

IMPACT OF DIFFERENT IMPLANT NECK SURFACES ON SOFT TISSUE HEALING AND CRESTAL BONE LEVELS

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Aim: this study aimed to investigate the influence of different implant neck surface characteristics on soft tissue healing and crestal bone levels.

Methods: monoblock implants with a transgingival concave neck were randomly placed at the crestal level in eight dogs. A total of 16 implants were used: eight with an anodized surface (anodized group) and eight with a non-anodized surface (non-anodized group). After three months of healing, the implants were retrieved and processed for histological analysis. The quality and quantity of peri-implant tissues were evaluated.

Results: histological analysis revealed that all implants were suc-

cessfully osseointegrated, and peri-implant mucosa surrounded the abutment surface in all 16 specimens. Given the same macrostructure of the implants, the different neck surface characteristics did not significantly influence soft tissue height or crestal bone resorption. However, a trend for reduced crestal bone resorption was observed in the anodized group. In addition, polarized light analysis showed that collagen fiber orientation was not affected by the implant neck microstructure.

Conclusions: implant neck microstructure may provide slight improvements in peri-implant tissue response; however, these differences were not statistically significant.

BONE REGENERATION AND DELAYED IMPLANT PLACEMENT OF THE ANTERIOR MANDIBLE AFTER TRAUMATIC TOOTH LOSS: A CLINICAL CASE REPORT

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Aim: the aim of this paper is to describe a clinical case of a stepwise guided bone regeneration (GBR) approach for the reconstruction of a post-traumatic anterior mandibular defect, focusing on restoring adequate bone volume to allow for predictable delayed implant placement.

Methods: a 21-year-old patient presented with traumatic loss of the mandibular incisors (3.1, 3.2, 4.1, 4.2) and severe interforaminal bone resorption. A two-stage surgical protocol was planned. In the first phase, horizontal GBR was performed using autogenous bone harvested from the mandibular symphysis and combined with a xenogeneic bovine-derived bone block stabilized with titanium pins. Intramarrow perforations were performed to improve vascularization. The graft was covered with a resorbable bovine pericardial membrane (BioRi-

par®) and a primary closure without tension was achieved. After a 6-month healing period, clinical assessments and CBCT were performed before implant placement.

Results: reentry revealed satisfactory bone regeneration with adequate ridge width and height. Two implants (3.3 × 11 mm at site 3.2 and 3.3 × 10 mm at site 4.2) were placed with good primary stability. Healing occurred without incident, without intra- or postoperative complications.

Conclusions: this case suggests that a stepwise horizontal GBR approach combining autogenous and xenogeneic grafts, protected by a resorbable membrane, is a reliable and predictable technique for reconstructing post-traumatic anterior mandibular defects, allowing for successful delayed implant placement under optimal conditions.

DUAL-GUIDE DIGITAL PROTOCOL: INTEGRATING GUIDED IMPLANT PLACEMENT AND NATURAL CROWN ORIENTATION FOR IMMEDIATE AESTHETIC LOADING. A CASE REPORT

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Aim: to describe a “Dual-Guide” protocol for the immediate replacement of a fractured maxillary incisor (1.1), focusing on the aesthetic and psychological benefits of reusing the patient’s natural crown as a biological provisional.

Methods: following a traumatic fracture, a fully digital workflow was chosen to minimize invasiveness. After a flapless extraction, a primary 3D-printed guide ensured precise implant placement. Simultaneously, the patient’s fractured crown was modified and bonded to a titanium abutment. A second dedicated surgical template was used to orient this temporary crown during immediate loading. This approach ensured an ideal emergence profile in a single session. After a 6-month osseointegration period, a definitive zirconia-ceramic restoration was fabricated and delivered.

Results: this protocol allowed the patient to recover his smile instantly with a “familiar” aesthetic, significantly reducing the psychological impact of the trauma. The natural temporary crown perfectly preserved the gingival architecture and the original papillae. The transition to the final prosthesis was seamless, benefiting from the stable and harmonious soft tissue profile shaped by the natural tooth during the healing phase.

Conclusions: the synergy between “Dual-Guide” technology and biological reuse provides a predictable, minimally invasive, and deeply personal approach. This workflow ensures immediate patient satisfaction without compromising the long-term excellence of the final prosthetic result.

FULL-ARCH MAXILLARY IMPLANT FAILURE AND SALVAGE REHABILITATION WITH NASAL FLOOR ELEVATION: A 7-YEAR FOLLOW-UP CASE REPORT

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Aim: to describe the management of a failed full-arch maxillary implant rehabilitation and its salvage through implant repositioning combined with nasal floor elevation, with a 7-year clinical and radiographic follow-up.

Methods: a patient presenting with failure of a full-arch maxillary implant-supported prosthesis underwent comprehensive clinical and radiographic evaluation. Implant failure was associated with inadequate positioning and insufficient bone support in the anterior maxilla. A salvage treatment plan was developed, including removal of failed implants, site debridement, and staged implant repositioning. Nasal floor elevation was performed to increase vertical bone availability in the anterior maxilla. New implants were placed following prosthetically driven planning, and a provisional prosthesis was delivered. The patient was followed up clinically

and radiographically over a 7-year period.

Results: the salvage approach resulted in successful osseointegration of the newly placed implants, with stable peri-implant tissues and satisfactory functional and aesthetic outcomes. Radiographic evaluation demonstrated maintained bone levels over time. No biological or mechanical complications were observed during the 7-year follow-up period.

Conclusions: salvage rehabilitation of failed maxillary full-arch implant restorations can be predictably achieved through careful re-planning and the use of advanced surgical techniques such as nasal floor elevation to restore adequate bone volume. Long-term follow-up confirmed the stability and reliability of this approach. However, as a single case report, these findings should be interpreted with caution and validated by further clinical studies.

FULL-ARCH MANDIBULAR REHABILITATION ON FOUR IMPLANTS USING A MODULAR GUIDED SURGERY WORKFLOW WITH IMMEDIATE PREFABRICATED PROVISIONALIZATION: A CLINICAL CASE REPORT

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Aim: to present the clinical workflow and short-term outcomes of a full-arch mandibular rehabilitation supported by four implants placed using a modular guided surgery system that allows control of each surgical phase, from tooth extraction to immediate prosthetic provisionalization.

Methods: a patient requiring mandibular full-arch rehabilitation underwent prosthetically guided digital planning based on cone-beam computed tomography (CBCT) and intraoral scanning. Four implants were virtually planned in the interforaminal region according to prosthetic requirements. A sequential modular surgical guide system was produced to assist residual tooth extraction, implant site preparation, implant placement, and delivery of a prefabricated immediate provisional prosthesis. Primary implant stability, correspondence with the digital plan, and surgical time were clinically assessed.

Results: all implants were positioned according to the virtual planning and achieved sufficient primary stability to permit immediate loading. The prefabricated provisional prosthesis was delivered as planned, without significant intraoperative adjustments. The guided surgical protocol provided improved procedural control and reduced operative time compared with conventional freehand techniques. No intraoperative complications were observed.

Conclusions: the modular guided surgery protocol allowed accurate implant positioning and reduced the deviations commonly associated with freehand implant placement, while improving surgical efficiency. Careful digital planning was essential for obtaining predictable functional and prosthetic outcomes. As this report describes a single clinical case, the findings cannot be generalized and should be confirmed by prospective controlled studies.

IATROGENIC ABUTMENT SCREW FRACTURE DURING IMPRESSION PHASE WAS MANAGED WITH FRAGMENT RETRIEVAL AND THREAD RECONDITIONING, PRESERVING IMPLANT INTEGRITY AND ALLOWING CONTINUATION OF PROSTHETIC TREATMENT

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Aim: to describe the clinical management of an unusual iatrogenic complication: the fracture of a healing abutment during unscrewing procedures. The report highlights the diagnostic sequence triggered by the inability to seat an impression coping and details the surgical technique used for fragment retrieval and internal thread reconditioning to preserve implant integrity.

Methods: a 64-year-old female patient with a Bone Level implant in site 2.3 was treated. During the impression phase, an iatrogenic fracture of the abutment screw occurred, with apical migration inside the implant body. Radiographic evaluation confirmed the presence of the fragment. A retrieval procedure

was performed using dedicated instrumentation, followed by internal thread reconditioning with a tap.

Results: the fractured screw was successfully removed without compromising the implant structure. The internal threading was restored, ensuring adequate mechanical stability, and a healing abutment was placed. The implant was preserved, allowing continuation of the prosthetic rehabilitation without complications.

Conclusions: early recognition and proper management of iatrogenic abutment screw fracture are crucial to avoid implant failure and removal. The use of appropriate retrieval techniques enables implant salvage and continuation of treatment.

REHABILITATION OF THE ANTERIOR MAXILLA WITH GUIDED SURGERY FOR IMMEDIATE PLACEMENT AND LOADING

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Aim: this study evaluates the clinical outcomes of immediate implant placement and loading in the anterior maxilla using flapless guided surgery, with focus on digital workflow and peri-implant soft tissue management.

Methods: a 53-year-old male patient presents for replacement of 1.1, 1.2, 2.1 and 2.2 after traumatic subluxation and progressive root resorption. Clinical examination, intra-extraoral scanning and CBCT show adequate bone volume for a type 1 immediate implant placement protocol. After atraumatic extraction, guided osteotomies are performed at sites 1.2 and 2.2 using the Mech and Human guided drilling protocol and two Shard implants 3,5 x 15 mm are placed. A de-epithelialized connective tissue graft is positioned to support the buccal soft tissue. An immediate provisional prosthesis is delivered without occlusal contacts.

Results: sutures are removed after 7 days. No biological or prosthetic complications are observed. At the follow up peri-implant soft tissues appeared healthy, stable, and well contoured.

Conclusions: guided surgery represents a key factor in the predictability of immediate implant placement and loading in the anterior maxilla. The digital workflow allows minimally invasive surgical approach, optimizes the use of the available residual bone, contributes to primary stability, supports immediate provisionalization, and improves control over the esthetic outcome. When combined with appropriate soft tissue augmentation, guided surgery enhances peri-implant tissue stability and may reduce the risk of biologic, prosthetic, and esthetic complications.

BIOLOGICAL ORIENTED IMMEDIATE LOADING (B.O.I.L.) WITH OSSTEM IMPLANTS: A CASE REPORT WITH 18 MONTH FOLLOW-UP

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Aim: the long-term success of implant therapy depends on peri-implant bone stability. The Biological Oriented Immediate Loading (B.O.I.L.) protocol, introduced by Fabrizio Bambini, aims to preserve biological width and reduce marginal bone loss through implant positioning based on soft tissue thickness. This study evaluates 18-month clinical outcomes of an immediate loading full-arch rehabilitation.

