

# The Proceedings of the 23rd Congress of the Iranian Academy of Periodontology: New Approaches in Periodontal and Dental Implant Treatment

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## Abstract 1

**Digital Implant Placement: Why, When, How?****Amir Raei**

Assistant Professor, Department of Periodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

Computer-assisted surgery for implant placement was initially introduced in the late 1990s. Due to recent advancements in digital technologies, it has become increasingly utilized to achieve an optimal implant positioning that is both biologically and prosthetically ideal. Different types of guided implant placement are typically categorized based on the level of guidance (partially versus fully) and the ability to make intraoperative adjustments (static versus dynamic). However, the rationale behind performing a digital workflow is clear based on accuracy, but the case selection criteria and the standard protocol might be considered vague. The purpose of this lecture is to provide a guideline with original case presentations regarding the digital implant placement workflow.

Keywords: Dental implant, digital, guided surgery.

## Abstract 2

**Guided Implant Surgery: Basic Principle, Indications, and Predictability****Hadi Gholami**

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The invention of computerized axial tomography (now known as computerized tomography) and developments of interactive software to allow virtual planning, aiming to guide the surgery precisely toward a specific target, have dramatically improved general and oral surgery. Virtual dental implant planning allows for a prosthetically driven approach, resulting in the best possible prosthesis design, better esthetics, optimized occlusion, and loading. This approach has also changed the surgical paradigm of using extensive flaps to obtain a proper view of the surgical area because flapless implant surgery, with or without immediate loading, has become more predictable. Two types of guided implant surgery protocols—static and dynamic—have been described in the literature. The static approach, better known as computer-guided surgery, uses a tissue-supported surgical template, which reproduces the virtual implant position directly from computerized tomographic data, and this information can be converted to guide templates to be used during surgery, with or without raising a mucoperiosteal flap. Dynamic guided surgery, also called navigation, reproduces the virtual implant position directly from computerized tomographic data and uses motion-tracking technology to guide the implant osteotomy preparation. As the technology developed, different levels of evidence were presented that showed various degrees of accuracy. Several protocols

for guided surgery are available in the literature and are distinguished by different guide production techniques, methods of support, and drilling/placement protocols. Implant planning software using cone-beam computerized tomography data has made it possible to plan the optimal implant position virtually the optimal implant position, considering the surrounding vital anatomic structures and future prosthetic requirements. This paper summarizes the evolution and ongoing trends in digital and virtual planning and implant surgery. This overview aims to clarify the different concepts of guided surgery and their respective advantages, disadvantages, and limitations. The outcome of guided surgery is assessed in terms of implant survival, precision, and complications. Clinical cases are provided to briefly demonstrate the workflow and clinical guidelines for the safe use of these approaches.

Keywords: Computer-assisted, dental implantology, implant, survival.

## Abstract 3

**Deep Margin Elevation Technique with a View to Biologic Width: Current Concepts and Clinical Considerations****Masoumeh Faramarzi**

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Background: Crown lengthening and deep margin elevation are different protocols for managing and treating decayed teeth. In this presentation, we will discuss this concept, indications and contraindications, clinical considerations of this technique, and comparisons with conventional crown lengthening surgery.

Methods: In this lecture, we will discuss the articles and systematic reviews in this field and cases related to this technique.

Results: After this lecture, the clinician can get an overview of this technique and have case selection in practice.

Conclusion: This lecture will raise clinicians' awareness of this technique.

Keywords: Biologic width, crown lengthening, deep margin elevation, subgingival margins.

## Abstract 4

**Gummy Smile: Etiology, Diagnosis and Clinically Effective Treatment Protocols****Mojtaba Bayani**

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Excessive gingival display, also known as “gummy smile,” is the overexposure of the maxillary gingiva while smiling. In some severe cases, the overexposure of the gingival tissue is evident even in the resting position of the lips. The critical element in managing a gummy smile is

identifying its etiology to determine the treatment plan and outcomes. A gummy smile may result from various disorders, including a short or hypermobile upper lip, altered passive eruption, vertical maxillary excess, dentoalveolar extrusion, and gingival hyperplasia. The treatment modalities vary according to the etiology of the gummy smile, and the key is accurately recognizing the cause of the pathology. In some cases, the gummy smile results from multiple factors, e.g., vertical maxillary excess and hypermobile lip, and a combination of techniques can be implemented. Less invasive treatment options include botulin toxin injection, and a newer alternative is hyaluronic acid injection. The surgical management range includes gingivectomy, crown lengthening, modified lip repositioning, and orthognathic surgery. This lecture aims to explore the literature for scientific evidence to increase dentists' knowledge of the diagnosis and treatment of excessive gingival show.

Keywords: Esthetics, gummy smile, treatment.

#### Abstract 5

##### **Deep Margin Elevation from a Restorative Point of View** **Shahriar Jalalian**

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Today, with the advancements in science, dentistry has transformed. There is more tendency towards conservative dentistry. In severely damaged teeth, decay may spread subgingivally. In these cases, indirect restorations are prescribed. Increasing the crown lengthening is prescribed in case of extension below the gingiva. Apart from CL surgery, deep margin Elevation is an alternative and more conservative solution. This method has many advantages, including preservation of tooth tissue, simpler clinical methods, saving time, etc. The material used to build the wall in deep margin elevation is completely compatible with the gingival tissue, and there is no problem. Deep margin elevation is usually performed after immediate dentin sealing, and in fact, these two processes are not separate from each other and have many advantages.

Keywords: Subgingival margins, cervical margin relocation, deep margin elevation, proximal box elevation.

#### Abstract 6

##### **Effect of Metronidazole Gel as an Adjunct to Mechanical Debridement in the Treatment of Peri-implantitis: A Randomized Clinical Trial**

##### **Azin Khorramdel**

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Background: The tissues surrounding dental implants may manifest clinical inflammatory symptoms and

irrecoverable bone loss. This study determined the effect of metronidazole gel as an adjunct to mechanical debridement compared to mechanical debridement alone in treating peri-implantitis.

Methods: Thirty-two patients with peri-implantitis were randomly assigned to two groups: mechanical debridement and local metronidazole gel treatment. Periodontal parameters such as GI, PI, PD, BOP, and CAL were recorded in the first visit. All the patients underwent mechanical debridement and received oral hygiene instructions. After local isolation and anesthesia, metronidazole gel (METRGEL, 0.75%) was placed in the peri-implant sulcus. Clinical outcomes were measured during 1- and 3-month follow-ups. Statistical analyses, including repeated-measures ANOVA, independent t-test, Friedman's test, and Mann-Whitney U test were utilized.

Results: In both groups, over the 3-month follow-up period, all the clinical outcomes, GI, PI, PD, BOP, and CAL, decreased. Pocket depth was significantly lower in the experimental group compared to the control group at both one and three-month follow-ups. Plaque index values were significantly lower in the experimental group after three months. CAL values were significantly lower in the experimental group one month after treatment.

Conclusion: Metronidazole gel resulted in a reduction in pocket depth and plaque index three months after treatment, with no significant effect on CAL, BOP, or GI scores.

Keywords: Gel, implant, metronidazole, peri-implantitis.

#### Abstract 7

##### **AI in Periodontology and Implant Dentistry: Prospects and Challenges**

##### **Surena Vahabi**

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Artificial Intelligence (AI) is transforming periodontology and implant dentistry through machine learning and deep learning algorithms, improving diagnostic accuracy, treatment planning, and patient outcomes. AI analyzes extensive datasets to predict periodontal disease progression and customize treatment plans, while AI-assisted imaging enhances implant placement accuracy based on anatomical factors. Despite these advancements, significant challenges hinder widespread adoption. Concerns such as patient data privacy, ethical implications of AI in healthcare, and regulatory compliance must be carefully managed. Additionally, ensuring AI models are interpretable and applicable across diverse patient populations remains critical. Looking forward, AI holds promise in revolutionizing oral healthcare with AI-driven diagnostic tools for early disease detection, virtual simulations for precise surgical planning, and



personalized treatment strategies integrating genetic and biometric data. Collaboration among dental professionals, AI researchers, and regulatory bodies are essential to responsibly harness these advancements. In conclusion, while AI offers substantial benefits in periodontology and implant dentistry, addressing ethical, regulatory, and technical challenges is crucial to ensure equitable access to advanced technologies while maintaining patient safety and ethical standards.

Keywords: Artificial intelligence, convolutional neural networks, periodontology, radiography.

#### Abstract 8

##### **Sinus Lift Surgery and Complication Management**

**Hoda Amirarjmandi**

Periodontist, Private Practice, Tehran, Iran

**Background:** Dental implant rehabilitation of the posterior maxilla has always been a challenge due to alveolar ridge atrophy and sinus pneumatization. Sinus augmentation is a well-known and predictable procedure for vertical deficiencies of the posterior maxilla. To date, various techniques have been described based on the physiology of intrasinus bone repair to obtain better outcomes. Nevertheless, these procedures could also be associated with several intra- and postoperative complications, such as membrane perforation, hemorrhage, infection, graft resorption, and loss of the graft or implants.

**Methods:** This study reviewed some articles on sinus lifting and its complications from 2008 to 2023 to evaluate the currently existing clinical evidence on the efficacy of membrane elevation for implantation in the atrophic posterior maxilla, history, materials, and management of complications, such as membrane perforation, benign paroxysmal positional vertigo, and implant displacement into the sinus cavity.

**Results:** Maxillary sinus augmentation, either crestal or lateral window approach, is a well-known, predictable, and often mandatory procedure to increase the alveolar bone height in the posterior maxilla for dental implant rehabilitation. However, the procedure is also associated with certain complications that may influence the outcomes of the therapy and patients' quality of life. A thorough knowledge of prevention and proper management of these complications is essential to obtain better treatment outcomes.

**Conclusion:** It is recommended that the most appropriate surgical technique be chosen according to the specific characteristics of the case and the surgeon's experience and skills.

Keywords: Anatomy, bone augmentation, complications, maxillary sinus, perforation, Schneiderian membrane, sinus lifting procedure.

#### Abstract 9

##### **Bone Reconstruction Scenarios: Theory to Practice**

**Nima Naddafaour**

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Considering the growing demands for implant placement, clinicians meet patients with insufficient bone volume daily. Researchers and clinicians have tried to solve these problems for decades, and different techniques and materials have been introduced to improve bone quantity. Each technique has its advantages and disadvantages. Without knowing the details, none of these procedures end up in success. In this paper and presentation, some cases and scenarios related to different treatment plans and techniques will be described, and the key points related to success and probable complications will be discussed. Specifically, some critical considerations in extensive horizontal and vertical ridge augmentation will be addressed. Choosing the right treatment plan, procedures, and materials are investigated to achieve optimal results in complicated cases.

Keywords: Bone defects, bone graft, bone reconstruction, bone tissue engineering, dental implant.

#### Abstract 10

##### **Key Clinical Guidelines for Zero Bone Loss Concept: Surgical and Prosthetic Factors**

**Saman Nasiri**

Periodontist, Private Practice, Lorestan, Iran

**Background:** The importance of crestal bone stability around dental implants for the success and longevity of treatment cannot be overemphasized. Unfortunately, after inserting a fixture or delivering a prosthesis, some crestal bone loss occurs, which will cause further problems.

**Methods:** It is well accepted by clinicians that stable crestal bone with remodeling of <0.2 mm per year is one measure of successful long-term implant treatment, with no bleeding on probing and a probing depth of 5-7 mm. With the zero-bone loss concept, we can hope for the long-term stability of dental implants and manage the soft and hard tissues properly.

