse compared to traditional healing screws.

Conclusions: the reduced cost of the PTFE screw, together with the peculiar characteristics of the material, represent two features that can bring huge benefits in clinical practice.

BUCCAL MUCOSAL THICKNESS AS A PARAMETER TO PREDICT PERI-IMPLANT SOFT TISSUE DEHISCENCE

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Aim: in this study, the relationship between the peri-implant soft tissue height and thickness was hypothesized as a possible parameter to predict the recession or creeping occurring at the vestibular gingiva around implants. Then, the variations of the free gingival margin, based on buccal horizontal thickness, were investigated during a 2-year follow-up.

Methods: 4 months after surgery, each of the 32 implants was restored with a single provisional screw-retained crown, left for 12 months, waiting for tissue maturation. Then, the Mucosal Thickness (MT) and the coronal height at the free Gingival margin Zenith (GZ-H) were measured by the same experienced calibrated operator. These prostheses were removed and a silicone precision impression was taken with an individualized transfer technique. All the parameters were recorded at provisional restoration placement (T_0), at definitive restoration placement, at one-year follow-up, and at two years follow-up.

Results: of the 32 implants inserted, 4 were excluded from the analysis due to damaged stone casts. Group 0 (MT <3.5 mm) had an average Δ GZ-H of -0.86 mm while for Group 1 (MT >3.5 mm) it was +0.77 mm at 2-years of follow-up ($p = 0,045$). The correlation between grouping and GZ-H variations progressively increased its strength at the different follow-up times. The distribution of GZ-H variations across the subgroups of sextant and gender do not present significant differences, hence these variables do not seem to affect the GZ-H variations.

Conclusions: this study showed that mucosal thickness can condition buccal soft tissue maturation and stability. Specifically, a mucosal thickness over the cut-off value of 3.5 mm should be pursued at provisional placement to reduce the chances for a gingival recession to occur. Implant position and gender did not seem to have an influence.

THE RELATION BETWEEN THE VACUUM EFFECT IN THE BUCCAL AREA AND PERI-IMPLANT TISSUE GROWTH

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Aim: in this study, a novel device based on the communicating vessel concept is created to confirm the presence of an intra-oral negative pressure at rest, relative to the atmospheric one. Thus, the null hypothesis is that a different pressure exists at rest in the vestibular space having the atmospheric pressure as a reference.

Methods: in this preliminary study, including two participants (1 male: 45 tests; 1 female: 15 tests), the tube is positioned in different zones and conditions categorized as Awake Anterior region (AA-P), Awake Posterior region (AP-P), and Sleep Posterior region (SP-P). The values are recorded by taking a sequence of photographs every 5 seconds during an observance period of 20 minutes. Taking into account an acclimatization period required due to the presence of a foreign body in the mouth, only the final 200 of 240 measurements performed are considered.

Results: the negative intra-oral pressure at rest in the buccal

area is confirmed and it seems to be settled at -1,25 mmHg. This value is in line with previous studies that measure swallowing peak pressure and the ones that attempt to evaluate the intra-oral pressure exerted by the cheeks and lips muscles. Moreover, no significant variations are identified in different individuals, across the sectors of analysis or based on the waking state.

Conclusions: thanks to the results of this study, the theories hypothesizing a relation between peri-implant tissue maturation in the buccal area and a vacuum effect find more support. According to the authors, this phenomenon is probably explainable by the activation of a gradient on the gingival microcirculation. Within the limitation of the present sample size, this research confirms the null hypothesis representing a starter point for further exploration of this topic with helpful implications for implant dentistry practices.

THE EFFECT OF DIFFERENT GAPS ON THE IMMEDIATE POST-EXTRACTION IMPLANT REHABILITATION. A PILOT STUDY

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Aim: the alveolar bone undergoes important changes in the post-extraction phase: characterized by both vertical and horizontal resorption. the objective of this study is to evaluate whether in the immediate post-extraction implant gap between the implant surface and the bone can influence the aesthetic results and the resorption of the peri-implant hard tissues.

Methods: in this study, PD and peri-implant bone resorption observed radiographically 6 and 12 months later were evaluated as parameters to evaluate the success of implant rehabilita-

tion. The patients weredivided into two groups, the first group had a gap of 1mm, the second group had a gap between 2 and 3 mm. All the gaps were no treated.