Methods: a 65-year-old female with stage IV periodontitis was treated using the B.O.I.L. protocol. Seven implants (Osstem ET III SA) were placed immediately after extraction with insertion torque >55 Ncm. Multi-unit abutments were placed at surgery, and a

fixed provisional prosthesis was delivered within 12 hours. A definitive zirconia prosthesis was placed after 4 months. Radiographic evaluations were performed at T0, 6, 12, and 18 months.

Results: radiographs showed minimal marginal bone loss over 18 months. Most remodeling occurred within the first 6 months, followed by stability. Mean marginal bone level variation was 0.07 ± 0.10 mm.

Conclusions: the B.O.I.L. protocol proved effective and predictable for immediate loading, promoting healing, reducing post-extractive bone resorption, and maintaining peri-implant stability over time.

INLAY TRIPLE-LAYER TUBEROSITY GRAFT FOR RIDGE AUGMENTATION: A NOVEL AUTOLOGOUS TECHNIQUE FOR COMBINED HARD AND SOFT TISSUE MANAGEMENT

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Aim: to describe a ridge augmentation technique using a trilaminar autogenous graft from the maxillary tuberosity, aimed at maintaining alveolar ridge architecture before implant placement.

Methods: a non-restorable tooth (2.3) was atraumatically extracted. A composite graft, including cortico-cancellous bone, connective tissue, and epithelium, was harvested as a single block from the maxillary tuberosity using a trephine bur. The graft was de-epithelialized and shaped to fit passively within the socket. The osseous component was placed within the defect, while the connective tissue layer sealed the coronal access. Stabilization was achieved using non-resorbable sutures to allow primary intention healing.

Results: postoperative discomfort was minimal, with no donor

site complications. At the 6-month re-entry for implant placement, clinical and radiographic evaluation showed preservation of ridge dimensions, increased soft tissue thickness, and adequate keratinized mucosa, avoiding the need for further augmentation procedures. At 4 years, tissues remained stable with favorable esthetic outcomes.

Conclusions: the inlay triple-layer tuberosity graft appears to be a minimally invasive approach for ridge augmentation, combining autogenous bone and tuberosity-derived connective tissue to limit post-extraction resorption and improve soft tissue quality. De-epithelialization may be a key step, exposing the connective matrix and promoting integration through epithelial-mesenchymal interactions and dynamic reciprocity.

IMMEDIATE LOADING FULL ARCH REHABILITATION USING INTRAORAL PHOTOGRAMMETRY AND FACIAL SCAN: CASE REPORT

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Aim: the objective of this case report is to show a digital approach in immediate loading full-arch rehabilitation using intraoral photogrammetry and facial scan

Methods: a 70 y.o. man with maxillary and mandibular hopeless dentition required a maxillary and mandibular full-arch rehabilitation. ASA II patient with previous lung stroke in 2013, in anti platelet and antihypertensive drug therapy. The first step of digital surgical planning is to match the pre-operative data (CBCT, intraoral scan, facial scan); maxillary and mandibular initial anatomical conditions have been reproduced. The lower arch was rehabilitated with a temporary partial denture to set up a correct occlusal plane at the defined VDO. The pre surgical intra-oral scan allowed the operator to record bite registration. A full thickness flap was elevated and after hopeless teeth extraction, in upper arch 4 im-

plants Nobel Active RP (3: 4.3 x 15 mm, 1: 4.3 x 13mm) were positioned, tilting distal implants to optimize the residual native bone, in lower arch 4 implants Nobel Parallel RP 4.3 x 13mm. Multi unit abutment were screwed. Post surgical intraoral photogrammetry (IPG) was performed using scan flags and scan caps intraoral photogrammetry complete workflow.

Results: 48 hours after the surgery, the patient received his immediate rehabilitation, restoring masticatory function, aesthetics and phonetics

Conclusions: IPG represents an efficient and predictive technique for post surgical full-arch immediate loading scan procedures. This workflow reduces the problems related to post-surgical bleeding and the deformations incorporated in the intraoral scan procedures in the edentulous patient.

LATE UNILATERAL PERIGRAFTITIS 8 YEARS AFTER BILATERAL SINUS FLOOR ELEVATION: A CASE REPORT

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Aim: to describe the clinical, radiographic and histological features of a late-onset infection involving grafted bone surrounding a dental implant.

Methods: a 65-year-old male presented with pain and swelling in the left posterior maxilla, 8 years after bilateral sinus floor elevation with autologous bone graft and simultaneous implant placement. Clinical examination and radiographic images such as cone beam computed tomography (CBCT) revealed localized bone loss associated with the implant and the grafted area, without pathological PPD. The implant and the graft were surgically removed, the site was debrided, and the retrieved tissues were submitted for histological analysis. After surgery, the patient underwent a clinical and radiological follow up protocol.

Results: clinical and radiographic findings were consistent with a localized infection confined to the grafted bone surrounding the implant. Histological examination revealed inflammatory infiltrate associated with residual graft particles and areas of necrotic bone. Following surgical treatment, complete resolution of symptoms was observed.

Conclusions: this case highlights a late complication affecting grafted bone after sinus floor elevation via lateral in association with dental implants. The combined clinical and histological findings suggest that such presentations may differ from conventional peri-implantitis and warrant further investigation to better define their pathological and clinical significance.

EVALUATION OF NEW BONE FORMATION IN AN IMMEDIATE POST-EXTRACTION CASE WITH IMMEDIATE LOADING USING A CONVERGENT TRANSMUCOSAL IMPLANT PLACED WITH GUIDED SURGERY

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Introduction: immediate implant placement in post-extraction sockets, combined with immediate loading, reduces treatment time and preserves hard and soft tissue volumes. Guided surgery allows prosthetically driven planning and accurate three-dimensional implant positioning, improving relationships with alveolar walls and peri-implant tissues. In sites with bone defects or discrepancies, regenerative procedures support stability and maturation of the peri-implant compartment.

Objective: to evaluate the adaptation of hard and soft tissues around an implant with a convergent transmucosal component in a 50-year-old patient undergoing immediate post-extractive placement with immediate loading and simultaneous bone regeneration and guided surgery.

Materials and methods: case report of a 50-year-old patient

undergoing extraction of tooth 2.1 due to trauma. At the same time, a transmucosal implant 3.8 × 11 mm was placed, with immediate provisionalization and regeneration using Bio-Oss Collagen. Primary stability: 45 Ncm. Healing and bone neoformation were assessed with CBCT at T0 and T1, with a 14-month follow-up.

Results: uneventful healing, with no complications. At 14 months: excellent implant stability, maintenance of peri-implant tissues, and good soft tissue maturation. Significant bone neoformation and reduction of the initial defect were observed.

Conclusions: immediate post-extractive placement with a convergent transmucosal implant, immediate loading, and guided bone regeneration shows favorable outcomes, confirming the reliability of the protocol in selected cases.

CRESTAL RIDGE EXPANSION AND IMPLANT PLACEMENT WITHOUT BONE GRAFTING: THE EMERGING ROLE OF HYALURONIC ACID

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Aim: this case report evaluates bone width gain and implant survival in a mandibular ridge with severe horizontal atrophy treated with a split crest technique associated exclusively with sterile hyaluronic acid (Aminogam® gel).

Methods: the patient presented with an abscess involving teeth 3.3, 3.4, and 3.5, with apical infections and paresthesia of the left lower lip. Extraction of the involved teeth was performed, resulting in gradual resolution of the paresthesia.

Due to the reduced ridge thickness (≈ 1 mm), a split crest technique associated exclusively with sterile hyaluronic acid was performed in two stages. The first phase consisted of ridge expansion using piezoelectric technology and the exclusive application of hyaluronic acid. After 50 days, a second phase

was performed with further ridge expansion, again using only hyaluronic acid, followed by implant placement. 90 days after the second phase, the prosthetic phase was initiated.

Results: an increase in bone volume was observed as early as 50 days after the first surgical phase. This gain was clinically confirmed during the second surgery, allowing the placement of two implants of adequate diameter with satisfactory primary stability. A 2-year follow-up showed implant survival without reported complications.

Conclusions: within the limitations of a single case report, exclusive use of hyaluronic acid with split crest may promote native bone formation without the use of particulate bone grafts, allowing bone volume increase and primary implant stability. Further studies are needed.

IMPLANT-PROSTHETIC REHABILITATION USING CUSTOM-MADE SUBPERIOSTEAL IMPLANTS AND SHORT IMPLANTS: A CASE REPORT

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Aim: to present a graftless implant-prosthetic rehabilitation approach in a patient with severe maxillary atrophy.

Methods: an edentulous patient with severe maxillary atrophy (Cawood-Howell class V) underwent CBCT-based digital planning. Two custom-made subperiosteal implants were designed using CAD/CAM technology and produced via additive manufacturing in titanium. Four short mandibular implants were also placed. Surgery was performed under general anesthesia, followed by delivery of fixed prostheses after 90 days.

Results: the treatment enabled stable implant placement without bone grafting procedures. The prosthetic rehabilitation was successfully completed with good functional and clinical outcomes in the short term.

Conclusions: custom-made subperiosteal implants represent a reliable graftless alternative for the rehabilitation of severe atrophic jaws. Digital technologies improve precision and predictability, although long-term studies are needed to confirm stability.

ARTIFICIAL INTELLIGENCE-DRIVEN DIGITAL PLANNING IN IMPLANT-PROSTHETIC REHABILITATION: A CASE REPORT

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Aim: the application of artificial intelligence to the ever-evolving technologies in dentistry now allows for increasingly predictable and reliable planning of complex surgical procedures.

Materials and methods: the patient described in this report is a 34-year-old woman presenting with the following clinical findings: osteolytic lesion involving teeth 11 and 12, edentulism in areas 15, 16, and 25, and the presence of root fragments of teeth 24 and 26. With the aid of artificial intelligence applied to the design of the desired implant-prosthetic rehabilitation, the treatment plan was established. As part of the surgical planning, it has also been decided to create a dental-supported surgical guide to lead the preparation of the implant beds. The guide was digitally produced using an ini-

tial prosthetic plan, ensuring that implant placement was prosthetically guided.

Results: the planned treatment consisted of removal of root remnants and compromised teeth, followed by the placement of dental implants in zones 15, 11, 24, and 26. To ensure the predictability of the planned outcome, autologous bone was collected from the mandible and grafted to promote proper bone healing and prevent resorption of bone volume in the area affected by osteolytic lesion.

Conclusions: in conclusion, this clinical case shows that, with the help of artificial intelligence applied to digital dentistry, it has been possible to perform a minimally invasive surgical procedure with immediate loading, by evaluating the results in advance and making the planned solution predictable.

COMBINED SURGICAL APPROACH WITH A PRF MEMBRANE AND A HETEROLOGOUS GRAFT FOR PERI-IMPLANTITIS

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Aims: peri-implantitis is a bacterial pathology affecting both hard and soft tissues of dental implants. Three different parameters should be considered for a correct diagnosis: periodontal probing >3 mm, bleeding on probing and suppuration. Non-surgical treatments are considered the first step towards a therapeutic decision, followed by surgery. The aim of this study is to present an integrated management of both hard and soft tissues which led to an improvement in peri-implant tissues, also with a good long-term implant outcome.