**Results:** In this article, surgical factors affecting bone loss, such as fixture design, vertical soft tissue, implant placement depth, attached gingiva width, and alveolar ridge condition, have been presented. In addition, some prosthetic factors for maintaining crestal bone stability have been stated.

**Conclusion:** Knowledge about the surgical and prosthetic factors related to the long-term stability of the crestal bone is essential and will significantly improve the results of implant treatment.

Keywords: Bone resorption, dental implants, immunomodulation, peri-implantitis.

## Abstract 11

**Vertical Ridge Augmentation****Farid Shiezhadeh**

Department of Periodontics, Mashhad University of Medical Sciences, Mashhad, Iran

Vertical ridge augmentation plays a crucial role in implant-supported rehabilitation, enabling the restoration of both function and aesthetics. This presentation aims to provide a comprehensive overview of the techniques and modalities used in vertical ridge augmentation. The presentation begins by discussing the concept of guided bone regeneration, which involves using a barrier membrane to compartmentalize and facilitate bone regeneration. This technique requires careful management of soft tissues and is considered technically demanding. Next, the presentation explores using bone block grafts for vertical ridge augmentation. This method involves the placement of solid grafts to create and maintain space for implant placement. The advantages and considerations of this approach will be discussed. Additionally, the presentation delves into the concept of distraction osteogenesis as a viable and faster approach for vertical ridge augmentation. However, the inherent limitations of this technique will be highlighted, leading to its current deprecation. Throughout the presentation, emphasis will be placed on each modality's indications, step-by-step approach, and effectiveness in achieving successful vertical ridge augmentation. Techniques and modalities utilized in vertical ridge augmentation aid in their understanding and decision-making process for implant-supported rehabilitation cases.

Keywords: Bone block, guided bone regeneration, vertical bone augmentation.

## Abstract 12

**The Esthetic Biological Contour for Designing Emergence Profile in Implant Restorations****Azam Sadat Mostafavi**

Associate Professor, Department of Prosthodontics, Tehran University of Medical Sciences, Tehran, Iran

Emergence profile design plays a vital role in supporting and stabilizing the peri-implant soft tissues, allowing an esthetically adequate outcome in implant-supported restorations. Factors, such as implant position and the surrounding soft tissues, influence the emergence profile contour. Therefore, properly managing implant restorations becomes a key part of achieving a pleased esthetic outcome. The literature was searched using related keywords in PubMed, Embase, and Scopus. Differentiating important areas of the emergence profile and considering particular designs for those areas, needs to be understood by the clinicians. Understanding the different zones of the emergence profile and their relation to factors like implant

position, implant design, and soft tissue thickness is key to providing more stable and promising results. These factors can be managed through adequate setting of surgical and prosthetic procedures with proper interim and definitive implant restorations. Proper emergence profile design provides pleasing esthetic outcomes and favorable soft tissue response to implant restorations.

Keywords: Emergence profile, implant-supported restoration, temporary restoration.

## Abstract 13

**Impacted Canine Exposure: Orthodontic and Surgical Considerations and Challenges****Atefe Saffar Shahroudi**

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One of the most common dental malformations is canine impaction, which leads to malocclusion and esthetic and functional problems for the patient. The prevalence of canine impaction in the maxilla is higher than in the mandible, and it has various genetic and environmental etiological factors, including the lack of sufficient space in the dental arch. Treating impacted canines is one of the most challenging and time-consuming orthodontic treatments. If the treatment plan is inducing the eruption of the impacted tooth using orthodontic forces, it is necessary that this tooth be exposed by surgery at the right time and then erupted by orthodontic forces. For the success of this treatment plan, sufficient interaction between the orthodontist and the surgeon is crucial. Using the right surgical technique and bonding an appropriate attachment on the tooth facilitates future orthodontic treatment and increases the success rate. This study investigated the latest and appropriate techniques for impacted canine exposure surgery, attachment bonding, and important considerations of this treatment from the point of view of orthodontics and periodontics, along with presenting several cases using a case-based approach.

Keywords: Apically displaced flap, canine exposure, closed-eruption method, impacted tooth, orthodontic anchorage procedures.

## Abstract 14

**Periodontists' Agreement on Linear Measurements on CBCT Images****Mahsa Khademi**

Department of Radiology, Islamic Azad University, Dental Branch, Tehran, Iran

Evaluation and interpretation of radiographic images by surgeons are done individually; therefore, some differences between them are inevitable. This study aimed to determine the agreement between periodontists in estimating linear measurements in CBCT images at the



School of Dentistry of Islamic Azad University of Tehran in 2019. In this descriptive-analytical study, 160 CBCT cross-sectional images were selected from maxillary and mandibular edentulous ridges with undercuts, strips, depression ridges, and the absence of a normal cortex. Five periodontists prepared the images, taking longitudinal measurements from the edge of the ridge to the anatomical region and transverse measurements 3 mm below the apex of the alveolar crest. SPSS 11 and ICC and multiple linear regression tests were used to analyze the data. The mean work experience of periodontists was 7.2 years, and their mean age was 43.2 years. The overall ICC reproducibility coefficient in ridge measurements in maxillofacial radiologists was 0.129. The highest ICC for longitudinal linear measurements of the remaining ridge in the maxilla was related to the strip ridge (0.991). The highest ICC for longitudinal measurement was related to the normal ridge in the mandible. The highest ICC for transverse measurements of the remaining ridge in the maxilla was related to the normal ridge (0.958). These values in the mandible of the ridge had an undercut. Gender and work experience had no significant effect on reproducibility. The highest mean of ICC between observers was for longitudinal measurement in the mandible, and the lowest mean was related to the transverse measurement of the residual maxillary ridge.

Keywords: Agreement, linear measurements, periodontist.

#### Abstract 15

### Laser Light Illuminating the Path to Enhanced Periodontal Care

**Alireza Mirzaei**

Laser Department, Islamic Azad Dental School, Tehran, Iran

Using laser technology in periodontal care represents a significant advancement in clinical practice. This article delves into the historical context of laser therapy in medicine, from its inception in 1960 to its evolution into low-level laser therapy (LLLT). LLLT, often called photobiomodulation (PBM), has attracted attention due to its potential to enhance periodontal treatment outcomes. The article thoroughly examines the mechanisms of action of photobiomodulation therapy PBM (T), covering its impact on cellular and tissue levels. The authors explore the evidence-based recommendations for using PBM in periodontal care, shedding light on its potential to improve periodontal conditions, especially when applied as an adjunct to conventional treatments. They investigate the role of PBM in individuals and its possible contribution to periodontal health. Additionally, the article delves into its application in periodontal regenerative procedures, its ability to expedite soft tissue wound healing, and the effects of PBM in reducing periodontal inflammation and mitigating discomfort after periodontal surgery. In

conclusion, the article calls for enhanced clinical research to streamline laser procedures, develop antimicrobial photodynamic therapy, and conduct well-designed randomized controlled trials (RCTs). It also emphasizes the importance of understanding the impact of laser therapy on therapeutic and biological goals, the potential to reduce invasive procedures, and the necessity of adequate research funding.

Keywords: Laser, periodontics, periodontology.

#### Abstract 16

### Effects of Photobiomodulation by Diode Lasers on the Management of Medication-related Osteonecrosis of the Jaw: From Bench to Bedside

**Neda Hakimih**

DDS, PhD, Researcher at Laser Application in Medical Sciences Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Medication-related osteonecrosis of the jaw (MRONJ) is defined as non-healing exposed bone, probably in the maxillofacial region with a history of current or previous treatment with bisphosphonates and antiresorptive or antiangiogenic agents. Recently, photobiomodulation has been proposed as a promising adjunctive method in the management of MRONJ.

Methods: A systematic literature search of different databases was performed up to May 2024, using a specific search strategy to find eligible studies that assessed the impact of photobiomodulation on the prevention and treatment of MRONJ in animal or human studies.

Results: Data revealed the positive effects of photobiomodulation with diode lasers and different wavelengths on preventing and controlling the symptoms and signs of MRONJ.

Conclusion: According to the current evidence, photobiomodulation may be beneficial in preventing and treating MRONJ as an adjunctive method.

Keywords: Bone necrosis, laser, oral cavity, osteonecrosis of the jaw, photobiomodulation.

#### Abstract 17

### Plasma: An Innovative and Attractive Adjuvant Therapy in Periodontology

**Mohammad Vahedi**

Department of Oral and Maxillofacial Medicine, Faculty of Dentistry, Islamic Azad Medical Sciences University, Tehran, Iran

Plasma is the fourth state of matter and consists of large quantities of highly reactive species, such as ions, stripped energetic electrons, excited atoms and molecules, ultraviolet photons, and active radicals. Various types of plasma are generated under different pressures, generally of two types: thermal and non-thermal. Thermal plasma

has been used in medicine for a long time for tissue removal and cauterization. Recent studies focused more on the non-thermal (cold atmospheric pressure) plasma (CAPP). Gases that can be used to produce CAPP are helium, argon, nitrogen, heliox, and air. CAPP has antimicrobial, anti-inflammatory, and tissue-repairing effects that are useful in several areas of dentistry. Furthermore, studies showed that CAPP treatment could improve cell morphology and viability of human gingival fibroblasts and enhance the growth factors' expression and wettability, as well as superior spreading of osteoblasts on root and implant surfaces, resulting in improved clinical parameters. Hence, it is a novel therapeutic technique that can be effectively used as an adjunct to conventional therapies for periodontitis and peri-implantitis. In this lecture, we will show the great potential of CAPP in periodontology.

Keywords: Adjunctive, periodontal surgery, plasma.

#### Abstract 18

### Comparative Evaluation of the Effects of High-Power Diode Laser 980 nm and CPP-ACP Paste on Treatment of Dentin Hypersensitivity

**Narges Naghsh**

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**Background:** Various methods have been recommended to treat dentin sensitivity, including Laser therapy and CPP-ACP (Casein phosphopeptide-amorphous calcium phosphate). The aim of this study was performed to compare the effect of high power Diode laser 980 nm and CPP-ACP paste on the treatment of dentin hypersensitivity (DH).

**Methods:** In this single-blind clinical trial study, 96 dentin-sensitive teeth were randomly divided into three groups of 32 and the groups were treated with Diode 980 nm laser, power 1 watt, 30 seconds irradiation, CPP-ACP paste and control group (guide radiation without laser irradiation). The level of sensitivity and pain were determined and compared before treatment, one week, one month and two months after the end of treatment. The data were evaluated with one-way variance statistical tests and Tukey's post hoc test ( $\alpha=0.05$ ).

**Results:** There was no significant difference between the groups in the average score of DH except the eighth week. ( $P>0.05$ ) In the eighth week, the average score of DH in the diode laser group ( $P=0.04$ ) and paste containing CPP ACP ( $P>0.001$ ) was significantly lower than the control group. Although there was no significant difference between these two test groups ( $P=0.18$ ). Changes in the average of DH in the eighth week showed that in the paste group containing CPP-ACP, reduced pain was more than the laser treated group ( $P=0.046$ ) and in the laser group it was more than the control group ( $P=0.01$ ).

**Conclusion:** Both treatments were effective in reducing dentin sensitivity after two months, but there is no significant difference between high power Diode laser 980 and CPP-ACP paste in the treatment of dentinal hypersensitivity.

Keywords: CPP-ACP, Dentin hypersensitivity, Diode 980 nm.