Results: between the two groups examined, no statistically significant difference was observed.

Conclusions: despite the limitations of this preliminary study associated with a small sample numbe, the results highlight that gap dimensions of 3 mm do not seem to predispose to significant peri-implant bone resorption in immediate implants in the frontal area of the maxilla.

DIGITALLY GUIDED IMPLANT-PROSTHETIC REHABILITATION: FROM BIOENGINEERING TO DENTISTRY

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Aim: bioengineering has made it possible to improve the prosthetic components and increase the predictability of rehabilitation. The study aims to guide the positioning of implants, considering both prosthetic rehabilitation and anatomical conditions. It will use finite element analysis to improve planning and achieve an optimal anatomical-prosthetic-biomechanical position through digitally guided surgery.

Methods: thanks to digitalization, dentistry can now perform fully digital diagnosis, treatment plans, guided surgery templates, and prosthetic production. Finite Element Analysis (FEA) is critical to understanding biomechanical behavior. The von Mises criterion and The Fracture Mechanics Analysis are applied to the FEA to consider the occlusal and masticatory forces.

Results: seven phases are required to insert dental implants

according to the protocol: anamnestic collection, instrumental examination, image matching and transformation from .dicom to .stl, the first design of a prosthodontic with an advantageous position from a biomechanical point of view, implant positioning respecting anatomy as much as possible, realization of definitive prosthetic design, first simulation, analysis of force peaks and attenuation by moving dental implant, definitive implant planning, realization of the surgical guide, surgical intervention.

Conclusions: bioengineering continues to revolutionize dentistry after performing routine instrumental examinations now consolidated in clinical practice; the opportunity to perform this simulation would allow short-term and long-term rehabilitation.

TREFOIL SYSTEM FOR THE TREATMENT OF MANDIBULAR EDENTULISM: A 7 YEAR FOLLOW UP

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Aim: to evaluate peri-implant health, prosthetic success and patient satisfaction as primary outcomes of Trefoil system.

Materials and Methods: this study included 20 patients (aged 58-81) who underwent a surgical treatment for implant placement and prosthetic rehabilitation using Trefoil system. A total of 60 implants were placed. All patients have been recalled for a clinical examination consisting in Bleeding on Probing (BOP), Plaque Index (PI), Peri-implant Probing Depth (PPD) measurements at 7 years. All prosthetic complications were reported. Intraoral periapical radiography was compared at 1-year and 7-year follow-up visit to evaluate Peri-implant Bone Loss (PBL). The analogical x-rays were digitalized and analyzed using an open source image analysis program, 'GIMP'. The prosthetic satisfaction was rated on a scale 1 to 10 by the patients through an oral interview.

Results: 15 out of 20 patients completed the follow-up examinations (5 dropout not related with rehabilitation failures). The implant survival rate was 100%. The Mean BOP (%) was 21 ± 18 , the Mean PI (%) $40,7 \pm 32,2$, the Mean PPD (mm) $2,64 \pm 1,2$ and the Δ PBL (mm) between 1- and 7-year $0,25 \pm 0,7$. The Prosthetic Survival Rate was 93,4%: one prosthesis broke 1 year after loading and it has been replaced with a custom-made prosthesis. No screw loosening were reported. The Mean Patient Prosthetic Satisfaction was 9,1.

Conclusions: the Trefoil system has proven to be a reliable long-term rehabilitation method with excellent patient prosthetic satisfaction even if plaque control and oral hygiene are not optimal.

ANALYSIS OF DIFFERENT ABUTMENT SURFACES ON SOFT TISSUE: A SPLIT-MOUTH RCT

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Aim: the objective of this research was to evaluate the soft tissue reaction around laser machined and microgrooved prosthetic implants for one year by analyzing the levels of IL-6, IL-1 β and MMP-8 in Peri-Implant Crevicular Fluid (PICF).

Methods: 24 patients were observed who each received an implant, an immediate healing abutment and a prosthetic abutment with a machined surface (group M) and an implant, an immediate healing abutment and a prosthetic abutment with a laser microgrooved surface (group LMS) with both groups having a split mouth design on the same jaw. PICF sampling, Pocket Probing Depth (PDD), and Bleeding on Probing (BOP) were as-

essed at 1,3, and 12 months. The levels of IL-6, IL-1 β and MMP-8 were determined using the Enzyme-Linked Immunosorbent System (ELISA), while the 1-, 3- and 12-month groups were compared using repeated measures ANOVA.