Methods: a patient presented with a painful lesion in #4.2 region, associated with an implant restoration, positive for peri-implantitis. Blood samples were centrifugated to obtain PRF membranes. After local anaesthesia, a full-thickness flap was created, and mechanical removal of the inflammatory tis-

sue and micro thread was performed in the coronal implant portion. Bone graft (heterologous deproteinized bovine bone) and a resorbable membrane were inserted and adapted to bone defect; PRF membrane was inserted to manage the mucosal defect over the previously inserted collagen membrane and subsequently sutured with 5/0 silk. Clinical and radiographic follow-ups were completed every six months with non-surgical periodontal treatment every 4 months.

Results: an adequate integration between aesthetic results and excellent long-term stability of peri-implant was reached.

Conclusions: bone graft allowed to restore bone defect also with the use of membrane as a guide for correct regenerative therapy; PRF membrane application resulted in an improvement in aesthetic self-reported compliance.

PHENOTYPIC MODULATION OF TUBEROSITY GRAFTS IN PERI-IMPLANT MUCOGINGIVAL SURGERY: A SURGICAL-PROSTHETIC CONCEPT FOR SOFT TISSUE STABILITY

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Aim: to describe a clinical approach for phenotypic modulation of tuberosity grafts in peri-implant mucogingival surgery to improve soft tissue stability and contour. While phenotypic modification has traditionally focused on changes occurring at the recipient site, this approach shifts the focus to the biological behavior of the graft itself, intending to guide its maturation toward stable and aesthetically favorable tissue characteristics.

Methods: a qualitative clinical assessment based on repeated clinical observations in routine practice was performed on mucogingival procedures using tuberosity-derived connective tissue grafts. Surgical variables were evaluated alongside prosthetic modulation of the emergence profile to assess their influence on graft maturation and soft tissue development.

Results: tuberosity grafts showed a biological behavior that can be descriptively compared to “Baobab seeds”: when transplanted in a non-native environment, they demonstrate a marked proliferative tendency. A combined surgical-prosthetic approach appeared to influence soft tissue overgrowth. In particular, small, de-epithelialized grafts placed in a deep and fully covered position supported clot stability and predictable healing. Prosthetic conditioning through a convex emergence profile at the provisional stage limited the space available for expansion, guiding tissue proliferation.

Conclusions: modulation of graft characteristics and prosthetic contouring may help guide the maturation of tuberosity grafts, contributing to a more controlled and stable peri-implant soft tissue architecture.

FLUID-DYNAMIC CRESTAL SINUS FLOOR ELEVATION FOR IMPLANT REHABILITATION OF THE ATROPHIC POSTERIOR MAXILLA USING HYALURONIC ACID: A CASE SERIES

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Aim: implant-prosthetic rehabilitation of the posterior edentulous maxilla is often challenging due to reduced bone volume associated with alveolar ridge resorption and maxillary sinus pneumatization. This study aims to evaluate the feasibility and preliminary clinical outcomes of a fluid-dynamic transcrestal sinus lift technique using hyaluronic acid as a biomaterial in patients undergoing implant rehabilitation of the atrophic posterior maxilla.

Materials and methods: a case series was conducted on three patients presenting with atrophic posterior maxilla. Pre-operative CBCT scans were used to assess residual bone height and maxillary sinus anatomy. A minimally invasive transcrestal approach was performed using the FLUSILIFT device to achieve fluid-dynamic elevation of the Schneiderian mem-

brane and simultaneous delivery of hyaluronic acid, followed by immediate implant placement.

Results: all procedures were completed without intraoperative or postoperative complications. CBCT analysis at 3 months showed successful membrane elevation, stable implant positioning, and evidence of vertical bone gain in all treated sites.

Conclusions: within the limitations of this preliminary case series, the fluid-dynamic transcrestal sinus lift using hyaluronic acid appears to be a feasible and minimally invasive technique, allowing simultaneous implant placement with encouraging short-term radiographic outcomes. Further studies with larger sample sizes and longer follow-up are required to confirm its clinical effectiveness.

AI-GUIDED CBCT ANALYSIS FOR THE PREDICTION OF IMPLANT STABILITY

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Aim: to evaluate the predictive accuracy of the RealGUIDE™ guided surgery software in implant dentistry by comparing preoperative CBCT-based estimates of bone density and primary implant stability with intraoperative clinical findings, thereby reducing operator-dependent variability.

Methods: ten implant surgery cases were analyzed. For each case, preoperative CBCT data were uploaded into the RealGUIDE™ software to obtain estimates of bone density and expected primary stability before implant placement. These preoperative digital predictions were subsequently compared with the clinical parameters recorded during surgery.

Results: in 7 out of 10 cases, the values predicted by the software were consistent with the intraoperative findings, showing substantial agreement between virtual planning and actual clinical performance. In the remaining 3 cases, the predicted

values differed from the observed outcomes, with the software tending to overestimate bone density. This discrepancy may have affected the reliability of the expected primary stability values.

Conclusions: within the limits of this preliminary case series, RealGUIDE™ demonstrated a satisfactory predictive performance in most cases, suggesting that AI-assisted software may represent a useful adjunct in implant treatment planning. The integration of artificial intelligence into guided implant surgery may improve the predictability of the procedure; however, the variability observed in some cases indicates that further refinement is required. Future implementation of machine learning models based on larger clinical datasets may enhance the accuracy and reliability of these systems in routine implantology practice.

ACCURACY OF DYNAMIC NAVIGATION IN SINGLE IMPLANT PLACEMENT: SPATIAL ANALYSIS WITHIN A DIGITAL WORKFLOW

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Aim: dynamic navigation systems are designed to improve precision of dental implant placement by providing real-time guidance. This study aimed to evaluate the clinical accuracy of the X-Guide® (Nobel Biocare) system for single implant placement using a non-invasive post-operative digital workflow.

Methods: eight patients requiring a single implant were included in this case series. Following a digital workflow (CBCT and intraoral scan), implants were placed using the X-Guide® dynamic navigation system. Accuracy was assessed by superimposing the pre-operative surgical scan (DICOM) with a post-operative intraoral scan (STL) obtained using an implant scanbody. This digital matching allowed for the measurement of the angular deviation (°), calculated and decomposed into

mesio-distal (MD) and vestibulo-lingual (VL) planes to assess the directional error.

Results: after digital superimposition, the mean global angular deviation was $1.81^\circ \pm 0.58^\circ$. When decomposed into planes, the mean angular deviation was $1.36^\circ \pm 0.55^\circ$ in the MD plane and $0.96^\circ \pm 0.69^\circ$ in the VL plane. No clinical complications were recorded, and all implants achieved optimal primary stability.

Conclusions: the detailed assessment of MD and VL angular deviations, combined with a radiation-free post-operative STL matching, confirms dynamic navigation system as a reliable tool to effectively transfer virtual planning to the patient, minimizing clinically significant directional errors.

MARGINAL BONE LOSS AND IMPLANT SURVIVAL ACROSS IMPLANT-ABUTMENT CONNECTION GEOMETRIES AND PLATFORM SWITCHING: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

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Aim: the aim of this systematic review and network meta-analysis was to evaluate the association between implant-abutment connection geometries, with or without platform switching, and peri-implant marginal bone loss and implant survival.

Material and methods: a systematic search of PubMed, Scopus, Web of Science, and Embase was conducted up to February 2026 to identify randomized clinical trials with at least 12 months of follow-up. A frequentist random-effects network meta-analysis was performed. Mean differences (MDs) were calculated for MBL and odds ratios (ORs) for implant survival, with 95% confidence and predictive intervals. Treatment ranking was assessed using surface under the cumulative ranking (SUCRA) values.

Results: from 9580 articles, twenty-five studies were included

in the qualitative analysis and 21 in the network meta-analysis. No statistically significant differences were found among the 13 implant-abutment connection geometries for either MBL or implant survival at 1 year. Internal hexagonal conical connections with platform switching showed the most favourable ranking for MBL (SUCRA = 85.1%), whereas double hexagonal internal connections ranked highest for implant survival (SUCRA = 81.0%). However, confidence and predictive intervals were wide, indicating substantial uncertainty. Platform switching improved MBL rankings in selected internal connections but showed no consistent effect on survival.

Conclusions: implant-abutment connection geometry and platform switching do not appear to significantly influence short-term MBL or implant survival.

IS BASELINE VERTICAL IMPLANT POSITION RELATIVE TO ADJACENT TEETH ASSOCIATED WITH PERI-IMPLANT OUTCOMES? A SYSTEMATIC REVIEW AND META-ANALYSIS

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Aim: determining the ideal vertical implant position is a cornerstone of prosthetic-driven implantology, requiring a balance between esthetic and biological considerations. This systematic review aimed to analyze baseline vertical implant positioning relative to adjacent teeth and explore its association with peri-implant outcomes.

Methods: Cochrane Central Register, PubMed, Scopus, and Web of Science were searched. To assess vertical implant positioning relative to adjacent teeth, two reference points and distances were considered: the cemento-enamel junction (IP-CEJ) and the interproximal bone level of the adjacent tooth (IP-ABL). The primary outcome was peri-implant marginal bone loss (MBL). Secondary outcomes included implant survival

and success rates, and prevalence of mucositis and peri-implantitis. Risk of bias was assessed using the Moga index, and certainty of evidence with GRADE.

Results: four studies met the inclusion criteria, including 267 implants. Mean baseline IP-CEJ distance was 4.69 mm, whereas mean IP-ABL distance was 2.13 mm. Exploratory meta-regression showed no significant association between baseline IP-CEJ distance and 12-month MBL ($p = 0.5$), nor between IP-ABL distance and 12-month MBL ($p = 0.19$).

Conclusions: baseline IP-CEJ and IP-ABL distances did not appear associated with 12-month marginal bone loss. However, overall evidence remains limited and uncertain due to heterogeneity and methodological limitations of the included studies.

PERI-IMPLANT MUCOSITIS AND PERI-IMPLANTITIS: EVIDENCE-BASED STRATEGIES FOR PREVENTION, DIAGNOSIS, AND LONG-TERM IMPLANT STABILITY

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Aim: peri-implant mucositis and peri-implantitis are inflammatory conditions affecting peri-implant tissues and represent distinct clinical entities. Mucositis involves inflammation without bone loss, whereas peri-implantitis is associated with progressive loss of supporting bone. According to the European Federation of Periodontology, their prevalence is approximately 46.8% and 19.8%, respectively. This study aims to identify evidence-based strategies to preserve peri-implant tissue health and ensure long-term implant survival.

Methods: a review of recent scientific literature was conducted using PubMed and Google Scholar. The included references span from 2018 to 2023 and focus on recent guidelines addressing the diagnosis of peri-implant health and diseases, as well as the non-surgical and surgical management of peri-im-

plantitis, including both home oral care and professional approaches.