#### Abstract 19

### Closed Sinus Floor Elevation: A Conservative Approach in Implant Treatment with Long-term Success of the Vertically Expander Screw Technique

**Mahdi Kadkhoda Zadeh**

Dental Research Center, Research Institute of Dental Sciences, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Department of Periodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran

The closed sinus floor elevation, specifically using the VES (vertically expander screw) technique, is a minimally invasive method for enhancing bone volume in the posterior maxilla. The VES technique offers a more conservative approach. In this presentation, we will focus on the long-term success of the VES technique. Clinical studies have shown that implants placed using the VES method demonstrate excellent stability and high survival rates over many years. This method is particularly advantageous for patients with reduced bone height near the maxillary sinus, providing reliable and predictable outcomes while preserving native tissue.

Keywords: Dental implants, maxillary sinus, peri-implantitis.

#### Abstract 20

### Peri-implantitis: Long-term Main Complications of Dental Implants

**Farrokh Khatiblou**

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Dental implants may be considered a reliable routine procedure in dental practice to replace missing teeth. The results of long-term studies indicate that implant-supported dental prostheses constitute a predictable treatment method for the management of fully and partially edentulous patients. Although dental implants are immune from caries, it has been shown that they are not immune from biological complications of peri-mucositis and peri-implantitis. Today, peri-implantitis has become a main long-term complication of dental implants and the most challenging condition for clinicians and patients. This presentation aims to define peri-implantitis and its prevalence, risk factors, treatment, and prevention.

Keywords: Dental implants, peri-implantitis.



## Abstract 21

**Soft tissue Management around Teeth and Implants****Reza Birang<sup>1</sup>, Hossein Behnia<sup>2</sup>, Ezzatollah Jalalian<sup>3</sup>, Reza Amid<sup>4</sup>, Ali Kamyar Abdolaali<sup>5</sup>, Majid Shahmoradi<sup>6</sup>**<sup>1</sup>Department of Periodontics, Faculty of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran<sup>2</sup>Department of Oral and Maxillofacial Surgery, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran<sup>3</sup>Associate Professor, Department of Fixed Prosthodontics, Dental Branch, Azad Medical Sciences University, Tehran, Iran<sup>4</sup>Professor, Department of Periodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran<sup>5</sup>Research Institute of Dental Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran<sup>6</sup>Assistant Professor, Department of Periodontics, Isfahan University of Medical Sciences, Isfahan, Iran

Effective soft tissue management is crucial for the long-term success of both natural teeth and dental implants. This panel explores contemporary strategies for optimizing soft tissue health, enhancing esthetics, and ensuring functional longevity in periodontal therapy and implantology. Managing soft tissues around teeth involves understanding the biological principles governing periodontal health. Key factors will be discussed, such as the architecture of the gingival margin and the presence of keratinized tissue. Innovative techniques, including connective tissue grafts and guided tissue regeneration, will be highlighted to emphasize their role in promoting gingival health and esthetic outcomes. Soft tissue integration is essential for preventing complications such as peri-implantitis in dental implants. The panel will address the importance of proper implant positioning, the selection of appropriate prosthetic components, and the timing of soft tissue augmentation procedures. Furthermore, we will discuss the interplay between soft tissue management and patient-specific factors, including age, systemic health, and oral hygiene practices. By fostering a multidisciplinary approach that incorporates surgical techniques, restorative considerations, and patient education, we aim to improve clinical outcomes and patient satisfaction. In conclusion, effective soft tissue management around teeth and implants is a multifaceted challenge that requires an evidence-based approach and collaboration among dental professionals. This panel seeks to provide insights and practical strategies that can be implemented in clinical practice to enhance patient care.

Keywords: Augmentation, connective tissue, implant, soft tissue.

## Abstract 22

**Vertical and Horizontal Bone Augmentation****Behzad Hooshmand<sup>1</sup>, Afshin Haraji<sup>2</sup>, Hamid Mahmoud Hashemi<sup>3</sup>, Neda Moslemi<sup>4</sup>, Amin Motamedi<sup>5</sup>**<sup>1</sup>Professor, Department of Periodontics, School of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran<sup>2</sup>Oral and Maxillofacial Surgeon, Faculty of Dentistry, Islamic Azad University of Medical Sciences, Tehran, Iran<sup>3</sup>Department of Oral and Maxillofacial Surgery, School of Dentistry, Tehran, University of Medical Sciences, Tehran, Iran<sup>4</sup>Department of Periodontics, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran<sup>5</sup>Periodontist, Private Practice, Kerman, Iran

Achieving optimal outcomes in vertical and horizontal bone augmentation is crucial for the long-term success of implants, especially in cases with severe alveolar bone defects. Key factors influencing the success of these procedures include patient-specific considerations, such as bone quality, soft tissue health, and overall systemic conditions. Proper case selection, including a thorough evaluation of the patient's medical history and bone anatomy using advanced imaging techniques, plays a foundational role. Surgical techniques are pivotal, with choices between autogenous bone grafts, allografts, xenografts, or synthetic materials depending on the clinical scenario. Autogenous grafts are often preferred due to their osteogenic, osteoconductive, and osteoinductive properties. Using barrier membranes is essential for guided bone regeneration (GBR) to protect the grafted area from soft tissue invasion and maintain space for new bone formation. Adequate blood supply to the graft site is critical, as is tension-free primary wound closure to ensure healing. Using low-speed drilling techniques during implant placement may help preserve bone quality. Postoperative care, including infection control and patient compliance with hygiene and follow-up, also significantly impacts the success rate. Innovations like using growth factors, such as platelet-rich fibrin (PRF) and concentrated growth factors (CGF), have shown promise in enhancing the healing process. Ultimately, a multidisciplinary approach and personalized treatment plan ensure the best results in bone augmentation for implant therapy.

Keywords: Bone graft, implant, vertical augmentation.

## Abstract 23

**Ridge Preservation: What Is It and When Should It Be Considered?****Babak Amoeian**

Periodontist, Private Practice, Babol, Iran

Ridge preservation is a dental procedure to prevent bone loss after tooth extraction. When a tooth is removed, the



surrounding bone that supports it may begin to deteriorate or resorb, potentially compromising the structure needed for future restorative procedures, such as dental implants. Ridge preservation aims to maintain the alveolar ridge's width and height, ensuring a better foundation for prosthetic solutions. The procedure involves placing bone graft material in the extraction socket, often accompanied by a collagen membrane to support natural bone regeneration. There are several indications for ridge preservation. It is crucial when future implant placement is planned, as maintaining bone volume is critical for implant stability and aesthetics. Additionally, it can be considered in cases where the patient desires to maintain the natural contour and function of the jaw, even if they do not immediately plan to receive an implant. Other factors include the proximity of the extraction site to important structures like sinuses or nerves and patient-specific concerns like pre-existing periodontal disease or systemic health conditions affecting bone regeneration. While ridge preservation is a common and generally successful procedure, not every extraction case requires it. Factors such as the patient's age, bone quality, and the overall treatment plan influence whether ridge preservation is necessary.

Keywords: Alveolar ridge, bone graft, bone loss, dental implant, regeneration, ridge preservation, tooth extraction.

#### Abstract 24

### Soft Tissue Recession around Dental Implants: Etiology, Classification and Treatment Modalities

**Vahid Esfahanian**

Associate Professor, Islamic Azad University, Isfahan (Khorasgan) Branch, Isfahan, Iran

Soft tissue stability around dental implants is a key factor for long-term success both in function and especially from an esthetic point of view. Soft tissue recession creates an unpleasant appearance of the replaced tooth and interferes with hygiene maintenance and keeping tissue health. Therefore, the intervention for treating this situation is indicated in cases where there is a possibility of complete improvement of the problem or at least prevention of its deterioration. In this presentation, once etiological factors of peri-implant soft tissue recession are discussed, a classification of implant buccal soft tissue recession, especially in a single unit between two natural teeth, is presented; finally, appropriate treatment modalities for each situation are shown. These treatments mainly consist of autologous connective tissue grafts accompanied by tunnel preparation or coronally advanced flap. In some situations, soft tissue graft substitute material can be considered based on the clinician's decision or the patient's preference. However, in untreatable cases, implant removal and an attempt at a new treatment in the future will inevitably be the only possible alternative way.

Keywords: Implant, soft tissue grafts, soft tissue recession.

#### Abstract 25

### Gingival and Alveolar Ridge Lesions: Introducing a Clinical Diagnostic Decision Tree

**Hamed Mortazavi**

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Diagnosis of gingival and alveolar ridge lesions might be quite challenging. This pictorial essay introduces a decision tree for these entities to their clinical features. General search engines and specialized databases including PubMed, PubMed Central, Science Direct, Scopus and authenticated textbooks were used to find relevant topics using keywords such as "gingivae," "alveolar ridge," "oral soft tissue lesions," "ulcerative lesions," "tumor-like lesions," "white lesions," "red lesions," "systemic disease," "medication," "gingival enlargement," and "pigmented lesions." Related English-language articles from 2000 up to now in medical and dental journals were appraised. Upon compilation of data, gingival and alveolar ridge lesions were categorized into four major groups according to their clinical findings: 1) ulcerative/erosive lesions, 2) exophytic lesions, 3) white lesions, and 4) pigmented lesions. In addition, each group was divided into several subgroups according to their etiology. Finally, 36 entities were organized as a clinical diagnostic decision tree to help clinicians establish a logical diagnosis by a stepwise progression.

Keywords: Oral disease, oral keratosis, oral leukokeratosis, oral leukoplakia.

#### Abstract 26

### Application of diode lasers and RF in oral soft tissue surgeries

**Arash Azizi**

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Diode lasers and radiofrequency (RF) use the spatially concentrated and very fast heating of tissue cells. They both can cut and coagulate tissues in a precise way. Bleeding is stopped with high efficacy, giving the surgeon a clear view of the surgical field.

Differences between diode lasers and RF

Diode laser radiation is passed through an optical fiber and emitted from the fiber tip to the tissue surface, but the radiofrequency current is directed through a metal electrode.

Main difference

Laser fiber cannot be inserted deeply into the tissue to produce a cut. Laser radiation emits from the front end of



a fiber, heats only the uppermost layer of the tissues, and ablates it. In contrast, the metal electrode of an RF device can be inserted into the tissue.

Other keys about laser and RF

The incision made by Rf is fast and stress-free, providing cosmetic results with appropriate coagulation and good heating. Diode laser is very useful in the treatment of superficial lesions apart from treatments in periodontics, endodontics, PDT, and LLLT.

This article investigates the applications, similarities, and differences between diode lasers and RF in soft tissue oral surgeries.

Keywords: Diode laser, oral surgery, radiofrequency, soft tissue.

#### Abstract 27

### Conservative Approaches for Edentulous Regions

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In dental implantology, addressing edentulous regions, particularly in partially or fully edentulous patients, poses significant challenges. Traditional implants rely on osseointegration, which is enhanced by a larger contact area with bone tissue. However, tooth loss in posterior jaws often leads to bone resorption, complicating implant placement due to proximity to vital anatomical structures like the inferior alveolar nerve and maxillary sinus. While techniques such as bone grafting and maxillary sinus lifting can restore bone height for standard implants, they come with increased postoperative morbidity, costs, and complication risks. As a solution, short implants have emerged as a simpler and more effective alternative for rehabilitating atrophic ridges. The atrophic mandible presents unique challenges due to its bone morphology, which affects graft stability and blood supply. Surgical interventions like vertical ridge augmentation and nerve transposition may address these issues but can lead to graft resorption and neurosensory disturbances. Recent systematic reviews and meta-analyses indicate that short implants yield comparable outcomes to standard implants, with advantages such as reduced marginal bone loss and lower biological complication rates.<sup>1,2</sup> Our six-year clinical study and investigations support these findings by showing similar results between 4-mm and longer implants in augmented bone. This highlights the potential of short implants as a viable option in cases prone to complications, particularly in the mandible, warranting further research to validate these conclusions.<sup>3-5</sup>

Keywords: Dental implants, edentulism, jaw.