Results: at 3 and 12 months, the LMS group showed significantly lower PD, BOP and IL-6, IL-1 β and MMP-8 levels than the M group ($P < .05$).

Conclusions: this study indicates that around implants/abutments with a laser microgrooved surface there are fewer remodeling and/or inflammatory phenomena compared to implants/abutments with a machined surface.

ALVEOLAR RIDGE RECONSTRUCTION: AUTOGENOUS TOOTH ROOTS VS ICE CREAM CONE TECHNIQUE

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This randomized controlled clinical trial compares clinical and histomorphometric outcomes of autogenous Tooth Roots (TRs) (Schwarz et al. 2018) versus the Ice Cream cone technique (IC) (Elian et al. 2007) for alveolar ridge reconstruction.

Patients with a hopeless single tooth and type II extraction socket were randomly allocated to TRs or IC groups. In TRs, autogenous roots derived from the extracted tooth and stabilized with osteosynthesis screws were used to reconstruct the missing buccal wall of the socket, while a resorbable collagen membrane and xenogeneic granules were utilized in IC. After six months, implant sites were prepared and samples collected. Digital impressions were taken at baseline (T_0) and before implant placement (T_1) and dimensional changes were analysed using 3D metrology software. Data distribution was as-

essed by using Kolmogorov-Smirnov test and, due to the normality of data, Student's t-test was performed for inter-group comparisons.

16 patients were included (TRs = 8; IC = 8). Mean total horizontal ridge resorption was 3.76 ± 0.57 mm (TRs) and 3.72 ± 0.59 mm (IC) ($p = 0.098$). The vertical resorption at mid-buccal aspect was 1.66 ± 0.48 mm (TRs) and 1.94 ± 0.71 mm (IC) ($p = 0.05$). Histomorphometry showed higher vital bone percentage in TRs (49.5 ± 11.2) compared to IC (23.9 ± 12.3) ($p = 0.002$), and a lower marrow spaces percentage in TRs (35.5 ± 18.9) compared to IC (57.6 ± 23.7) ($p = 0.01$).

Both TRs and IC represent suitable approaches for alveolar ridge reconstruction of type II extraction sockets. However, TRs showed superior bone quality with higher vital bone percentage.

A COMPARISON OF IMPLANT STABILITY OVER 90 DAYS: MAGNETIC MALLET VS OSSEODENSIFICATION BURS

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Introduction: implant stability depends on bone density, implant design, and surgical technique used in site preparation. Magnetic Mallet (MM) and Osseodensification Drills (OD) aim to improve implant stability in poor-quality bone.

Aim: this study monitored changes in implant stability over 90 days after placement using OD or MM. It also evaluated the impact of preparation technique, Insertion Torque (IT) and crown emergence profile on Marginal Bone Loss (MBL).

Methods: each patient received two identical implants in the posterior maxilla. Test sites were randomly assigned and prepared with MM, while control sites with OD. ISQ was measured immediately post-surgery and at 7, 14, 21, 28, 60, and 90 days. Radiographic measurements were taken at T_0 (post-surgery), T_1 (prosthesis delivery), and T_2 (1-year

post-loading). Parametric and non-parametric tests and linear regression analysis were performed.

Results: fourteen patients (9 M, 5 F; mean age: 49.7 ± 14.3 years) were included. After one year, all implants were in function. Median IT was 55.0 (IQR 49) Ncm in MM, and 65.5 (IQR 20.8) Ncm in OD ($p = 0.150$). Baseline ISQ values were 70.0 ± 6.5 (MM) and 74.8 ± 5.0 (OD) ($p = 0.273$). Both groups initially decreased in stability, followed by increasing ISQ values after 21 days. OD had significantly higher ISQ values at 28, 60, and 90 days ($p = 0.025$, $p = 0.013$ and $p = 0.017$, respectively). MBL from T_0 to T_1 was significantly related only to IT ($p = 0.016$).

Conclusions: no significant differences in primary stability were observed between MM and OD; however, OD performed better in achieving secondary stability.