Results: the control of modifiable risk factors - such as smoking, diabetes, history of periodontitis, and poor oral hygiene - is essential before and after implant placement. Proper implant positioning and prosthetic design facilitate effective plaque control. Non-surgical management relies mainly on mechanical biofilm removal using manual or powered instruments and air polishing. Adjunctive therapies, including antibiotics, lasers, or probiotics, show limited evidence and cannot be routinely recommended.

Conclusions: early diagnosis, patient compliance, and individualized supportive care programs are critical to maintaining peri-implant tissue stability and achieving long-term clinical success.

ARTIFICIAL INTELLIGENCE IN IMPLANT DENTISTRY: A NARRATIVE REVIEW OF PREDICTIVE MODELS AND CLINICAL APPLICATIONS

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Aim: to critically evaluate the role of artificial intelligence (AI) in implant dentistry, focusing on its applications in diagnosis, risk assessment, treatment planning, and prediction of clinical outcomes.

Methods: a narrative review was conducted using PubMed/MEDLINE, Scopus, and Web of Science databases, including English-language articles published between 2015 and 2024. Relevant studies on machine learning, deep learning, and computer vision applied to implant dentistry were selected based on their clinical applicability, model performance, and translational potential.

Results: AI models demonstrated high accuracy in diagnostic tasks, particularly in detecting peri-implant bone loss and early disease using convolutional neural networks. Prognostic models enabled personalized risk assessment for implant fail-

ure and peri-implantitis by integrating clinical and radiographic data. Deep learning systems often achieved accuracy above 80-90%, although performance varied depending on dataset quality and validation. AI also enhanced surgical planning, navigation, and prosthetic design, improving workflow efficiency and treatment precision. However, limitations such as data heterogeneity, lack of external validation, algorithmic bias, and limited interpretability remain significant challenges.

Conclusions: AI represents a powerful decision-support tool in implant dentistry, improving diagnostic accuracy, risk stratification, and treatment planning. Nevertheless, its clinical integration requires robust validation, standardized datasets, and explainable models. AI should complement, not replace, clinician expertise, supporting a shift toward predictive, personalized, and precision-based implant care.

IMMEDIATE IMPLANT PLACEMENT IN SOCKETS WITH PERIAPICAL LESION: A SYSTEMATIC REVIEW OF SURVIVAL RATES, RISK FACTORS AND CLINICAL PROTOCOL

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Aim: the study aims to compare clinical outcomes of implants placed in sockets with periapical lesions, after adequate decontamination, with delayed implants and immediate implants placed in healthy sockets.

Materials and methods: a systematic review was conducted including eleven studies that met predefined criteria using the main search engines PubMed, Scopus, and Web of Science, following the PRISMA protocol. Outcomes analyzed included implant survival rate, marginal bone loss, and complications.

Results: eleven studies that met the predefined inclusion criteria were selected. In all cases, periapical lesions were removed prior to implant placement. The literature showed very high implant survival rates, reaching 100% in the short and medium term, both in infected and non-infected sites. Overall survival ranged be-

tween 92% and 100%, with lower values reported in some studies (94.44% at 36 months and 92% at 6 months). No statistically significant differences in marginal bone loss were found between implants placed in properly debrided infected sites and those placed in non-infected or healed sites, with mean bone resorption generally ranging from 0.5 to 1.5 mm after 12 months. Complications were rare and mainly associated with inadequate primary stability and poor oral hygiene. Notably, the absence of antibiotic therapy was associated with a reduction in implant survival of up to 22%.

Conclusions: with proper case selection and surgical management, immediate implant placement in infected sites is a safe and predictable approach, with survival rates and marginal bone loss comparable to conventional protocols.

COMPARING THE ACCURACY OF PHOTOGRAMMETRY AND INTRA-ORAL SCANNING FOR DIGITAL IMPRESSION TECHNIQUES FOR IMPLANT-SUPPORTED FIXED FULL-ARCH RESTORATIONS

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Aim: to evaluate the available evidence on photogrammetry in implant dentistry, focusing on its accuracy compared with intraoral scanners (IOS) and traditional impressions in full-arch rehabilitations.

Methods: this scoping review was conducted through a PubMed search using the mesh terms “photogrammetry” and “dental implants”. Analysing the latest 3 years of publications on the topic, 105 articles were identified. Studies were selected according to the following inclusion criteria: English language, clinical studies on human subjects (≥ 10 patients), full-arch implant rehabilitations, and comparison between photogrammetry and intraoral scanner (IOS), with or without traditional impressions.

Results: four studies were included in the present review, com-

prising a total of 56 patients and 65 edentulous arches. Overall, 37 maxillary and 28 mandibular arches were analysed. A total of 217 implants were reported. In one study, 19 edentulous arches rehabilitated with at least 4 implants per arch were described. Photogrammetry systems included PIC system®, ICam4D®, and Elite®. Most studies compared photogrammetry with IOS, while few included traditional impressions. The available evidence shows a trend toward higher accuracy and trueness of photogrammetry in full-arch rehabilitations, although data remain limited and heterogeneous.

Conclusions: photogrammetry may represent a reliable technique in full-arch implant workflows. Further clinical studies are needed to better define its role in digital implant dentistry.

UNDERSTANDING IMPLANT FAILURE: CLINICAL AND HISTOPATHOLOGICAL OUTCOMES IN A PROSPECTIVE COHORT STUDY

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Aim: the present prospective cohort study aims to analyze the clinical and histopathological characteristics of failed dental implants. The primary objective was to evaluate signs of chronic inflammation, bone resorption, and structural alterations in peri-implant tissues. Additional objectives included assessing the correlation between radiographic bone loss, histopathological findings, and patients' medical history.

Methods: the study included patients undergoing implant removal at the University Hospital of Pisa (2021-2026), excluding cases of jaw osteonecrosis. Radiographic bone loss was assessed on orthopantomograms (OPG) as a percentage relative to implant length. Clinically stable implants were removed using trephine burs and fixed in formalin for histological analysis.

Results: sixty implants from 33 patients (mean age 66.3) were

analysed. Late failures prevailed (91.6%), mainly due to peri-implantitis (50%). Mean bone loss was 54.4%. Notably, 70% of implants belonged to patients with previous failures and 53.6% were associated with bone metabolism-interfering drugs. Implants in patients taking these drugs showed significantly higher bone loss (61.6% vs 46.7%, $p < 0.001$). Histology revealed vital residual bone, but evident remodelling alterations in patients on drug therapy, despite preserved bone-implant contact.

Conclusions: late implant failure was strongly linked with a history of previous failures. Drugs interfering with bone metabolism emerged as a key factor in worsening peri-implant bone loss. These findings highlight the need for careful pharmacological anamnesis and personalized follow-up to enable early detection of tissue alterations.

A MINIMALLY INVASIVE APPROACH FOR MANDIBULAR REHABILITATION IN FRAIL PATIENTS: 10-YEAR FUNCTIONAL OUTCOMES OF IMMEDIATELY LOADED 4 MM ULTRASHORT IMPLANTS

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Background: rehabilitation of the atrophic mandible in frail patients represents a significant clinical challenge. Ultrashort implants offer a minimally invasive alternative to regenerative procedures, potentially reducing morbidity and surgical risks.

Aim: to evaluate the 10-year clinical and prosthetic outcomes of immediately loaded full-arch mandibular rehabilitations supported by 4-mm ultrashort implants in frail patients.

Materials and methods: a retrospective study was conducted on edentulous patients with a residual ridge height ≥ 5 mm. Four-millimeter implants were placed (4.0 mm diameter in canine-premolar regions and 4.5 mm in molar regions) and immediately loaded. The primary outcome was prosthetic success, defined as a stable prosthesis supported by at least four

implants. Secondary outcomes included implant survival and complications.

Results: of the 18 patients initially enrolled, 14 were re-evaluated at the 10-year follow-up (3 deceased, 1 lost to follow-up). Prosthetic success was 100% (14/14). Regarding implant loss, 4 patients experienced no implant loss, 6 lost one implant, and 4 lost two implants. The cumulative implant survival rate was 82.9% (68/82).

Conclusions: despite the limited sample size, full-arch rehabilitation supported by 4 mm ultrashort implants appears to be a reliable long-term treatment option for frail patients with mandibular atrophy, ensuring maintenance of prosthetic function.

COMPARATIVE EFFECTS OF DIFFERENT AMOXICILLIN REGIMENS FOR DENTAL IMPLANT SURGERY ON PERI-IMPLANT TISSUE HEALTH

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Aim: the aim of the present project was to evaluate the effect of different antibiotic strategies (long-span vs short-span) for implant surgery on peri-implant tissue health, oral microbiota and salivary MiRNomics in healthy patients (ethical approval: EU CT 2023-510391-31-00). In the present abstract the results regarding peri-implant tissue health will be analysed.

Methods: the patients included have been randomly divided into two groups: Long-span prescription (1 g Amoxicillin every 8 h starting 1 day before surgery and for 5 days after surgery) and Short-span (2 g Amoxicillin 1 h before surgery). Patients were rehabilitated with single implants or partial implant-supported fixed prostheses. During the follow-up implant survival rate, marginal bone loss (MBL), biologic and technical complication rate and probing depth (PD) have been evaluated.

Results: no drop-outs occurred. Three implants failed (2 short-span, 1 long-span), resulting in a 97.2% iCSR. Minor biological complications (hematoma, swelling, fistula, rosacea) resolved spontaneously; no adverse antibiotic reactions were reported. Technical complications were limited to one loose screw. At 7.5 months, the estimated mean difference in MBL was 0.39 mm (95% CI, -0.05 to 0.84; $p = 0.091$) and mean PD difference was 0.12 mm (95% CI, -0.54 to 0.79; $p = 0.715$) displaying no statistically significant differences on both parameters in the two groups.

Conclusions: the results provide no clear evidence of difference between long-span and short-span protocols regarding early marginal bone resorption or peri-implant health.

THE INFLUENCE OF DIFFERENT AMOXICILLIN REGIMENS FOR DENTAL IMPLANT SURGERY ON ORAL MICROBIOTA

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Aim: this project evaluates the effect of different antibiotic strategies for implant surgery on peri-implant tissue health and oral microbiota in healthy patients (ethical approval: EU CT 2023-510391-31-00). This abstract focuses on oral microbiota.

Materials and methods: 84 patients were randomly divided into two groups:

1. long-span: 1 g amoxicillin every 8 h from 1 day before surgery to 5 days after;
2. short-span: 2 g amoxicillin 1 h before surgery.

Before surgery non-invasive samples were collected using paper points for microbiota analysis. Patients received single implants or partial implant-supported prostheses. Follow-up analyses were performed at 2 and 6 months.

Crevicular fluid samples were collected using DNA/RNA shield and Müller-Hinton broth, stored frozen, and analyzed by 16S rRNA sequencing (NGS, Illumina MiSeq). Data were processed in MySQL and analyzed in R.