#### Abstract 28

### A Conservative Approach in Atrophic Ridge: Subperiosteal Implants

**Alireza Parhiz**

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Subperiosteal implants are placed under the gingiva but above the jawbone. They are used when there is insufficient bone height for traditional implants. These implants consist of a metal framework that sits on top of the jawbone with posts protruding through the gums to securely hold the artificial teeth. One of the main advantages of subperiosteal implants is that they can be an option for patients who do not have enough bone for endosteal implants, which are placed directly into the jawbone. This makes them suitable for individuals who may not be good candidates for bone grafting procedures to build up bone mass. Subperiosteal implants are often used in cases where patients have experienced bone loss in their jaw due to conditions such as periodontal disease. They can provide a stable foundation for artificial teeth, improving chewing ability and restoring aesthetics. However, subperiosteal implants may require a more invasive surgical procedure compared to endosteal implants, as they involve placing the metal framework on top of the bone. Additionally, they may have a slightly higher risk of complications such as infection due to their placement under the gingival tissue. Overall, subperiosteal implants can be a valuable treatment option for patients with significant bone loss, who are looking to restore their smile and improve oral function when traditional implants are not feasible.

Keywords: Dental implant, prosthesis, surgical dental prosthesis.

#### Abstract 29

### 3D Ring Augmentation in Complex Bony Defects

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Tooth loss resulting from periodontal or endodontic infections, as well as congenital or traumatic injuries, often leads to ridge defects and irreversible bone resorption. Bone grafting is the established method to address dental bone loss, yet site grafting becomes particularly challenging when the ridge lacks sufficient height. Techniques to create a bony envelope for guided bone regeneration are necessary in such cases. Autogenous bone grafts, sourced from the patient, are considered the gold standard due to their superior osteogenic, osteoinductive, and osteoconductive properties. Utilizing intraoral block bone autografts is an effective approach for augmenting

local alveolar defects before implant placement. Khoury et al. described a technique involving the stabilization of two split autologous bone blocks using micro-screws, with the gap filled by autogenous bone chips. These bone blocks are typically harvested from the mandibular symphysis or ramus using piezoelectric surgery or micro-saws, then divided into two thin laminae. However, rectangular-shaped blocks present several challenges, including suboptimal adaptation to uneven recipient surfaces and limitations due to the anatomical constraints of intraoral sites, making large rectangular blocks difficult to harvest. Additionally, the process is time-consuming and technique-sensitive. To address these issues, we introduced ring-shaped, 8-shaped, and Olympic-shaped blocks using trephine drills for lateral and vertical augmentation in both esthetic and posterior regions. These blocks are harvested from various intraoral sources, including the symphysis, ramus, and alveolar ridge, offering improved adaptability and efficiency for bone augmentation procedures.

Keywords: Alveolar ridge augmentation, augmentation, mandibular ridge, maxillary, ridge augmentation.

## Abstract 30

**Immediate Placement of Implants into Extraction Sockets****Ali Akbar Khoshkhou Nezhad**

Periodontist, Private Practice, Tehran, Iran

Dental implants have become a predictable treatment modality for fully and partially edentulous patients. In this regard, the immediate implant placement technique has several advantages over delayed implant placement, as follows:

1. Treatment time is reduced.
  2. The amount of surgery is reduced, and so is the treatment expense.
  3. Ideal implant location can be achieved.
  4. The width and height of the alveolar bone are preserved.
- The discussion in the following presentation will be based on scientific articles and self-experience in preserving and reconstructing periodontium.

Keywords: Dental implantation, dental implant loading, endosseous dental implantation, immediate, osseointegration.

## Abstract 31

**Connective Tissue as a Golden Tissue in Implant Soft Tissue Augmentation: A Case Series****Ali Momen**

Periodontist, Private Practice, Tehran, Iran

Soft and hard tissue atrophy is a natural phenomenon after tooth extraction. To fix this problem, several hard and soft tissue augmentation techniques are used. In cases where the bone is sufficient for implant placement in the right prosthetic location, some interventions to augment the

mucosal thickness around dental implants are indicated to optimize esthetics and maintain peri-implant health. In this lecture, we review some potential of connective graft in soft tissue augmentation through case series.

Keywords: Free gingival graft, recession, soft tissue defect.

## Abstract 32

**Surgical and Non-surgical Periodontal Treatments: Loyalty to the Rules of Being a Periodontist****Amir Moein Taghavi**

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Surgical and non-surgical treatments have formed the basis of periodontal therapies for several decades. However, it is important to note that today's treatments differ completely from those of 30 years ago. Information about the etiological factors of periodontitis, wound healing mechanisms, and the relationship between patient-related factors such as smoking and diabetes with treatment outcomes has increased. Technological advancements have expanded the treatment options available to clinicians. There has been a greater emphasis on patient-centered outcomes in clinical research. Our understanding of what is happening around us has also increased. The advancements in periodontics over the past 50 years have been greater than in any other dental specialty. New and old treatment beliefs have intertwined. This article will review what has transpired in periodontal treatments from the past to the present.

Keywords: Biofilm, dental plaque, non-surgical periodontal therapy, oral hygiene, periodontal disease.

## Abstract 33

**Saving Compromised Teeth****Gholamali Gholami<sup>1</sup>, Mohammad Asnaashari<sup>2</sup>, Amir Moeintaghavi<sup>3</sup>, Niloofar Jenabian<sup>4</sup>, Haleh Heshmat<sup>5</sup>**<sup>1</sup>Professor, Department of Periodontics, Shahid Beheshti University of Medical Sciences, Tehran, Iran<sup>2</sup>Professor, Department of Endodontics, Shahid Beheshti University of Medical Sciences, Tehran, Iran<sup>3</sup>Professor, Department of Periodontics, Mashhad University of Medical Sciences, Mashhad, Iran<sup>4</sup>Associate Professor, Department of Periodontics, Babol University of Medical Sciences, Babol, Iran<sup>5</sup>Associate Professor, Department of Operative Dentistry, School of Dentistry, Islamic Azad University, Tehran, Iran

Today, with the introduction of dental implants, most clinicians prefer to extract any decayed tooth or one with an apical lesion or questionable prognosis. However, in recent years, significant advancements have been made in non-surgical and surgical periodontal treatments, and many teeth that were previously extracted can now be preserved with very conservative treatments, relying on



regenerative dentistry. On the other hand, the success of complex implant treatments is under question. In this panel, we aim to discuss various treatment approaches from the perspectives of specialists in different dental fields based on diverse case studies.

Keywords: Poor prognosis, tooth extraction, tooth preservation.

#### Abstract 34

### How Does Platelet Derivatives' Application Decrease the Adverse Effects of Smoking in Periodontal and Implant-related Surgeries? A Review of Clinical Data

**Aida Kheiri**

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**Background:** Smoking has always been a factor that affects the outcomes of oral surgeries. Since platelet derivatives (PD) have been described as an autologous biomaterial for better healing, this review focuses on the biological effects of PD application in smokers who undergo periodontal and implant-related surgeries.

**Methods:** An initial search was performed in PubMed/MEDLINE, Scopus, and Google Scholar from January 2000 to May 2024 to select all clinical studies in the English language that focused on the function of PD during the healing period. Studies were not considered if smokers were not included in their samples.

**Results:** None of the studies reported undesirable outcomes following PD application. PD acts as a scaffold with different growth factors, including VEGF and PDGF, as well as IL-4, IL-6, fibronectin, and fibrin. These factors can increase the vascularization and cell migration rate and control the immune system, especially in smokers with altered healing responses.

**Conclusion:** Platelet derivatives' application comprises various biomolecules with different release rates. These features can positively influence smokers for enhanced healing procedures and clinical outcomes.

Keywords: Dental implants, periodontitis, platelet-rich plasma, smoking, wound healing.

#### Abstract 35

### Dental Implant Surgery with Immediate Restoration in the Esthetic Zone: A Case Report

**Zahra Farhang Fallah**

Department of Periodontics, Tehran Islamic Azad University of Medical Sciences, Tehran, Iran

**Background:** Losing a tooth from the esthetic zone is a big concern for patients who want to restore their smile quickly. This case report explores the process of performing immediate dental implant surgery with restoration in these aesthetically important areas.

**Case presentation:** A 64-year-old male patient presented to our dental clinic with the chief complaint of a missing left maxillary lateral tooth and dissatisfaction with his smile. Following the prosthetic assessment, we decided to create space by reshaping the adjacent tooth. Subsequently, an implant surgery procedure was conducted using an active-surface fixture. Given the limited bone width and slight exposure of the implant, guided bone regeneration (GBR) using allograft material and a connective tissue graft from the palate was employed. The implant achieved a final torque of 30 N/cm<sup>2</sup>. Immediate provisionalization was performed by a prosthodontics resident, who instructed the patient to avoid exerting excessive pressure during mastication.

**Outcome:** At the four-month follow-up examination, both clinical and radiographic assessments demonstrated successful outcomes, with stable implant integration evidenced by a periostest value of -8.0. Consequently, the final prosthesis was delivered to the patient. Comprehensive documentation and photographic documentation of the treatment process are available.

**Conclusion:** After implant surgeries, especially in the esthetic zone and in patients with high esthetic demand, it is possible to deliver immediate restorations by observing the basic points during surgery and giving the necessary advice to the patient.

Keywords: Dental implantation, immediate dental implant loading, osseointegration.

#### Abstract 36

### A Narrative Review of Malignant Transformation around Dental Implants

**Kimia Hafezi Motlagh**

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**Background:** Over the years, an increasing number of articles related to oral squamous cell carcinoma (OSCC) around dental implants have been published, leaving room for doubt regarding the possible relationship between dental implants (DI) and OSCC. Therefore, this narrative review aimed to characterize the epidemiologic profile of patients with OSCC around DIs, screen for possible risk factors involved in carcinogenesis, and evaluate the spectrum of clinical characteristics to better understand the misdiagnosis with peri-implantitis.

**Methods:** A comprehensive search was conducted in Scopus, PubMed, Google Scholar, and Ovid databases using the keywords "oral squamous cell carcinoma," "dental implants," and "carcinogenesis." The search was limited to articles published in the last 20 years.

**Results:** The search strategy resulted in the selection of 80 articles. The articles were evaluated, and after duplication removal, 53 abstracts were reviewed, resulting in the selection of 33 studies according to inclusion and

exclusion criteria.

**Conclusion:** Malignant transformation around dental implants was more common in women >70, non-smokers, and non-drinkers, and the majority had oral leukoplakia before the diagnosis of OSCC. It is important to emphasize that these lesions may present clinical and radiographic features that could resemble peri-implantitis, leading to a delay in diagnosis and subsequent treatment.

**Keywords:** Dental implants, neoplasm, oral squamous cell carcinoma.

#### Abstract 37

### Effect of Leukocyte- and Platelet-rich Fibrin on the Bone Loss and Primary Stability of Implants Placed in Posterior Maxilla: A Randomized Clinical Trial

**Meshkat Naeimi Darestani**

Department of Periodontics, Faculty of Dentistry, Semnan University of Medical Sciences, Semnan, Iran

**Background:** In this study, we investigated the effects of leukocyte and platelet-rich fibrin (L-PRF) on implant stability and alterations in the marginal bone surrounding posterior maxillary implants.