SOFT TISSUE GRAFTING WITH A VOLUME STABLE COLLAGEN MATRIX FOR IMMEDIATE IMPLANTS: A RCT

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Aim: immediate implants are a reliable solution to replace hopeless teeth, but they may be associated to an increased risk of soft tissue complications. Soft tissue grafting with autogenous Connective Tissue (CTG) is the gold-standard treatment to reduce the risk of recession but harvesting procedures can be associated to complications. Therefore, the use of Volume Stable Collagen Matrixes (VCMXs) has been introduced. We report the 1-year results of a RCT on immediate implants placed with or without a soft tissue augmentation with a VCMX.

Methods: patients who needed type 1 immediate implants in the esthetic area were included in the study. The primary outcome was the evaluation of Soft Tissue Thickness (STT) at 3 and 6 mm from the margin. The Secondary outcomes were the Pink Esthetic Score (PES), Marginal Bone Loss (MBL), surgery

time and PROMs. The data were collected before surgery and at follow-up.

Results: twenty-three patients who received 23 implants (12 in the test group and 11 in the control group) were included in this analysis. The Test Group showed a significantly higher STT at 3 mm (4.3 ± 1.4 vs 1.8 ± 0.3 mm; $p < 0.0001$) and 6 mm (3.5 ± 1 vs 2.7 ± 0.6 mm; $p = 0.05$) as compared to the Control Group. The PES was 12.9 ± 1 in the Test Group e 11.4 ± 1.5 in the Control Group, with a statistically significant difference ($p = 0.027$). No differences between groups were observed for the other parameters.

Conclusions: at 1-year follow-up, the use of a VCMX significantly improved the SST and PES of type 1 immediate implants as compared to implants placed without a VCMX.

NANO-SUPERHYDROPHILIC AND BIOACTIVE SURFACE IN POOR BONE ENVIRONMENT

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Aim: to evaluate the Implant Stability Quotient (ISQ) values at the implant insertion (T_0) and at critical time points [30 (T_{30}) and 45 days (T_{45}) after surgery] by comparing a traditional moderately rough surface with a bioactive surface in D3/D4 bone. An additional aim was to compare loading time and Marginal Bone Loss (MBL) of both groups.

Materials and Methods: patients requiring an implant-prosthetic rehabilitation and with D3 and D4 bone density were recruited and consecutively allocated into two groups. Bioactive (Test Group, TG) and traditional (Control Group, CG) surfaced implants were placed with guided surgery. Insertion Torque Value (ITV, Ncm), insertion torque curve integral (I), ISQ measured at three different time points (T_0 , T_{30} , T_{45}), time of loading, and MBL (mm) at 6 months were assessed.

Results: at the end of the study, 30 implants were analyzed in the TG (18 x D3, 12 x D4) and 30 (22 x D3, 8 x D4) in the

CG. The mean ISQ values at T_0 , T_{30} , T_{45} were 74.57 ± 7.85 , 74.78 ± 7.31 , 74.97 ± 6.34 in TG group, and 77.12 ± 5.83 , 73.33 ± 6.13 , 73.44 ± 7.89 in CG group, respectively. MBL at 6 months was respectively 0.20 (0.18, 0.44) mm and 0.00 (0.12, 0.48) mm for TG and CG with no statistical significance ($p = 0.21$). Data analysis showed statistically significant differences between groups in DISQ at T_0 - T_{30} ($p = 0.005$) and T_{30} - T_{45} ($p = 0.012$). CG showed a statistically significant decrease in ISQ at T_{30} ($p = 0.01$) and T_{45} ($p = 0.03$) compared to baseline, while no significant change was observed in TG.

Conclusions: within the constraints of this study, the current data suggest that the bioactive surface implant exhibited superior performance in terms of stability in D3-D4 bone quality during the early stages of bone healing, implying a more rapid transition from primary to secondary stability.

EFFECT OF VACUUM PLASMA ACTIVATION ON IMPLANT STABILITY. A MULTICENTER RCT

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Aim: the aim of this randomized clinical trial is to longitudinally monitor the stability of implants inserted after vacuum plasma activation, comparing it with that of non-activated implants.

Methods: sixteen patients (11 M, 5 F; mean age: 59.1 ± 8.9 years) received two adjacent or contralateral implants (Anyridge, Megagen, Gyeongbuk, South Korea) of same diameter and length (total 32 implants). Test implants were subjected to vacuum plasma activation immediately before insertion (Plasma X Motion, Megagen, Gyeongbuk, South Korea), whereas those in the control group were not. Implant Stability Quotient (ISQ) was measured post-surgery and at days 7, 14, 21, 28, 42, 60, and 90.