Results: at the phylum level, crevicular fluid microbiota showed high ecological stability with no temporal drift and a strong subject-specific signature. Three dynamic profiles were identified: resilient (57%), moderately fluctuating (38%), and unstable (5%). Baseline composition explained ~18% of future variability, indicating non-random dynamics.

Conclusions: crevicular fluid microbiota represents a structured and stratifiable ecosystem. Its baseline configuration may predict future behavior, supporting its potential role in forecasting implant stability and peri-implant outcomes.

MACHINED *VERSUS* FULLY ROUGHENED ZYGOMATIC IMPLANTS: RANDOMIZED SPLIT-MOUTH CLINICAL TRIAL

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Aim: comparative evidence on zygomatic implant surface design is scarce. This randomized split-mouth trial evaluated whether a machined-coronal design achieves different clinical and peri-implant outcomes than a fully roughened design in the rehabilitation of severely atrophic maxillae.

Methods: adults requiring maxillary full-arch fixed rehabilitation received, within the same patient, contralateral zygomatic implants randomized to a fully roughened design (Zyg-55) or a machined-coronal design (Zygan). Standardized surgical and prosthetic protocols were used. The primary outcome was implant survival. Secondary outcomes were implant success (complications) and peri-implant parameters recorded without prosthesis removal: probing pocket depth (PPD), bleeding on probing (BOP), gingival index, and plaque index (PI). Mixed-effects models assessed associations between PPD and clinical/anatomical covariates.

Results: twenty-two participants received 86 zygomatic implants (59 Zygan; 27 Zyg-55). Mean follow-up was 49.91 ± 7.46 months at patient-level. No failures occurred (implant survival 100% in both groups). Cumulative success was 79.90% for Zygan and 85.20% for Zyg-55. Greater PPD was significantly associated with BOP ($\beta = +0.72$ mm; $p = 0.002$) and PI ($\beta = +0.35$ mm; $p = 0.027$). PPD did not differ by implant design, sinus anatomy, ZAGA class, age, implant length, or follow-up time. Complication rates were low and comparable between designs.

Conclusions: both zygomatic implant designs showed excellent 5-year outcomes, with no survival differences and similar peri-implant clinical performance. Long-term peri-implant mucosal health appears more influenced by local inflammation (plaque and bleeding) than by coronal surface design, underscoring the central role of biofilm control and supportive care.

EFFECTS OF OZONATED OIL APPLICATION ON IMPLANT STABILITY: A SPLIT-MOUTH RANDOMIZED CONTROLLED CLINICAL TRIAL

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Introduction: the antimicrobial and anti-inflammatory properties of ozone are of growing interest in oral implantology. This split-mouth randomized controlled crossover study evaluated the effect of intraoperative ozonated oil application on primary and secondary implant stability.

Materials and methods: patients requiring implant rehabilitation with comparable bilateral edentulous sites were included. In test group (T), ozonated oil was applied in the implant site preparation, whereas the control group (C) followed a standard protocol. Identical implants were used in both groups. Stability was evaluated by the analysis of Implant Stability Quotient (ISQ) at baseline (T0) and at 7, 14, 21, 28, 42, 60, and 90 days (T1-T7).

Results: 15 patients (mean age 52.4 ± 12.0 years) and 30 implants (20 mandibular, 10 maxillary) were included. No compli-

cations were recorded. Baseline ISQ were comparable between groups (T: 77.20 ± 2.62 ; C: 74.60 ± 5.89 ; $p = 0.126$). The test group showed statistically significant higher ISQ values starting at 28 days (T4 - T: 74.43 ± 2.99 ; C: 71.73 ± 5.1 ; $p = 0.001$; T5 - T: 74.27 ± 1.85 ; C: 71.57 ± 5.36 $p = 0.000$; T6 - T: 74.60 ± 1.72 ; C: 72.40 ± 4.03 ; $p = 0.045$; T7 - T: 75.20 ± 1.72 ; C: 72.83 ± 3.65 ; $p = 0.019$).

Conclusions: intraoperative application of ozonated oil appears to be a safe and effective adjuvant in implantology. Our data indicate a significant acceleration of early osseointegration, effectively buffering the transient stability dip and enhancing secondary stability at 60 and 90 days. While promising for clinical predictability, these findings warrant validation in larger cohorts.

6-MM IMPLANTS FOR THE REHABILITATION OF TOTALLY EDENTULOUS NON-ATROPHIC MANDIBLES: 7.5-YEAR RESULTS FROM A MULTICENTER RANDOMIZED CONTROLLED TRIAL

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Aim: short implants are a reliable option for rehabilitating atrophic edentulous sites, as an alternative to longer implants placed after bone augmentation. Given their predictability and efficacy, their use in non-atrophic/non-augmented sites has recently gained interest. This multicenter parallel-group randomized controlled trial (RCT) aimed to compare 6-mm and 11-mm implants placed without bone augmentation for the rehabilitation of totally edentulous mandibles in comparable surgical and prosthetic conditions.

Methods: thirty patients from three centers were randomly assigned to test (6-mm) or control (11-mm) groups. Each received five interforaminal implants (4-mm diameter; OsseoSpeed TX, Astra Tech, Dentsply Sirona) supporting a fixed full-arch mandibular prosthesis. Implants were loaded after 3

months. Primary outcome was peri-implant marginal bone level change (MBLc); secondary outcomes included implant/prosthesis survival and biological/technical complications and were analyzed at patient level ($\alpha = .025$ primary; .05 secondary) over 7.5 years.

Results: a total of 150 implants were placed. At 7.5 years, 25 patients (124 implants) were evaluated (5 dropouts). One implant loss/prosthesis failure occurred (test group). No significant intra- or inter-group differences in MBLc ($p > .025$), survival rates, or complications ($p > .05$) were observed.

Conclusions: despite the need for longer follow-up and well-designed RCTs, the obtained results support a potential enlargement of clinical indications of short implants for the rehabilitation non-atrophic/non augmented edentulous sites.

VOLUME STABLE COLLAGEN MATRICES (VCMXS) TO IMPROVE SOFT TISSUE THICKNESS AROUND IMMEDIATE IMPLANTS: A RANDOMIZED CLINICAL TRIAL

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Aim: this randomized clinical trial evaluated soft tissue thickness (STT) at immediate implants placed with or without soft tissue augmentation using a volume-stable collagen matrix (VCMX). Secondary outcomes included clinical, esthetic, volumetric, and patient-reported parameters.

Materials and methods: participants received immediate implants in the anterior esthetic zone with (test) or without (control) VCMX. Outcomes were assessed at baseline, immediately post-surgery, and at 6 and 12 months, including STT, width of keratinized tissue (WKT), vertical soft tissue position (VPS), papilla index (PI), pink esthetic score (PES), marginal bone level (MBL), and patient-reported outcomes. Volumetric changes were assessed using digital analysis.

Results: thirty-eight patients completed the study. The test group demonstrated a significant increase in STT post-surgery ($p < 0.0001$), followed by partial reduction while maintaining a net gain at 12 months. The control group showed slight reductions in STT. Between-group differences were significant at all time points. WKT remained unchanged. VPS was stable in the test group but showed significant recession in controls. Esthetic and patient-reported outcomes favored the test group. Marginal bone loss was significant only in controls. Both groups exhibited volumetric shrinkage, more pronounced in controls.

Conclusions: the use of VCMX at immediate implant placement improves peri-implant tissue stability without increasing patient morbidity.

PERI-IMPLANT BONE LEVEL IN FULL-THICKNESS VS PARTIAL-THICKNESS FLAP IMPLANT PLACEMENT: A 3-YEAR RANDOMIZED CONTROLLED TRIAL

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Background and aim: flap design during implant placement may compromise peri-implant tissue stability by disrupting the periosteal vascular supply. This randomized controlled trial evaluated whether partial-thickness (half-flap, HF) implant placement confers greater peri-implant tissue stability than full-thickness (full-flap, FF) elevation over a 3-year follow-up.

Materials and methods: twenty-six patients received 70 implants (35 per group), monitored following prosthetic loading. Marginal bone level (MBL), probing pocket depth (PPD), mucosal recession (REC), and bleeding on probing (BOP) were recorded at baseline and at 1 (T1), 2 (T2), and 3 years (T3). Between-group comparisons used the Wilcoxon rank-sum test ($p < 0.05$).

Results: baseline comparability was confirmed for all variables. From T1 onwards, MBL trajectories diverged: the FF

group sustained bone loss of $+0.74 \pm 0.72$ mm, while the HF group showed bone gain of -0.50 ± 0.65 mm at T3 ($p < 0.001$). REC was significantly greater in FF from T1 ($p = 0.035$), reaching 1.06 ± 0.49 mm at 3 years *versus* 0.19 ± 0.40 mm in HF ($p < 0.001$). Proximal PPD was consistently higher in FF at all time points ($p < 0.001$). Mesial and distal BOP reached 74% and 79% in FF at T3, *versus* 6% and 11% in HF (both $p < 0.001$).

Conclusions: partial-thickness flap elevation was associated with superior peri-implant soft tissue stability and crestal bone maintenance over 3 years. The null hypothesis is rejected. These findings support the preferential use of the partial-thickness approach when soft tissue preservation is a primary treatment objective.

INFLUENCE OF TORQUE-CURVE DYNAMICS ON INITIAL BONE REMODELING AROUND DENTAL IMPLANTS: A MULTICENTER PROSPECTIVE STUDY

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Aim: this study investigated the relationship between implant insertion torque and early peri-implant bone remodeling (IBR), extending beyond peak torque to include dynamic features of the torque-time curve. The aim was to assess whether static, integral, and dynamic torque-derived parameters are associated with IBR.

Methods: a multicenter study was conducted across ten centers, including 97 implants placed in healed ridges. Full torque-time curves were recorded during insertion. Static metrics, torque-time and torque-depth integrals, regression parameters, and variability indices were extracted. Peri-implant bone levels were assessed radiographically and clinically at placement and after three months. Associations between torque variables and IBR were analyzed using mixed-effects linear regression models accounting for clus-

tering and confounders.

Results: higher insertion torque (mean, maximum, final) was significantly associated with increased IBR, especially buccally. Torque-time and torque-depth integrals were not associated with IBR. Dynamic descriptors of torque delivery, reflecting irregular and non-linear patterns, were significantly associated with buccal remodeling independent of torque magnitude. Lingual/palatal remodeling was less pronounced and mainly related to torque magnitude.

Conclusions: insertion torque affects IBR through both magnitude and delivery pattern. Energy-based metrics alone are insufficient, while torque-curve dynamics provide additional insight and may help optimize implant placement and preserve marginal bone stability.

PROSPECTIVE ANALYSIS OF OSSEOINTEGRATION AND PERI-IMPLANT TISSUE RESPONSE TO GRADUALLY ANODIZED SURFACE IMPLANTS

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Aims: the present study evaluates the performance, clinical benefits, and safety of dental implants with a gradually anodized surface, characterized by high biocompatibility, the ability to reduce bacterial load, and excellent osseointegration. The device used features increasing roughness in a corono-apical direction.