**Methods:** This randomized clinical trial was conducted to compare the variable of L-PRF placement around maxillary implants. Resonance frequency analysis (RFA) was used to evaluate the implant stability immediately after surgery and 1, 2, 4, 6, 8, and 12 weeks after surgery ( $T_0$  to  $T_6$ , respectively). In addition, the amount of marginal bone changes around the implant at  $T_6$  was compared with the baseline using periapical radiography.

**Results:** The RFA outcomes were statistically significant within each group ( $P < 0.001$ ,  $\eta^2 = 0.322$ ); however, in none of the follow-ups and immediately after the surgery, there was a significant difference between the two groups in terms of the implant stability quotient scores ( $P > 0.05$ ). At  $T_0$ , the test and control groups' respective mean levels of marginal bone loss around the implants were 0.4836 mm and 0.7343 mm, significantly different from the corresponding values at  $T_6$ . On the other hand, marginal bone loss around the implant was not significantly different between the two groups at  $T_0$  and  $T_6$  ( $P = 0.532$ ).

**Conclusion:** L-PRF did not improve the RFA outcomes of implants three months after implant placement, and changes in the ISQ values over time were the same in both groups. In addition, L-PRF had no superior effect on the marginal bone loss around the implants.

**Keywords:** Dental implants, dental implant stability, L-PRF, platelet derivatives.

#### Abstract 38

### Efficacy of AI for the Identification and Classification of Dental Implant Systems in Radiographs

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Beheshti University of Medical Sciences, Tehran, Iran

Convolutional neural networks (CNNs), a particular type of deep learning architecture, are positioned to become one of the most transformative technologies for medical applications. The current study aimed to evaluate the efficacy of the deep CNN algorithm for identifying and classifying dental implant systems. A total of 5390 panoramic and 5380 periapical radiographic images from 3 types of dental implant systems with similar shapes and internal conical connections were randomly divided into a training and validation dataset (80%) and a test dataset (20%). We performed image preprocessing and transfer learning techniques based on fine-tuned and pre-trained deep CNN architecture (GoogLeNet Inception-v3). The test dataset was used to assess the accuracy, sensitivity, specificity, receiver operating characteristic curve, area under the receiver operating characteristic curve (AUC), and confusion matrix compared between deep CNN and periodontal specialist. The deep CNN architecture (AUC=0.971, 95% confidence interval 0.963–0.978) and board-certified periodontist (AUC=0.925, 95% confidence interval 0.913–0.935) showed reliable classification accuracies. This study demonstrated that deep CNN architecture is useful for identifying and classifying dental implant systems using panoramic and periapical radiographic images.

**Keywords:** Artificial intelligence, deep learning, dental implants, supervised machine learning.

#### Abstract 39

### Comparison of PRF and Acellular Dermal Matrix on Vertical Soft Tissue Thickness around Dental Implants: A Randomized Controlled Trial

**Mahsa Ghorbani**

Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

**Background:** Previous studies have shown that adequate thickness or initial augmentation of soft tissues positively affects the stability of peri-implant bone. This randomized, controlled trial evaluated the efficacy of platelet-rich fibrin (PRF) for increasing vertical soft tissue thickness around dental implants. This randomized, controlled trial aimed to evaluate the efficacy of platelet-rich fibrin (PRF) for increasing vertical soft tissue thickness around dental implants and compare the results with acellular dermal matrix.

**Methods:** Putty impressions were taken from each patient to calibrate the measurement site at baseline and follow-up. After randomization, 20 fully threaded titanium implants were inserted in the posterior mandible in 20 patients (7 men and 13 women) using a full-thickness flap elevation. In the test group (10 patients), mucosa was treated with 2 layers of PRF membrane. In the control group (10



patients), one layer of acellular dermis membrane (ADM) with a thickness of 0.6–1 mm was placed over the crestal bone before suturing. Tissue thickness was measured before implant insertion (baseline) and at the time of reentry after 3 months, using a #15 endodontic file and a digital Vernier. An independent examiner analyzed the data.

**Results:** After three months, all the 20 implants were osseointegrated. Soft tissue augmentation with PRF and ADM led to a significant tissue gain. The crestal tissue thickness in the PRF and ADM groups increased from  $1.66 \pm 0.23$  mm to  $3.3 \pm 0.75$  mm and  $1.52 \pm 0.22$  mm to  $2.58 \pm 0.47$  mm, respectively. Tissue thickness after three months in the PRF group was significantly higher than in the ADM group ( $P < 0.05$ ).

**Conclusion:** This randomized, controlled trial demonstrates that platelet-rich fibrin (PRF) and acellular dermal matrix (ADM) effectively increased vertical soft tissue thickness around dental implants. However, PRF showed significantly higher efficacy and provided a greater advantage for soft tissue augmentation in dental implant procedures.

**Keywords:** Acellular dermal matrix, dental implants, platelet-rich fibrin, soft tissue thickness.

#### Abstract 40

### Does Adding Autografts to Bone Materials Boost Ridge Augmentation Outcomes?

**Mohammad Hoseini Hooshiar**

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**Background:** This systematic review presents a fundamental question: a pioneering and pivotal contribution to the discipline. In guided bone regeneration (GBR), does incorporating autogenous bone into bone substitute improve the histological outcome?

**Methods:** A meticulous electronic search was conducted, including the Scopus, EMBASE, Web of Science, and PubMed/MEDLINE databases, until August 1, 2023. The systematic review incorporated studies that provided comprehensive documentation of bone regeneration using autogenous bone grafting or alternative bone substitutes. In this investigation, the percentage of new bone served as the primary outcome. A total of 303 studies were obtained from PubMed/MEDLINE, 879 from Scopus, 589 from Web of Science, and 268 from Embase, as a result of the initial search, which yielded 2039 studies. A total of 643 duplicate entries were eliminated. Following the elimination of abstracts and titles, 1372 publications were omitted. The full texts of 24 articles were subsequently examined. Following the application of the eligibility criteria, 21 more articles were excluded, resulting in the inclusion of three articles in the systematic review. Histological outcomes of bone augmentation, including the formation

of new bone, were evaluated in the intervention group of these studies by employing bone substitutes (xenografts or allografts) in combination with autografts. The control group, on the other hand, was administered xenografts in solitary. No statistically significant differences were observed in new bone formation between the groups in the most recent follow-up evaluations. Given considerable variations among study protocols, a meta-analysis was deemed unsuitable.

**Conclusion:** Compared to groups receiving a combination of xenograft and autograft, this systematic review did not identify any substantial benefits during longer-term follow-up periods in groups receiving a combination of xenograft and autograft.

**Keywords:** Alveolar bone loss, bone regeneration, bone substitutes.

#### Abstract 41

### Clinical Outcomes of Free Gingival Graft vs. Palatal Pedicle Graft in Peri-implant Soft Tissue Phenotype Modification: A Randomized Controlled Trial Comparing Patient Reports

**Hossein Khoshkhou Titkanlou**

Assistant Professor, Department of Periodontics, Mashhad Dental School, Mashhad University of Medical Sciences, Mashhad, Iran

**Background:** The importance of peri-implant soft tissues in maintaining tissue health and esthetics has been recognized. A thickness of at least 2 mm is considered a protective factor against peri-implantitis. This study assessed clinical outcomes and complications at implant sites following soft tissue augmentation with either palatal free gingival graft (FGG) or palatal pedicle graft (PPG).

**Methods:** In this randomized controlled clinical trial, 42 patients with inadequate keratinized tissue width were randomly assigned to intervention groups: group 1: free gingival graft (FGG) and group 2: palatal pedicle graft. The keratinized tissue width (KTW), vestibular depth, and surface shrinkage were recorded preoperatively and one and three months after the procedure. Patient-reported outcome measurements (PROMs) were recorded at a two-week follow-up.

**Results:** Thirty-five patients completed the study (FGG group,  $n=17$ ; PPG group,  $n=18$ ). Group 2 demonstrated a higher increase in KTW and vestibular depth at 1 and 3 months ( $P < 0.05$ ). The number of analgesics in each group was not significantly different two weeks after the procedure; however, the numeric analog scale (NAS) showed significantly higher pain scores on days 3 to 8 in group 1 patients.

**Conclusion:** The use of palatal pedicle graft in soft tissue augmentation demonstrated more keratinized tissue

width formation and less postoperative morbidity. There was no difference between the methods used to compare surface shrinkage.

**Keywords:** Free gingival graft, palatal pedicle graft, peri-implant soft tissue, soft tissue augmentation.

#### Abstract 42

### Periodontitis and Taste Impairment: A Prospective Sign and Symptom

**Arghavan Tonkaboni**

Associate Professor, Department of Oral Medicine, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

**Background:** Periodontal diseases increase systemic inflammation by the action of periodontopathic bacteria. Psychosomatic factors are considered one of the most critical risk factors for periodontal disease. The potential mechanisms of psychological stress-induced periodontal disease, emphasize the importance of neuroimmune modulation for periodontal health, and are expected to provide a new perspective for periodontal science based on psychoneuroimmunology. Smell and taste impairments have been considered suggestive signs and symptoms of this change in periodontal diseases.

**Methods:** The literature, including PubMed, Google Scholar, and Scopus, was searched by taste, smell, and periodontitis as keywords.

**Results:** More than 1000 articles were found to investigate the relationship with halitosis; however, most were self-reported. Some reports about taste impairment in periodontitis showed that changes in oral microflora, immunologic cytokines, and inflammation can cause taste impairment. It should be considered that taste problems are detectable with some standard tests. It could be a key to approaching patients who suffer from systemic diseases concerning periodontitis, like diabetes.

**Conclusion:** The findings suggest a positive association between periodontitis and distorted senses of taste and smell.

**Keywords:** Periodontitis, smell, taste.

#### Abstract 43

### Investigating the Correlation between Blood Groups and Periodontal Diseases

**Kimia Hafezi Motlagh**

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**Background:** It has been suggested in research studies that ABO blood types and the propensity to acquire chronic diseases are related. It has also been noted that ABO system antigens can act as infectious agent receptors. Consequently, the current study investigated the correlation between blood types and periodontal

disorders in Iranian patients.

**Methods:** In this case-control study, 268 individuals diagnosed with chronic periodontitis, characterized by clinical attachment loss of  $>3$  mm, were recruited. Additionally, 268 healthy individuals with clinical attachment loss of  $\leq 3$  mm were chosen as a control group. These participants were randomly selected from the clients at the School of Dentistry and underwent examination after providing informed consent. The blood groups of patients were ascertained using laboratory tests with the determination of their Rh factor, whether positive or negative. The odds ratio values and the presence or absence of the Rh factor were computed and documented for each blood group.

**Results:** The odds ratios in healthy individuals compared to those with chronic periodontitis were 1.21 for blood group A, 0.75 for group B, 1.13 for group AB, and 0.94 for group O, and this ratio in Rh cases was reported to be 0.9 positive and 1.15 Rh negative.

**Conclusion:** The odds ratio for blood groups A and B in healthy individuals exhibited statistical significance compared to individuals with chronic periodontitis. However, no significant differences were observed concerning Rh positivity or negativity in dual blood group instances. Undoubtedly, further investigations should be undertaken in this matter.

**Keywords:** Blood group, blood group antigen, periodontal disease, Rh factor.

#### Abstract 44

### The Effects of Medications on Dental Implant Osseointegration: A Review of Recent Reports

**Nazanin Roqani Dehkordi**

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**Background:** Dental implants have become one of the most common procedures for rehabilitating those with single missing teeth or completely edentulous jaws. As more implant patients get older and use many drugs for a variety of systemic diseases, clinicians should be aware of the potential pharmacological effects on bone remodeling and osseointegration. The current study investigated the positive and negative effects of medications on osseointegration.