Results: survival rate was 100% in test group and 93.7% in

control group (one implant lost after 28 days). Implant stability decreased in both groups from implant placement to day 21, followed by increasing ISQ values. The maximum loss of stability compared to baseline was 5.4% in the test group and 11.8% in the control group. ISQ values were significantly higher in test than in control group at 7, 21 and 28 days, ($p = 0.044$; $p = 0.027$; $p = 0.007$). Intra-group comparisons showed statistically significant difference in control group ($p = 0.014$) and not in test group ($p = 0.053$).

Conclusions: implants treated with vacuum plasma before placement showed minimal loss of stability in the early stages of healing, significantly lower if compared to those untreated.

ACCURACY OF DYNAMIC NAVIGATION FOR IMPLANT PLACEMENT IN AESTHETIC ZONE

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Aim: to assess dynamic navigation guided surgery accuracy for implant placement in the aesthetic zone.

Methods: consecutive edentate patients in need of at least 1 implant in the aesthetic zone were treated between December 2021 and January 2023. Implant placement accuracy was evaluated with an AI driven algorithm segmenting in Standard Tessellation Language (STL) pre- and post-operative Cone Beam Computed Tomographies (CBCT) and superimposing with implant planning file. Linear (mm) and angular (°) deviations were measured at implant platform and apex. Mean values and Standard Deviations were calculated to investigate how the implant site characteristic (Healed vs Post-Extractive) and the type of arch (Maxilla vs Mandible) affects the accuracy.

Results: 60 implants in 40 patients were placed. The overall Global platform (GP) and Global Apex deviation (GA) were 1.07 mm (SD 0.45 mm) and 1.22 mm (SD 0.55 mm), with a mean

Angular Deviation (AD) of 1,98° (SD 0,96°). The null hypothesis was that jaw (maxilla vs mandible) and implant site (healed vs post-extractive) do not influence the accuracy. The results in the healed sites (1,95±0,6 AD, 0,98±0,38 GP and 1,05±0,44 GA) were similar with the post-extractive sockets (2,12±1,02 AD, 1,27±0,70 GP and 1,30±0,78 GA). Also, similar values were between the maxilla (2,12±0,75 AD, 1,16±0,61 and 1,3±0,70) and the mandible (1,79±0,75 AD, 1,18±0,73 GP and 1,24±0,73 GA). Mean values and Standard Deviations with confidence interval were calculated to investigate how the implant site characteristic (Healed vs Post-Extractive) and the type of arch (Maxilla vs Mandible) affect the accuracy.

Conclusions: dynamic CAIS enhanced operator performance in a sector where the accuracy is crucial. Implant site characteristics and the type of arch did not affect significantly the accuracy values.

IMMEDIATE VS DELAYED LOADING WITH TWO-PIECE ZIRCONIA IMPLANTS: RANDOMIZED CLINICAL TRIAL

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Aim: this study outlines a multicenter randomized controlled trial examining a new two-piece zirconia implant configuration in the molar or premolar region, comparing immediate loading with delayed loading in the original bone, without the use of regenerative techniques.

Methods: these implants have a 3.3 mm deep 3C connection for a custom glass fiber abutment. The implant's textured surface ensures strong primary stability and integration with surrounding bone. A 2.5bmm transgingival collar promotes soft tissue healing. Before surgery, OPT and CBCT scans are done to assess eligibility. Subsequently, a 3D scan is performed, followed by the placement of the selected implant. If the patient is allocated to the immediate loading group, an additional intraoral 3D scan is undertaken

post-surgery to fabricate a PMMA temporary crown along with the customized abutment, handled by the same laboratory across all participating centers. This temporary crown is then loaded one week later. Seven weeks post-surgery, both groups get an intraoral 3D scan for the final crown, cemented the next week. Follow-up appointments are biannual for five years.

Results: the primary outcome will involve monitoring the success of the implants within the respective groups. Secondary parameters pertaining to peri-implant health and the occurrence of any complications will also be assessed.

Conclusions: this report aims to demonstrate how ceramic implants, are considered a routine treatment option for the clinician by demonstrating long-term success.