Materials and methods: a total of 46 patients were included in the study, for a total of 84 implants. The procedural workflow and the related follow-up were organized into three main phases. In the surgical phase, all 46 patients underwent treatment, with the placement of 86 implants overall; among these, 12 cases required regenerative surgical procedures. During the prosthetic phase, all patients completed the definitive rehabilitation, for a total of 86 implant-supported units that were successfully loaded and functioning. The 12-month follow-up after definitive prosthetic loading was completed for 28 patients (60.9%), corresponding to 53 implants.

Results: the results of the study on implant survival one year after prosthetic loading show high success rates. In the total sample of 46 cases, the survival rate was 97.7%. Simultaneous guided bone regeneration (GBR) was performed in 26.08% of implant sites. One year after definitive prosthetic loading, plaque levels at implant sites were low or not detectable and no bleeding was observed in any of the examined implant sites.

Conclusions: the results of this analysis show that implants characterized by a gradually anodized surface ensure excellent survival rates, associated with a minimal incidence of inflammation, bleeding, and bacterial biofilm accumulation. These findings suggest that the hybrid surface morphology promotes optimal primary osseointegration and a favorable biological response of the soft tissues, supporting its routine clinical use.

COMPUTER-ASSISTED IMPLANTOLOGY: ENHANCING ACCURACY AND TIME EFFICIENCY IN PROSTHETICALLY GUIDED POST-EXTRACTIVE IMPLANT PLACEMENT

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Aim: in post-extractive implantology, accurate matching between intraoral scans and radiological 3D imaging ensures that the surgical procedure reflects the prosthetically driven plan. The aim of this study was to evaluate and compare the execution time of AI-assisted automated segmentation and matching *versus* conventional manual procedures in cases involving impacted canines. (NCT06693635)

Methods: in this study, six cases with CBCT and intraoral scans were analyzed; all involved impacted canines that were extracted and immediately replaced with dental implants following a prosthetically guided approach. CBCT were acquired and integrated with an intraoral scan using AI-assisted software. The software automatically segmented dental and bone structures and matched STL-DICOM files. The execution time

of the AI-assisted workflow was recorded and compared with manual procedures performed by the operator.

Results: the mean execution time registered for the AI-assisted workflow was approximately 3 min 54 s, compared to 2 min 42 s for manual segmentation and 4 min 42 s for the total manual workflow. The digital workflow significantly reduces operator-dependent steps. In cases with metallic artifacts, segmentation required longer processing times.

Conclusions: AI-assisted workflows significantly reduce planning time by minimizing operator-dependent variability. In post-extractive implantology, particularly in complex cases such as impacted canines, this approach enhances the predictability and accuracy of treatment, although image artifacts may still influence processing time.

BUCCAL SOFT AND HARD TISSUE CHANGES AFTER IMMEDIATE IMPLANT PLACEMENT AND PROVISIONALIZATION IN THE AESTHETIC AREA

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Aim: to quantitatively evaluate buccal soft tissue profile changes following immediate implant placement and provisionalization (IIPP) in the aesthetic area, and to assess buccal hard tissue changes and patient-reported outcomes (PROMs).

Methods: five patients requiring single-tooth extraction in the aesthetic area underwent prosthetically driven IIPP. The gap between the implant surface and buccal socket wall was grafted with a bone substitute, and a collagen matrix was placed at the vestibular aspect for soft tissue augmentation. Immediate screw-retained provisional restorations were delivered.

Buccal soft tissue changes were assessed by superimposition of STL files from digital impressions, while buccal bone

changes were evaluated using CBCT scans at baseline and 4 months. Pain was recorded using a visual analog scale (VAS, 1-10).

Results: at 4 months, STL superimposition revealed a slight reduction in the buccal soft tissue contour. CBCT analysis showed limited marginal buccal bone resorption. Pain levels were low in all patients (VAS <3).

Conclusions: IIPP demonstrated limited buccal soft and hard tissue alterations at 4 months, with low patient-reported pain. These preliminary findings support the potential of this approach to maintain peri-implant tissue stability while minimizing patient morbidity.

COMPUTER-GUIDED MINIMALLY INVASIVE CRESTAL SINUS LIFT: PRELIMINARY RESULTS

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Aim: to assess the feasibility and early clinical performance of a digital, computer-guided flapless crestal sinus lift protocol, evaluating implant stability and vertical bone augmentation.

Methods: this case series included 5 patients presenting with posterior maxillary edentulism and residual bone height between 3 and 5 mm. Preoperative planning was performed using CBCT and intraoral scanning, merged through dedicated software to design a static surgical guide, according to a fully digital workflow. Flapless implant placement with contextual transcresal sinus lift was performed using sequential bone compactors. Bone graft material (0.25 g) was inserted and condensed prior to implant placement. Implant stability quotient (ISQ) was recorded at implant placement, before implant loading (at 6 months) and at 1 year after surgery. Radiographic

evaluation (CBCT) was performed at 6 months to assess vertical bone gain.

Results: seven implants were placed. Mean patient age was 56.6 ± 4.2 years. Mean ISQ values increased over time: 67.3 ± 3.1 (baseline), 72.4 ± 2.9 (6 months) and 74.6 ± 2.7 (1 year follow-up). Mean vertical bone gain at 1 year follow-up was 4.2 ± 0.8 mm. No intraoperative or postoperative complications were recorded, including Schneiderian membrane perforation, infection, or graft displacement.

Conclusions: computer-guided flapless crestal sinus lift appears to be a predictable and minimally invasive technique, allowing safe implant positioning and satisfactory bone augmentation with progressive improvement in implant stability.

PREDICTIVE MODELS FOR POST-OPERATIVE COMPLICATIONS IN GUIDED BONE REGENERATION WITH THE SIMULTANEOUS PROTOCOL: A CLINICAL STUDY

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Aim: Guided bone regeneration (GBR) with simultaneous implant placement is widely used, but complications such as membrane exposure, dehiscence, infection, and swelling remain challenges. This study aimed to identify predictors to improve outcomes.

Methods: a retrospective cohort of 391 patients (mean age 57.5 ± 15.4; 208 females, 183 males) treated with simultaneous GBR was analyzed. Clinical and surgical variables were collected. Outcomes included membrane exposure, dehiscence, infection, swelling, and re-grafting. Logistic regression models were applied and validated with bootstrap. Performance was assessed by AUC, calibration, sensitivity, specificity, and accuracy.

Results: membrane exposure was associated with vertical/combined defects (OR 2.56) and posterior sites (OR 1.48). Dehiscence was linked to defect complexity (OR 1.66) and posterior location, while conservative flap design reduced risk (OR 0.71). Swelling was associated with flap extension (OR 1.21) and sedation (OR 2.31). Infection was rare but linked to prolonged antibiotics (OR 2.22/day). Re-grafting occurred in 6.1% and was predicted by gingival recession (OR 14.07), never-smoking (OR 5.11), and corticosteroids (OR 1.61). Models showed moderate to good performance (AUC up to 0.744).

Conclusions: defect type, site, and patient factors predict GBR complications. Multivariable models, especially for re-grafting, showed good accuracy, supporting risk stratification.

SCREW-RETAINED IMPLANT-SUPPORTED PROSTHESES USING TI-BASE ABUTMENTS: A MULTICENTER RETROSPECTIVE STUDY

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Aim: to evaluate clinical outcomes and mechanical complications of screw-retained implant-supported fixed prostheses using Ti-base through a multicenter retrospective study.

Materials and methods: patients with implant-supported screw-retained partial prostheses using Ti-base abutments were included from five dental centers. Clinical charts were reviewed, and periapical radiographs were taken. Bone levels were measured and compared with bone levels at implant insertion. Patient characteristics, implant and prosthesis features, crown height and transmucosal height of the Ti-base were collected. The emergence profile was classified into three categories (0°, <30°, >30°). Any biological or technical complication was recorded.

Results: a total of 341 implants in 192 patients were analyzed.

133 rehabilitations were single crowns and 123 were fixed partial dentures supported by 2-4 implants. 92.7% prostheses were made of zirconia, 7.3% PMMA or cobalt-chromium ceramic or titanium/composite. 27 patients (14%) were bruxists. Mean marginal bone loss (mean follow-up: 40 months; range: 3-129 months) was 0.58 mm (range: 0 mm to 3.4 mm). 23 implants (6.7%) showed marginal bone remodeling greater than 0.5 mm. Median bone loss was 0.3 mm. Technical complications occurred in 16 cases (8.3%), the most common being screw loosening. Biological complications were reported in 14 cases (mucositis and failed osseointegration).

Conclusions: screw-retained prostheses using Ti-bases demonstrated excellent clinical outcomes, with stable marginal bone levels and low incidence of complications over time.

STRATEGIES FOR POSTERIOR ATROPHIC MAXILLARY REHABILITATION: CLINICAL AND RADIOLOGICAL EVALUATION ON NON-AXIAL IMPLANTS

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Aim: to evaluate the clinical outcomes and survival rates of graft-less implant-prosthetic rehabilitations in partially edentulous patients with atrophic posterior maxilla, utilizing residual bone through non-axial implants, in a retrospective case series.

Methods: a retrospective single-center study was conducted at IRCCS San Raffaele Hospital on 18 patients with moderate to severe posterior maxillary atrophy and partial edentulism (≥ 3 missing teeth). All patients preserved their residual dentition and were treated with graft-less implant-prosthetic rehabilitations. Clinical and radiological data were analyzed to evaluate implant survival and complication rates.

Results: the study included 20 sectorial graft-less implant rehabilitations in 18 patients (12 males, 6 females; mean age

67.4 years) with 44 implants placed in native bone. These rehabilitations utilized 20 non-axial implants (tilted, trans-sinus, and pterigo-tuberal), combined with 24 axial implants. At a mean follow-up of 4.7 years, two implant failed (one axial implant due to a non retrievable screw fragment of the MUA abutment, one trans-sinus implant due to peri-implantitis), resulting in an overall survival rate of 95.5%. No other complications were observed, and all patients achieved successful rehabilitation.

Conclusions: within the limitations of this study, graft-less approaches proved to be a reliable option for the rehabilitation of the atrophic posterior maxilla. Further prospective studies are needed to corroborate these findings.

IMPLANT-PROSTHETIC MANAGEMENT OF ATROPHIC JAWS: BONE GRAFTS VS MINIMALLY INVASIVE SURGERY WITH SHORT AND NARROW IMPLANTS

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Aim: this study compares bone graft-based regeneration and minimally invasive approaches using short and narrow implants for atrophic jaws. The aim of the study is to evaluate the effectiveness through implant survival, marginal bone loss (MBL), complications, and patient satisfaction, and explores whether treatment should be individualized rather than universally defined.