**Methods:** A comprehensive search for relevant papers was undertaken using four databases: Web of Science, PubMed, Scopus, and Google Scholar.

**Results:** Some frequently given medications, such as nonsteroidal anti-inflammatory drugs (NSAIDs), glucocorticoids, proton pump inhibitors (PPIs), selective serotonin reuptake inhibitors (SSRIs), anticoagulants, metformin, and chemotherapeutic treatments, might impair osseointegration. On the contrary, some therapeutic drugs, such as anabolic, anti-catabolic, or



a combination of anabolic and anti-catabolic agents, can improve osseointegration and boost the treatment's success rate.

**Conclusion:** Mineralization promoters and bone resorption inhibitors are systemic drugs that help with osseointegration. On the other hand, drugs commonly prescribed to the elderly with systemic disorders may interfere with osseointegration, resulting in implant failure.

**Keywords:** Dental implant, osseointegration, medication, drug effects.

#### Abstract 45

#### Application of Artificial Intelligence in Periodontology: a Comprehensive Review

**Shabnam Aghayan<sup>1</sup>, Negar Ahmadi<sup>2</sup>, Anita Nourmohammadi<sup>2</sup>, Pegah Aghajani<sup>2</sup>**

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**Background:** In recent years, the use of artificial intelligence (AI) has become increasingly popular in dentistry because it facilitates the process of diagnosis and clinical decision-making. However, AI has multiple prominent drawbacks that restrict its wide application today. Dentists must be aware of AI's advantages and disadvantages before its implementation. Therefore, the present study comprehensively reviewed various applications of AI in periodontics along with its advantages and disadvantages. **Methods:** For this review article, a complete query was carried out on PubMed and Google Scholar databases, and the studies published during 2020–2024 were collected using the keywords “Artificial Intelligence,” “Dentistry,” “Machine learning,” “Deep learning,” and “Periodontology.”

**Results:** In recent research, AI applications in assessing periodontal health and diagnosis of disease, dental implantology science, designing dental implants, and identifying the bone level on radiograph images have been mentioned. Despite AI's benefits in clinical dentistry, three controversial challenges must be managed, including ease of use, financial return on investment, and evidence of performance.

**Conclusion:** AI's newest advancements in periodontology require further scientific work before being applied to clinical practice. Moreover, the immense use of AI in clinical dentistry is only achievable when its challenges are appropriately managed. With the development of AI, this technology is expected to be used as a powerful diagnostic tool in periodontology. It is suggested that AI technology, specifically DL, can identify bone levels in radiographs. This finding can significantly reduce failure in the field of implantology.

**Keywords:** Artificial intelligence, machine learning, deep learning, periodontology, dental implants.

#### Abstract 46

#### Artificial Intelligence Applications in Dental Panoramic Radiography for Periodontal Diseases: A systematic review

**Raheleh Mahboub Farimani<sup>1</sup>, Meysam Soleymani<sup>2</sup>, Zahra Manafpour<sup>3</sup>**

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**Background:** This systematic review explores the utilization of artificial intelligence (AI) techniques in the analysis of dental panoramic radiographs (DPR) for the diagnosis and assessment of periodontal diseases such as periodontitis and gingivitis. The aim is to assess the current state of research, identify trends, and evaluate the effectiveness of AI-based approaches in this domain.

**Methods:** PubMed, Google Scholar, Web of Science, and Scopus were systematically searched from 2000 to Feb 2024 for English language articles related to AI applications in dental panoramic radiography for periodontal diseases. Identified titles and abstracts were independently screened by two reviewers. Inclusion criteria encompassed studies involving the application of AI, including machine learning and deep learning algorithms, in the analysis of DPR for periodontal diseases.

**Results:** Of 12,193 uniquely identified articles, 39 studies were included. These studies demonstrated a growing interest in employing AI techniques, such as convolutional neural networks and computer vision algorithms, for automated detection, classification, and severity assessment of periodontal conditions from DPR. The included studies utilized various statistical and machine learning methods. Studies were assessed for their methodology, sample size, AI techniques used, and outcome measures. We assessed the quality of the selected studies using QUADAS-2.

**Conclusion:** The integration of AI technologies shows promising potential in enhancing the efficiency and accuracy of periodontal disease diagnosis and assessment using DPR. However, further validation through large-scale clinical trials and standardization of methodologies are warranted to facilitate the clinical translation of these AI-based tools into routine dental practice.

**Keywords:** Artificial intelligence, computer-assisted, deep learning, dental radiography, diagnosis, machine learning, periodontal diseases, periodontitis, panoramic radiography, radiographic image interpretation.



## Abstract 47

**Osseodensification in Implant Dentistry****Rumina Najafi<sup>1</sup>, Amir Moeintaghavi<sup>2</sup>**<sup>1</sup>Dental Student, Student Research Committee, Mashhad University of Medical Science, Mashhad, Iran<sup>2</sup>Professor, Department of Periodontics, Faculty of Dentistry and Dental Research Center, Mashhad University of Medical Science, Mashhad, Iran

**Background:** One of the important factors influencing the long-term success of implant treatments is the primary stability of dental implants. To achieve the stability of dental implants, sufficient bone density is needed to create firm bone-implant contact during osseointegration and implant placement. Osseodensification is a non-extraction approach to increase bone density, preserves bone bulk, improves primary stability of implants, and is used to create condensed autograft in peri-implant sites by compressing the cancellous bone. This narrative review aims to investigate the effects of the osseodensification technique at the implant preparation site.

**Methods:** The literature was searched for studies about osseodensification and its role in the stability of dental implants and bone preservation. The publications were selected using Pubmed, Cochrane, Google Scholar, and Scopus from 2015 to 2022 using a combination of the following keywords: osseodensification, implant stability, bone density, and osteotomy. Twenty-five studies were found. After removing irrelevant studies, 12 articles were reviewed.

**Results:** Special design and counterclockwise rotation of osseodensification burs lead to elastic strain in bone trabecula and less extraction of bone particles, so it reduces the amount of osteotomy, increases primary stability of dental implants and enhances the torque of implant during insertion and removal compared to conventional methods. Studies have shown that the osseodensification technique improves the quality and quantity of bone and preserves bone bulk on the implant surface. Based on the studies conducted on humans, clinical symptoms such as pain, infection, bleeding, peri-implantitis, etc., were less in the osseodensification technique.

**Conclusion:** It seems that the osseodensification technique reduces complications during and after implant placement by creating sufficient bone density and increasing the primary stability of dental implants. Therefore, this technique enhances implant treatment's success and makes patients feel more comfortable and satisfied.

**Keywords:** Osseodensification, dental implant, bone density, implant stability.

## Abstract 48

**A Narrative Review of Dental Implants in Patients with Oral Lichen Planus: Can Patients Diagnosed with Oral Lichen Planus Be Rehabilitated with Dental Implants as Successfully as Normal Patients?****Kimia Hafezi Motlagh**

Department of Oral Medicine, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

**Background:** Oral lichen planus (OLP) is an autoimmune and chronic inflammatory disease. The etiology of OLP is still unknown, but it is believed to be associated with cell-mediated immune dysregulation. Since OLP is a mucosal disease, it has been suggested that it affects the ability to attach to the titanium surface, and some conditions are considered risk factors for dental implants.

**Methods:** The research protocol followed the Preferred Reporting Items for Systematic Reviews (PRISMA2020) checklist. The online databases Pubmed, Scopus, Embase, Google Scholar, and Cochrane were searched using the following relevant keywords.

**Results:** The search strategy resulted in the selection of 180 articles. The articles were evaluated, and after duplication removal, 53 abstracts were reviewed, resulting in the selection of 25 studies according to inclusion and exclusion criteria. The risk of bias assessment was done using the Modified Newcastle-Ottawa quality assessment scale.

**Conclusion:** The results also suggested that implants did not influence the manifestations of OLP and that OLP was not a risk factor for peri-implant diseases. The loss of implants in some cases was not due to OLP but instead to parafunction, poor bone quality, or malignant transformation of OLP. This treatment approach may be considered a safe solution for OLP patients. Regarding the most suitable materials for OLP patients, the choice of titanium for the abutments and the metal supra-structure of restorations may be recommended.

**Keywords:** Dental implants, implant survival, oral lichen planus, OLP.

## Abstract 49

**Comparative Evaluation of the Efficacy of Probiotic and 0.2% Chlorhexidine Mouthwashes on the Gingival Inflammatory Indices in Patients with Gingivitis****Narges Naghsh**

Department of Periodontics, Faculty of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran

**Background:** This study aimed to compare the effect of probiotic versus chlorhexidine mouthwashes on some periodontal indices.

**Methods:** In this double-blind, controlled, prospective clinical trial, 48 subjects referring to the Faculty of Dentistry, Isfahan University of Medical Sciences, who had



plaque-induced gingival inflammation were randomly divided into three groups: group 1: chlorhexidine mouthwash (0.2%, Vi-one), group 2: probiotic mouthwash (Famifact capsule solved in distilled water), and group 3 (distilled water). The subjects themselves did not know about the mouthwash contents they used. At the beginning of the study, plaque index, gingival index, and bleeding on probing (BOP) were measured and recorded. Mouthwash use continued for four weeks. Participants in all three groups were recalled two weeks and four weeks after the start of the study to re-measure their gingival indices. Finally, the data were analyzed using chi-squared, one-way ANOVA, repeated-measures ANOVA, least significant difference, and post hoc Duncan statistical tests. The significance level was considered at  $\alpha=0.05$ .

Results: Both probiotic and chlorhexidine mouthwashes significantly reduced plaque index, gingival index, and BOP compared to placebo at the two mentioned intervals ( $P<0.05$ ). In the two-week evaluation, chlorhexidine mouthwash reduced plaque index more than probiotic mouthwash ( $P<0.05$ ); however, at the four-week evaluation, probiotic mouthwash was more effective in reducing the gingival index ( $P<0.05$ ).

Conclusion: Our findings showed that after one month, the probiotic mouthwash had a similar effect on reducing gingival inflammatory indices without chlorhexidine's side effects. However, more clinical and microbiological studies are required on different probiotic mouthwashes.

Keywords: Chlorhexidine, gingival inflammation, mouthwash, probiotics.

#### Abstract 50

### Assessment of Maxillary Sinus Lifting Procedure in the Presence of Chronic Sinusitis

**Mehdi Amiri Siavashani**

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Background: Chronic sinusitis can be considered a relative contraindication for sinus lifting procedures. However, its specific effects on bone height, infection, and healing have not been well investigated as its incidence as a post-operative complication.

Methods: A retrospective comparative investigation was executed to evaluate the impact of chronic sinusitis on sinus lifting procedures regarding bone height, infection, and healing scores. Preoperative and 6-month postoperative records (CBCT or CT and panoramic radiographs) of 40 patients who underwent sinus lifting procedures with graft and implant placement were split into two sets of 20 patients each. Group A comprised patients with healthy sinuses, whereas group B included patients with chronic sinusitis (identified as the presence of thickening of Schneiderian membrane  $\geq 2$  mm, mucosal cyst, polyp, or fluid level). Records of both groups were

assessed for the difference in bone height of the alveolar ridge between the preoperative radiographs and after six months postoperatively, and clinical notifications at the postoperative follow-up to report the healing and infection scores.

Results: Statistically, there was a non-significant difference in mean bone height gain ( $P>0.05$ ) in comparison to the control group's mean bone height ( $8.84\pm 0.93$ ). Also, there was a non-significant variation in mean healing and infection scores.

Conclusion: According to the available data, chronic sinusitis presenting as a thickening of the Schneiderian membrane has no significant effect on postoperative bone height, healing, or infection score in patients undergoing sinus augmentation with simultaneous implant placement. Further research is needed to better evaluate the effect of chronic sinusitis and its current status as a relative contraindication for sinus lifting procedures.

Keywords: Bone height, chronic sinusitis, healing scores, infection, maxillary, sinus lifting.

#### Abstract 51

### Bone Augmentation Techniques in Periodontology: A Systematic Review

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Background: After tooth extraction, bone deficiency commonly occurs in the alveolar ridge. These deficient sites should be regenerated to enhance the likelihood of successful implant placement. Various techniques are available to promote bone regeneration in these sites. This article assesses and compares the efficacy and reliability of variable bone augmentation techniques in dental implantology.

Methods: We reviewed 80 different articles related to bone augmentation through PubMed/MEDLINE and Google Scholar from 2016 to 2023. The techniques used in the articles were as follows: platelet-rich fibrin (PRF), vertical augmentation procedures, use of different biomaterials such as autogenous bone (Auto), xenografts (XG), allografts (AG), alloplasts (AP), bioactive agents (Bio), hyaluronic acid (HA), and combinations of these, customized barrier membrane (Titanium Alloy, Polly Ether-Ether Ketone and Unsintered Hydroxyapatite), lateral augmentation of the jaw by the split expansion ridge technique, plasma rich in growth factors (PRGF), lateral bone augmentation procedures, bone marrow aspirate concentrates for implant site, different methods of guided bone regeneration (GBR), autologous platelet concentrates (APCs) for hard tissue regeneration, and porcine dentin-derived bone graft material.

Results: Sixteen articles were eligible and met our inclusion

criteria (systematic review, randomized controlled trial, and meta-analysis). These articles showed that techniques such as the use of different biomaterials such as Auto, Bio+XG, and XG+Auto, customized barrier membrane (Titanium Alloy, Polly Ether-Ether Ketone and Unsintered Hydroxyapatite, Split-expansion ridge (alveolar ridge splitting—ARS), plasma rich in growth factors (PRGF), autologous platelet concentrates (APCs) for hard tissue regeneration, concentrated growth factor, lateral bone augmentation procedures, and porcine dentin-derived bone graft material have shown both clinical safety and bone augmentation efficacy.

**Conclusion:** Although the results of this systematic review show the reliability of new and alternative bone augmentation techniques in the sinus floor, posterior mandible, and alveolar ridge compared to typical techniques, further investigations and trials with more participants are required for accurate evidence.

**Keywords:** Bone augmentation, dental implant, bone regeneration, bone graft, guided bone regeneration.

#### Abstract 52

### Onlay Platelet-rich Fibrin Membrane versus Free Gingival Graft in Increasing the Width of Keratinized Mucosa around Dental Implants: A Split-mouth Randomized Clinical Trial

**Farnam Motallebi**

Department of Periodontology, Faculty of Dentistry, Mansoura University, Egypt

**Background:** This study aimed to compare the use of the platelet-rich fibrin membrane (PRF) versus the free gingival graft (FGG) during the second stage of dental implant procedures to increase the amount of keratinized mucosa around dental implants.

**Methods:** Fifteen patients with bilaterally missing teeth and deficient keratinized mucosa (KM) width were recruited for a split-mouth randomized controlled trial. After implant placement on the control sides, onlay FGG was used, whereas, on the other side (study side), onlay PRF membranes were applied to augment the KM. One month and three months after augmentation, the increase in keratinized mucosa width, bone level around the implants, and soft tissue health were evaluated and compared. The shrinkage percentage was also calculated for both grafts.

**Results:** There was a significant increase in the width of KM in the FGG and PRF groups; however, it was observed that FFG resulted in significantly better results than PRF, with no significant difference in peri-implant soft tissue health or bone level.

**Conclusion:** Within the limitations of this study, it was

concluded that the onlay PRF membrane could increase the keratinized mucosa width around dental implants with the advantages of a lower surgical time and less postoperative discomfort and pain for the patients compared to the FGG. However, FGG had a significantly higher ability to augment and increase keratinized mucosa around dental implants.

**Keywords:** Platelet-rich fibrin, free gingival graft, keratinized mucosa, dental implant, soft tissue augmentation.

#### Abstract 53

### Assessing the Correlation between Osteoporosis and Periodontitis among Postmenopausal Women

**Fatemeh Fallah Toosi**

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**Background:** Chronic periodontitis and osteoporosis are common multifactorial inflammatory diseases that increase in intensity with age. Also, the severity of both diseases increases in women during the post-menopausal stage. Some associations between periodontitis and osteoporosis have been documented; however, the findings remain unclear. This study aims to assess and correlate the relationship between skeletal osteoporosis and periodontitis among post-menopausal women in Mashhad, Iran.

**Methods:** This study consisted of 75 postmenopausal women with an age range of 46-76 years. Based on the T-score obtained from the results of skeletal BMD, patients were divided into three groups (n=25): the osteoporotic group, the osteopenic group, and the normal group. Data regarding the patient's BMI, duration of menopause, smoking habits, alcohol consumption, and history of bone fracture were obtained. All the patients underwent a clinical dental observation, and periodontal indices such as periodontal probing depth (PPD), clinical attachment loss (CAL), gingival index (GI), and plaque index (PI), and the existence or severity of periodontitis were recorded.

**Results:** This research showed a significant association between periodontitis and osteoporosis (P=0.001). Also, the severity of periodontitis seemed to be higher in the osteoporotic and osteopenic groups compared to the normal group. The mean CAL (P=0.000) and PPD (P=0.002) were also significantly associated with osteoporosis.

**Conclusion:** There is a definite correlation between osteoporosis and periodontitis in post-menopausal women. Close cooperation between dentists and general practitioners will likely help reduce the risks of these diseases.



**Keywords:** Osteoporosis, periodontitis, postmenopausal women, bone mineral density, periodontal disease.

#### Abstract 54

### Relationship between Clinical Parameters of Gingiva and Alveolar Bone Dimensions in Maxillary CBCT

**Hesam Pourmohammad**

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**Background:** The gingival biotype is crucial for esthetics and biological function. Anatomical characteristics of the periodontium, including gingival thickness, the width of keratinized gingiva, and alveolar bone morphology, influence its behavior. This study aims to investigate the relationship between clinical parameters of the gingiva and alveolar bone dimensions in maxillary cone-beam computed tomography scans.

**Methods:** This study assessed 189 maxillary anterior teeth in 36 patients. In the CBCT view, the facial bone thickness (BT) was measured at the crestal level, 2.4 mm apical to the bone crest, and the gingival biotype (GB), gingival thickness (GT), the width of keratinized gingiva (WKG), probing depth (PD), and papillary filling (PF), measured with clinical examination. Finally, data were analyzed with SPSS 22.

**Results:** In the central, lateral, and canine teeth, there was a significant correlation between GB and BT at the crestal level ( $P=0.000$ ) and 2 ( $P=0.002$ ) and 4 mm apical to the bone crest ( $P=0.000$ ). Also, There was a significant correlation between GT and BT at the crestal level ( $P=0.003$ ). WKG significantly correlated with BT at the crestal level ( $P=0.000$ ) and 2 mm apical to the bone crest ( $P=0.003$ ). There was a significant correlation between GT and BT at the crestal level ( $P=0.000$ ) and 2 ( $P=0.000$ ) and 4 mm apical to the bone crest ( $P=0.000$ ).

**Conclusion:** The relationship between gingival clinical parameters and bone tissue is significant. Clinical evaluations, assessment of periodontal factors, and radiographic evaluations are essential for restorative and periodontal treatments, including immediate implant placement.

**Keywords:** Bone thickness, cone-beam computed tomography, gingival biotype, gingival thickness, probing depth.

#### Abstract 55

### Application of Artificial Intelligence in Dental Implants: A Systematic Review of Literature

**Kimia Ghods, Omid Moghaddas, Kian Ghods**

Dental Material Research Center, Islamic Azad University of Medical Sciences, Tehran, Iran

**Backgrounds:** Artificial intelligence (AI) is a branch of computer sciences that aims to produce intelligent

machines capable of performing tasks that usually require human intelligence. In recent years, AI has become increasingly popular in dental implants. Therefore, the present study aims to comprehensively review various applications of AI in dental implants and their advantages and disadvantages.

**Methods:** A complete query was carried out on PubMed, Google Scholar, Embase, and Scopus databases, and the studies published during 2015-2024 were collected using the keywords “artificial intelligence,” “dentistry,” “machine learning,” “artificial neural network,” “deep learning,” “periodontology,” and “dental implant.” After applying appropriate inclusion and exclusion criteria, 29 relevant articles on artificial intelligence in dental implants were selected and evaluated.

**Results:** The most significant advancement of AI is in optimizing the design of dental implants. Nonetheless, in new research, AI applications in detecting fractured or intact dental implants, modifying the dental implant's porosity, length, and diameter, facilitating implant planning, predicting dental implant success and osteointegration, identifying bone-supporting dental implants, and classification of dental implant brand and treatment stage, have been mentioned.

**Conclusion:** The results showed that AI application in dental implantology can be beneficial. Nonetheless, based on observed challenges in dental practice, AI's newest advancements in dental implants require further scientific work before being applied.

**Keywords:** Artificial intelligence, artificial neural networks, deep learning, dental implant, dentistry, machine learning, periodontology.

#### Abstract 56

### Knowledge, Attitude, and Practice of Orthodontists Regarding the Management of Impacted Canines

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**Background:** There are various approaches and strategies for treating impacted maxillary canines, but there is still no consensus. Different surgical methods for exposure have been proposed, each with pros and cons. Although this is a long-lasting challenge in orthodontics and periodontics, we lack robust evidence in this area. This study aimed to evaluate the knowledge, attitude, and practice of orthodontists and orthodontic residents regarding the management of impacted maxillary canine teeth.

**Methods:** This cross-sectional study was conducted on 72 orthodontists and 26 orthodontic residents from 9 provinces of Iran in 2023. A researcher-designed questionnaire was used to assess the knowledge, attitude, and practice of orthodontists and orthodontic residents regarding the management of impacted maxillary canine

teeth. Data were analyzed by the multiple backward linear regression and Pearson's correlation test ( $\alpha=0.05$ ).

Results: The mean knowledge score of the participants was  $6.41 \pm 1.94$ , and the mean attitude score was  $15.9 \pm 2.7$ . The knowledge and attitude scores had a significant, direct correlation ( $P=0.001$ ). The mean number of visited patients weekly significantly correlated with the knowledge score ( $P=0.002$ ), while clinical experience had a significant inverse correlation with the knowledge score ( $P=0.002$ ). Participation in extracurricular courses in periodontology or oral surgery significantly affected the participants' attitudes ( $P=0.001$ ). Faculty members preferred apically positioned flaps to treat labially impacted canines, while other participants preferred closed exposure ( $P=0.025$ ). Clinicians with a higher number of visited patients ( $P=0.02$ ) and greater experience ( $P=0.00$ ) preferred extraction of the lateral incisor and its substitution with the impacted canine.

Conclusion: The knowledge, attitude, and practice of Iranian orthodontists depend on various factors, and their strategy for exposing the impacted maxillary canines differs significantly based on their experience and academic position and patients' situation.

Keywords: Impacted canine, orthodontic treatment, surgical exposure, knowledge, attitude, practice.