Methods: a combined literature review (PRISMA, PubMed) and clinical analysis was performed. Fourteen studies were selected (11 with comparable data). Additionally, 20 patients (10 grafting, 10 minimally invasive) were analyzed for survival, MBL, complications, and satisfaction. Radiographs were measured with calibrated orthopantomographs and ImageJ. Two long-term cases were included for qualitative assessment.

Results: short and narrow implants showed higher survival (97.5% vs 90.4%) and lower MBL (0.44 vs 1.69 mm). Both methods were stable, but minimally invasive approaches had shorter treatment time, lower complexity, and fewer complications. Grafting provided better aesthetic and volume control, while minimally invasive techniques ensured faster treatment and higher comfort.

Conclusions: both approaches are valid and predictable. Grafting is preferable for aesthetic/anterior cases but is more invasive; minimally invasive implants suit posterior or less complex cases. No method is universally superior; treatment should be personalized, balancing clinical factors, aesthetics, and patient well-being.

LONG-TERM BONE STABILITY AFTER IMMEDIATE IMPLANTS AND ALVEOLAR RIDGE PRESERVATION: A 15-YEAR RETROSPECTIVE CLINICAL STUDY

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Aim: in contemporary dentistry, preservation of the alveolar socket after tooth extraction is essential for maintaining the alveolar ridge and facilitating future implant placement. This retrospective clinical study assessed bone-level changes 15 years after immediate implant placement combined with alveolar ridge preservation.

Methods: fifty non-smoking patients aged between 25 and 75 years (30 males and 20 females) who received single-implant rehabilitation in anterior and posterior areas of both the maxilla and mandible were included. Bone levels and implant survival were evaluated over time using standardized intraoral radiographs taken at 1, 5, and 15 years after prosthetic loading. Implants were placed immediately following atraumatic tooth

extraction. The residual gap was grafted with bovine hydroxyapatite and protected with a collagen membrane. The primary outcome was bone-level stability, while implant failure was considered a secondary outcome. No temporary crowns or removable prostheses were used during the healing phase. Radiographs were digitized to allow detailed measurements.

Results: analysis of the 50 patients treated with immediate implant placement showed significantly higher bone resorption in the maxilla compared with the mandible.

Conclusions: posterior implants demonstrated greater bone loss than anterior implants, particularly after 1 and 15 years of follow-up, although no implant failures were recorded.

RECONSTRUCTION OF BONE DEFECTS AFTER IMPLANT LOSS: A MEDIUM-TERM CLINICAL AND RADIOGRAPHIC EVALUATION

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Aim: this study evaluates the medium-term survival rate and the complication rate of implants placed in edentulous ridges treated with different reconstructive and regenerative procedures after an implant removal.

Methods: after a previous implant removal, 65 atrophic sites of 59 patients were treated. A total of 215 implants were then placed. The regenerative/reconstructive techniques were:

- a. 2 sites treated with zygomatic implants (8 implants),
- b. 7 sites with GBRs with collagen membranes (14 implants),
- c. 6 sites with PTFE membranes (12 implants),
- d. 5 sites with custom made meshes (8 implants),
- e. 10 sites with intraoral bone blocks (17 implants),
- f. 25 sites with calvarium bone blocks (113 implants),

g. 6 sites with iliac crest bone blocks (31 implants),

h. 3 allografts (11 implants),

i. 1 distraction osteogenesis (1 implant).

Results: patients were followed up with clinical and radiographic controls between 1999 and 2026. 17 implants encountered complications. 3 implants failed and needed removal, therefore an implant survival rate of 98,6% was calculated.

Conclusions: this is the first study that evaluates implants placement in sites reconstructed after implant removal, with a medium-term follow-up. However, due to heterogeneous and hardly comparable data, further randomized controlled trials on implant survival are needed.

FIVE-YEAR RETROSPECTIVE STUDY ON PERI-IMPLANT BONE STABILITY: RADIOGRAPHIC COMPARISON OF TWO SOCKET PRESERVATION PROTOCOLS VS SPONTANEOUS HEALING

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Aim: to evaluate five-year radiographic peri-implant marginal bone level (MBL) stability after two socket preservation protocols *versus* spontaneous healing.

Methods: twenty-four patients receiving implants after extraction were divided into three groups ($n = 8$). Test 1 sites were grafted with cortico-cancellous xenograft and covered with a slow-resorbing bovine pericardium membrane. Test 2 sites received the same graft with a fast-resorbing porcine collagen membrane. Control sites healed spontaneously. MBL change was calculated from osteointegration (T0) to five-year follow-up (T1).

Results: implant survival was 100% in all groups. Mean MBL was lower in Test 1 (0.17 ± 0.20 mm) than in Test 2 (0.46 ± 0.12 mm) and Control (0.45 ± 0.27 mm). Significant differences were found between Test 1 and Test 2 ($p = 0.0048$) and Control ($p = 0.0333$), whereas Test 2 and Control showed no difference ($p = 0.929$).

Conclusions: membrane characteristics may influence long-term peri-implant bone stability after socket preservation. Slow-resorbing membranes were associated with reduced marginal bone loss and improved marginal bone stability at five years.

IMPLANT SITE PREPARATION TECHNIQUES COMPARED: MAGNETODYNAMIC, PIEZOELECTRIC AND TRADITIONAL SURGERY

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Aim: this study compared magnetodynamic surgery, traditional drill-based surgery, and piezoelectric surgery for the preparation of the implant site, focusing on operative time and intra/postoperative discomfort.

Methods: a total of 86 patients (69.8% female, 30.2% male) treated at the Oral Surgery Clinic, University of Trieste, were included. 43 underwent implant placement with the Magnetic Mallet (MM); the remaining 43 received preparation with the Piezodevice (IP) on one side and drills (D) on the other. All surgeries were performed by the same operator. Data included bone quality, operative time, and postoperative questionnaire responses for pain (VAS scale) and analgesic use. A statistical analysis was conducted using Mann-Whitney U and Kruskal-Wallis tests.

Results: significant differences emerged in operative times

and pain perception, influenced by bone quality. The MM and D had comparable times in D1–D2 and D3–D4 bone, but the D produced higher VAS scores. The MM vs IP showed significant differences in absolute times ($p = 0.00018$) and relative times for both D1–D2 ($p = 0.01875$) and D3–D4 ($p = 0.00584$), with qualitative VAS differences. The IP vs D also showed significant absolute ($p = 0.000005$) and relative time differences for D1–D2 ($p = 0.00718$) and D3–D4 ($p = 0.000145$), with VAS variations. In the MM group, higher bone density significantly prolonged times ($p = 0.04136$).

Conclusions: within the limits of this study, the traditional drill-based technique remains valid and widely used, but the Magnetic Mallet can offer advantages in terms of patient comfort and postoperative recovery. The Piezodevice, while excelling in tissue preservation, is limited by longer operative times.

CLINICAL AND RADIOGRAPHIC OUTCOMES OF CUSTOMIZED TITANIUM MESH *VERSUS* SCREW TENT-POLE GRAFTING: A RETROSPECTIVE STUDY

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Aim: Guided bone regeneration (GBR) is a predictable technique for treating severe alveolar ridge deficiencies prior to implant placement. However, maintaining space in non-contained defects may be challenging with resorbable collagen membranes supported by tenting screws. This study compares clinical, radiographic, procedural, and peri-implant outcomes of customized CAD/CAM titanium meshes *versus* resorbable membranes for horizontal and/or vertical alveolar ridge augmentation.

Methods: this retrospective study included 40 patients with severe alveolar ridge defects divided into two groups ($n = 20$ each). Ridge augmentation was performed with particulate bone grafts stabilized with tenting screws and a resorbable collagen membrane or with customized CAD/CAM titanium mesh. CBCT scans at baseline and 6 months evaluated vertical and horizontal bone gain. Operative time, complications,

pseudo-periosteum, implant survival and peri-implant marginal levels at prosthetic loading and 5-year follow-up were recorded.

Results: at 6 months, bone height ranged from 8.7-8.93 mm in maxilla and 9.25-9.35 mm in mandible, while ridge width ranged from 4.7-5.3 mm, with no significant intergroup differences ($p > 0.05$). Peri-implant marginal bone loss remained limited and stable from prosthetic loading to the 5-year follow-up. Mean operative time was significantly shorter in the customized mesh group, 72.7 minutes (range: 60-85) for the Tent-pole group and 62.4 minutes (range: 60-65) for the Ti-mesh group. All 60 implants in 40 augmented sites survived without failures or grafting.

Conclusions: both GBR techniques provided comparable bone regeneration and long-term peri-implant stability, while CAD/CAM titanium meshes were associated with reduced operative time.

ACCURACY OF DIGITAL PLANNING AND PTERIGOID IMPLANT GUIDES: A RESTROSPECTIVE STUDY

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Aim: this study aimed to assess the accuracy of pterygoid implant (PI) 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 (EZplan Real Guide software), which was exported as .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 PIs were performed. To assess implants placement, 3D analysis was conducted on 3DSlicer software, comparing the planned and placed PIs: linear and angular displacements were measured at the apex and base of each model.

Results: results of 35 models indicated minimal linear displacement between the planned and placed PIs. Mean linear displacements at the apex were 0.42 ± 0.34 mm (X-axis), 0.52 ± 0.61 mm (Y-axis), and 0.50 ± 0.69 mm (Z-axis) for the left and right PI, respectively. Regarding basal displacements, the mean was 0.37 ± 0.35 mm (X-axis), 0.36 ± 0.25 mm (Y-axis), and 0.40 ± 0.28 mm (Z-axis), respectively. The mean angular displacements recorded 1.28 (yaw), 1.55 (roll), 1.39 (pitch) for left PI and 1.52 (yaw), 1.19 (roll), 1.20 (pitch), for right PI.

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

SOCKET SHIELD TECHNIQUE AND LONG-TERM STABILITY OF ALVEOLAR BONE DIMENSIONS: A RETROSPECTIVE CONE BEAM COMPUTED TOMOGRAPHY ANALYSIS

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Aim: to evaluate the long-term dimensional stability of the alveolar ridge following immediate implant placement using the Socket Shield Technique (SST), with specific focus on horizontal buccal and palatal bone changes over a 3-year period.

Methods: this retrospective study included 20 patients requiring single-tooth implant rehabilitation in the esthetic zone. All cases were treated with SST following a standardized protocol, preserving a buccal root fragment of approximately 1 mm. Immediate implant placement and provisionalization were performed. Cone Beam Computed Tomography (CBCT) scans at baseline (T0) and after 3 years (T1) were superimposed using stable anatomical landmarks to ensure reproducible measurements. Horizontal alveolar bone dimensions were assessed, and statistical analysis was performed

using paired nonparametric tests ($p < 0.05$).

Results: no horizontal buccal bone loss was observed in any patient over the 3-year follow-up. Minimal horizontal palatal bone resorption occurred in 15% of cases, with a mean reduction of 0.18 mm. Overall alveolar thickness showed a slight, non-significant decrease (mean -0.21 mm; $p = 0.109$). Vertical palatal bone height remained stable in all cases. Measurement reproducibility was high.

Conclusions: the Socket Shield Technique demonstrated excellent preservation of alveolar bone dimensions, particularly at the buccal aspect, over a 3-year period. This approach appears to be a predictable and effective option for maintaining ridge stability in the esthetic zone, although further prospective studies with larger samples are recommended.

MARGINAL BONE LEVEL TRANSFORMATIONS IN FULL-ARCH REHABILITATION: DIGITAL *VERSUS* ANALOG PROTOCOLS. A 5-YEAR RETROSPECTIVE STUDY

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Aim: this retrospective study compares clinical outcomes of analog vs digital impressions in full-arch immediate loading. The primary endpoints included are peri-implant marginal bone level (MBL) changes (placement, loading, 2, and 5 years) and mechanical/prosthetic complication rates.

Methods: 62 patients (2019-2020) underwent full-arch rehabilitation with immediate placement, divided into analog impression and digital intraoral scan groups. All received titanium-PMMA screw-retained restorations. MBL was assessed via standardized radiographs. Procedural time, complications, and failures were recorded. Statistical analysis used repeated measures ANOVA and post-hoc Bonferroni tests.

Results: at 5-year follow-up, implant survival was 99.6%. No significant differences occurred in prosthetic complications.

Baseline MBL was slightly higher in the analog group (0.21 ± 0.04 vs digital 0.17 ± 0.04 , $p < 0.001$). Overall bone loss remained within clinical limits for both groups. Digital impressions significantly reduced procedural time compared to analog methods.

Conclusions: both techniques yielded consistent clinical outcomes. Digital impressions improved efficiency but were associated with slightly higher bone loss over time. Analog impressions remain a reliable standard, though digital methods enhance patient experience. Further long-term randomized studies are required. Digital workflows offer efficient, streamlined rehabilitation, potentially improving compliance. However, the association with marginally greater bone loss necessitates further study to optimize long-term stability.

LONG TERM OUTCOMES OF MAXILLARY FULL-ARCH IMPLANT-SUPPORTED REHABILITATION WITH REDUCED NUMBER OF IMPLANTS: 9 YEAR RETROSPECTIVE STUDY ON SURVIVAL AND COMPLICATIONS

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Aim: according to the WHO, recent decades have seen a progressive increase in life expectancy and, consequently, in the proportion of edentulous patients. Since the early 2000s, surgical protocols have been developed to allow rehabilitation with immediately loaded fixed prostheses in cases of severe bone atrophy, avoiding more invasive reconstructive surgeries and related complications. This study aims to evaluate long-term implant survival in relation to operator expertise and implant-prosthetic complications.

Materials and methods: immediate loading rehabilitations with a reduced number of implants were analyzed over a 9-year period. Implant failures and prosthetic complications were recorded to assess the impact of increasing operator ex-

perience on implant survival. The observation period was divided into three 3-year intervals.

Results: the study included 79 males and 80 females, with 89 mandibular and 103 maxillary arches, for a total of 852 implants. The overall implant failure rate was 1.64%, while prosthetic complications occurred in 16.14% of cases. Across the three intervals, implant failure rates were 2.14%, 8%, and 0.5%, and prosthetic complication rates were 22.6%, 52.4%, and 9.3%, respectively.

Conclusions: operator expertise significantly affects rehabilitation outcomes, reducing implant failure rates and prosthetic complications.

COMPARISON OF TWO PARALLELIZING DEVICES FOR ADJUSTABLE CONOMETRIC ABUTMENTS: PRELIMINARY RESULTS FROM AN *IN VITRO* STUDY

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Aim: conometric abutments provide excellent peri-implant bone stability and a low incidence of biological and prosthetic complications. Loss of retention may occur in cases of insufficient parallelism. The ORBIT abutment® system (Bionica, Thiene, Italy) includes orientable abutments and a dedicated parallelizing device (Parallelizer Lem, Bionica, Thiene, Italy) (device A). The aim of this study was to evaluate its performance in terms of abutment angular deviation and to compare it with a novel parallelizing device (device B).

Methods: four pairs of PMMA models were fabricated from maxillary and mandibular impressions and mounted in dental mannequins (maxilla: six analogues; mandible: four analogues). In each arch, one abutment was designated as reference. The remaining abutments were parallelized by four oper-

ators, each performing five repetitions per device for each setup in a randomized order. Measurements were performed using a coordinate measuring machine (SpartScope 300, OGP, USA) to determine the direction of each abutment axis, and angular deviations relative to the reference were calculated.

Results: a total of 640 abutments were parallelized for each device. The mean angular deviation relative to the reference was 2.37° for device A and 2.13° for device B, with a statistically significant difference ($p = 0.001$). A significant inter-operator effect was observed for device A ($p = 0.029$), whereas no significant variability was found for device B ($p = 0.678$).

Conclusions: both devices achieved a high degree of parallelism. Device B demonstrated greater accuracy and reduced operator-dependent variability.

IMPLANT SITE PREPARATION WITH PIEZOSURGERY FOR REX IMPLANTS: PROTOCOL OF AN *IN VITRO* STUDY ON SUBTRACTIVE AND EXPANSIVE APPROACHES AND THE SWIPE TECHNIQUE

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Aim: piezosurgery in implant site preparation enables selective and controlled bone cutting, facilitating the placement of implants with non-conventional geometries even in thin alveolar ridges. The aim of this study is to evaluate the effect of three different piezoelectric implant site preparation techniques on peri-implant bone density and primary stability.

Methods: thirty bovine ribs will be used in an *in vitro* experimental model. All specimens will undergo baseline CBCT (T0) to assess cortical thickness and ensure homogeneous distribution among groups. Specimens will then be assigned to three implant site preparation protocols (n = 10/group): subtractive preparation, expansive preparation using ridge expanders, and the SWIPE protocol. REX TL 2.9 implants will

then be inserted using the REX IPD device. Primary stability will be measured by resonance frequency analysis and expressed as ISQ values. After implant insertion, a second CBCT scan (T1) will be performed to assess peri-implant bone density. SEM will be used to assess technique-related microstructural changes.

Results: the experimental phase is currently ongoing.

Conclusions: alternative or hybrid preparation protocols may offer potential clinical advantages. Modification of implant site preparation through SWIPE may influence primary stability and peri-implant bone density. Findings from this model may help clarify the mechanical and morphological effects of different piezoelectric preparation techniques.

IMPLANT SURFACE ALTERATIONS DURING INSERTION AT DIFFERENT TORQUE LEVELS: AN *IN VITRO* STUDY

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Introduction: titanium surface treatment influences implant properties, increasing roughness and wettability. However, how bone-implant friction during insertion affects surface characteristics remains poorly investigated. This *in vitro* study evaluated microtopographic variations of implants with different surface treatments after insertion at high and low torque.

Material and methods: tapered implants with identical macrogeometry were allocated to eight groups according to surface treatment (acid etching, sandblasting, SLA, electro-galvanization) and insertion torque (<30 Ncm or >60 Ncm). Each implant was analyzed pre-insertion (T0) using optical profilometry and SEM in eight predefined areas distributed across the collar, threads, and inter-thread spaces. Implants were inserted into standardized fresh bovine ribs.

After placement, they were retrieved through bone excision and reanalysed (T1). Surface roughness parameters (Ra, Rsk, Rku) were assessed.

Results: a total of 40 implants (10 per surface treatment) were included. Ra significantly decreased from T0 to T1 (p <0.001), with area-related variations (p <0.008). Rsk reduction was influenced by surface treatment (p <0.033), with significant differences between electro-galvanization and SLA (p <0.021). Rku decreased across areas (p <0.001).

Conclusions: implant insertion induces measurable microtopographic alterations, independent of insertion torque. Variations occur across implant regions and surface types, with consistent roughness reduction at collar and threads and greater Rsk decrease in the electrogalvanized surface.

TWO DIFFERENT IMPLANT SITE PREPARATION TECHNIQUES: ROTARY CUTTERS VS PIEZODRILL. A COMPARATIVE EXPERIMENTAL ANALYSIS

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Aim: the preparation of the implant site is a crucial step for the success and survival of the implant itself and prosthetic rehabilitation. For this reason, technologies aimed at obtaining minimally traumatic preparations and respecting biological principles of tissues are constantly being developed in order to promote better bone healing and integration of the implant fixture. In this context, piezo-electric surgery is proposed as a valid alternative to rotary cutters, and the Piezodrill® is one of the most recently introduced tools based on this technology. This *in vitro* study aims to compare the main parameters of the implant site obtained by preparation with conventional cutters compared to that prepared with Piezodrill®.

Methods: 20 conical implants will be inserted into 20 ribs, 10 inserted with site preparation using conventional cutters, 10

using Piezodrill®. The site preparation time, temperature developed during the osteotomy and 60s from the end of it, as well as primary implant stability expressed in Newton and with ISQ index will be evaluated. A microscopic evaluation of the surface of the sites prepared with the two techniques will also be performed at SEM. Final control CBCTs will be carried out after all fixtures have been inserted.

Results: recruitment is currently ongoing.

Conclusions: the results of the study may provide useful indications on the biological and biomechanical behavior of the implant site prepared with piezoelectric technology compared to conventional cutters, contributing to the evaluation of their potential use in implantological practice.

VALIDATION OF RESTING NEGATIVE VESTIBULAR PRESSURE IN SUPPORT OF THE “SUCTION CHAMBER” HYPOTHESIS IN PERI-IMPLANT TISSUE GROWTH

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Aim: this study aimed to validate the presence of a stable resting negative pressure within the oral vestibule and to investigate its variation based on anatomical location (anterior vs posterior) and biological sex, in order to support the “suction chamber” hypothesis for peri-implant soft tissue maturation.

Methods: a cross-sectional observational study was conducted on 11 healthy adults. Intraoral vestibular pressure was measured using a manometric system based on communicating vessels. Pressure variations relative to atmospheric pressure were recorded every 5 seconds during 20-minute sessions in both anterior and posterior vestibules. Data were analyzed using descriptive statistics and non-parametric tests (Mann-Whitney U, Kruskal-Wallis).

Results: a total of 18,996 measurements were analyzed. The

overall mean resting pressure was -2.77 ± 2.82 mmHg, confirming a persistent sub-atmospheric baseline. Significantly more negative values were found in the anterior region compared to the posterior ($p < 0.001$). A statistically significant difference was also found between sexes ($p < 0.001$), with males exhibiting a tendency toward more negative pressure values.

Conclusions: this study confirms the existence of a quantifiable resting negative pressure in the oral vestibule, which varies significantly by anatomical location and sex. These findings provide a physiological basis for the “suction chamber” concept, supporting the hypothesis that such negative pressure may act as a biomechanical stimulus influencing peri-implant soft tissue growth and maturation in relation to the restoration emergence profile.