#### Abstract 57

### Investigating the Effect of Photobiomodulation on the Regeneration of Traumatized Sensory Nerves of the Jaw: An Animal Model

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Background: A wide range of dental procedures, such as local anesthetic injection, root canal treatment, tooth extraction, wisdom tooth surgery, dental implant surgery, orthognathic surgery, removal of benign or malignant tumors, jaw and facial trauma and its surgical treatment, and temporomandibular joint surgery, can damage jaw nerves. Many studies have reported that the incidence of inferior alveolar nerve (IAN) injuries is related to implants, varying from 0% to 40%. Injury to the IAN and lingual nerve (LN) may cause numbness and paresthesia. Numbness of the lower lip and chin is followed by involuntary biting of soft tissues around the mouth, drooling when eating or drinking, loss of taste, and difficulty speaking. All these events may lead to legal actions against the clinician. In most cases, the change in sensation is a transient phenomenon. However, some remain for more than 6 months, resulting in varying degrees of long-term or permanent disability. There are several treatment methods, such as systemic drug therapy, physical therapy, local electrical stimulation, and nerve repair surgery, such as external neurolysis, direct

suturing, autogenous vein grafting, Gortex tubes, low-level laser therapy (LLLT) or photobiomodulation (PBM), and acupuncture. The value of surgical approaches to the IAN described for managing IAN injury remains unclear, and some procedures may do more harm than good. In addition to these advances, surgical treatment should be the last option for treatment due to the risk of aggravating neuropathic symptoms. Laser technology may offer a non-invasive approach to managing mild to moderate nerve damage and as an adjunct in severe nerve damage. Some studies state that early nerve repair provides better results than late repair.

Methods: Forty male Wistar rats with an approximate weight of 250-350 grams were kept in separate metal cages with three rats in each cage. They were kept in a 12-hour day/night cycle so that they had free access to water and standard laboratory food. The rats were divided into four groups. The first group was the control group, which included 10 rats that underwent surgery and had crushing damage on their IAN, with no therapeutic intervention. The second group included 10 rats; after causing damage to their nerves, only routine drug therapy intervention was done. In the third group, after causing damage, 10 rats, in addition to routine drug therapy, underwent laser therapy with a wavelength of 808 and a power of 200 mW in the form of a continuous wave and energy density of 12 joules/cm<sup>2</sup>. In the fourth group, after causing damage, 10 rats, in addition to routine drug therapy, received laser therapy with a wavelength of 1064 nm and a power of 200 mW in the form of a continuous wave, and an energy of 12 J/cm<sup>2</sup> was applied.

Results: This study showed that using LLL improved nerve regeneration in the 808-nm PBM group; the number of nerve fibers and the rate of myelination were significantly higher compared to the control group. In addition, the axon density in these two intervention groups was higher compared to the control group. Also, the histomorphometric analyses of the axon density showed a significant difference from the control group.

Conclusion: Based on the histomorphometric and histopathological results of the present study, it can be concluded that PBMT with 810 and 1064 nm diode lasers had positive effects on IAN regeneration at the end of the 30-day healing period. PBMT, with a wavelength of 808 nm and a higher penetration capacity through tissues, is helpful for biostimulation of IAN after injury.

Keywords: Photobiomodulation, laser therapy, nerve regeneration, inferior alveolar nerve, dental injury.

#### Abstract 58

### Effectiveness of Different Surface Treatments on Peri-implantitis Management: A Randomized Clinical Trial

**Reza Arabzadegan**

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**Background:** Peri-implantitis critically impacts dental implant success, with various proposed surface treatments lacking clear comparative effectiveness. This study evaluates the clinical and microbiological outcomes of different treatments.

**Methods:** Ninety peri-implantitis patients were randomly assigned to three groups: (1) mechanical debridement, (2) mechanical debridement with photodynamic therapy (PDT), and (3) mechanical debridement with laser therapy. Clinical parameters such as probing depth (PD), clinical attachment level (CAL), and bleeding on probing (BOP) were measured at baseline and after three and six months. Microbiological changes were assessed via quantitative polymerase chain reaction (qPCR).

**Results:** All treatments significantly reduced PD, CAL, and BOP compared to baseline. However, combination therapies (mechanical debridement with PDT or laser) provided superior microbial reduction and clinical improvement outcomes. At six months, the PDT group showed a 45% reduction in PD, while the laser group showed a 50% reduction. Both combination therapies significantly decreased the prevalence of pathogenic bacteria compared to mechanical debridement alone.

**Conclusion:** Combining mechanical debridement with either PDT or laser therapy enhances clinical and microbiological outcomes in managing peri-implantitis. These combination treatments offer a promising approach to improving peri-implant health and longevity. Future research should focus on long-term outcomes and patient-centered assessments to further validate these findings.

**Keywords:** Bleeding on probing (BOP), clinical attachment level (CAL), mechanical debridement, peri-implantitis, photodynamic therapy (PDT), probing depth (PD), quantitative polymerase chain reaction (qPCR), surface treatments.

#### Abstract 59

**Five-year Clinical and Radiographic Evaluation of the Success of Implants Inserted into Reconstructed Maxillary Bone by Allograft Block in Patients Recalled to the School of Dentistry of Tehran Islamic Azad University of Medical Sciences in 2020**

**Saba Amini**

Student Research Committee, Islamic Azad University of Medical Sciences, Tehran Dental School, Iran

**Background:** In recent years, the demand for implant dentistry has grown considerably. Reconstructing the remaining alveolar ridge using implants with allograft materials requires further studies to assess the radiographic and clinical success of implants. This study aimed to evaluate the 5-year clinical and radiographic success of implants inserted into a reconstructed maxillary bone by an allograft block in patients recalled to the School of Dentistry, Tehran Islamic Azad University of Medical

Sciences in 2020.

**Methods:** In this descriptive cross-sectional study, patients undergoing maxillary alveolar ridge reconstruction surgery by allograft blocks, followed by placement of 12 implants, were recalled after about 5 years. On the day of the visit, patients were ordered a CBCT radiograph using a Rotograph 3D Evo device to determine the level of mesial and distal crestal bone surrounding implants by measuring its distance to the implant's shoulder in millimeters as well as the presence of radiolucency around the implants. The patients were also subjected to clinical examinations, including assessing probing depth (PPD) at three points using the Williams probe, determining the presence of bleeding on probing (BOP), determining the presence of pus, assessing tooth mobility, and assessing the presence of pain.

**Results:** Twelve implants were examined in this study. The success rate of implants was 100%. All the implants functioned in optimal conditions. None of the implants indicated pain, tenderness, pus, bleeding on probing, or mobility. The radiolucency index around the implant was 16.7%, and the mean bone resorption was  $0.67 \pm 0.39$  mm. No correlation was found between the rate of bone resorption around the implants ( $P=0.998$ ) and the radiolucency around the implants. Also, the depth of palatal and buccal probing ( $P=0.991$ ) was not correlated with the incidence of radiolucency around the implants.

**Conclusion:** According to this study, the 5-year success rate of implants placed in reconstructed maxillary bone by allograft block was significantly high clinically and radiographically. Using allograft materials for alveolar crest reconstruction seems to be a viable alternative to autogenous grafts.

**Keywords:** Allograft, alveolar ridge augmentation, clinical evaluation, dental implants, maxillary area bone, radiographic evaluation.

#### Abstract 60

**Clinical and Radiographic Outcomes of a Combined Surgery Approach to Treat Peri-implantitis**

**Saba Mansouri**

Dental Student, Tehran Azad University of Medical Sciences, Tehran, Iran

This study aimed to report the 24- to 30-month follow-up results of a randomized clinical trial on surgical reconstructive therapy for peri-implantitis. Peri-implantitis is a challenging disease, and there is a lack of predictable treatment options. Surgical treatment has yielded better outcomes than non-surgical approaches, but long-term results are still under investigation. The relapse of the disease and the regeneration of lost bone are significant concerns. This study explored the use of Er:YAG laser for implant surface decontamination as an adjunct to surgical therapy. The initial 6-month results

showed favorable pocket depth reduction in the laser group. However, longer-term outcomes are crucial to assess the efficacy of reconstructive therapy. The study included 21 patients who completed the 2-year follow-up, with six implants lost. Both groups showed reduced probing pocket depth and radiographic marginal bone loss over time. Er:YAG laser favored pocket depth reduction in the longer term. The study highlights the need for standardized reporting of long-term results in peri-implantitis treatment and the potential benefits of Er:YAG laser as an adjunctive tool.

#### Abstract 61

### A Cross-sectional Study on Periodontitis Incidence Rate in SCC Patients

**Saba Mashhour**

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**Background:** This study examined the prevalence of periodontitis in patients with scleroderma.

**Methods:** In this cross-sectional study, patients with scleroderma from Imam Reza Hospital's Rheumatology Department were referred to the Mashhad Faculty of Dentistry during 2022-2023. Patients completed a questionnaire with demographic and organ involvement details. Periodontal indicators like CAL, PD, PI, and GI were examined using dental instruments and a loupe in six sextants. Data were analyzed using SPSS 21 at a significance level of  $P \leq 0.05$ .

**Results:** The study of 50 samples found that patients with specific symptoms such as diffuse skin involvement, Raynaud's syndrome, finger ulcers, and cardiac issues had deeper probing depths. CAL was higher in subgroups with organ involvement, especially those with cardiac issues ( $P=0.03$ ). Moderate to severe periodontitis was more prevalent in individuals with Raynaud's syndrome ( $P<0.001$ ) and finger ulcers ( $P=0.03$ ). PI significantly increased in sextants for patients with toe ulcers, digestive problems, and cardiac issues. Patients with positive ACA autoantibody levels had deeper probing depths ( $P=0.04$ ), with 80% having limited skin involvement ( $P<0.001$ ), and 20% were classified as diffuse type.

**Conclusions:** Patients with scleroderma, particularly those with diffuse skin involvement, Raynaud's syndrome, thumb ulcers, and positive serum levels of Scl-70, exhibited a more disrupted periodontal condition. It is crucial to closely monitor the patient's periodontal health at the onset of the disease, especially when skin involvement is limited and organ damage is minimal. Nevertheless, further research is warranted in this area.

**Keywords:** Periodontal medicine, periodontitis, rheumatological inflammatory diseases, scleroderma.

#### Abstract 62

### Investigating the Relationship between the Buccal Bone Thickness and Inclination of the Anterior Teeth of the Mandible Using CBCT

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**Background:** Immediate dental implant placement has been a topic of interest in the last decade. The alveolar buccal bone is usually very thin, and any bone resorption causes the disintegration of the soft tissue over it, which is especially a big concern in the aesthetic zone. Therefore, knowledge of the anatomy and thickness of the alveolar bone before implantation is crucial and increases the success of the surgery and the patient's comfort. This study was conducted to determine the relationship between the thickness of the buccal plate of the mandibular bone and the inclination of the mandibular anterior teeth by CBCT.

**Methods:** In this cross-sectional descriptive study, the images of 96 CI I patients who were referred to the Department of Periodontics, Faculty of Dentistry, Islamic Azad University, Tehran, for implant treatment were examined. The thickness of the buccal plate of the mandible in the central incisor, lateral incisor, and canine teeth at three points of the CEJ and 4 mm below the CEJ, and the apex of the tooth and their inclination angle were measured by the On Demand program. Pearson's correlation coefficient was used to analyze the data.

**Results:** The average thickness of the buccal plate of the mandible in canine, lateral, and central teeth in CEJ was  $<0.6$  mm. In the area 4 mm lower than the CEJ and the apex of the tooth,  $<1$  mm was observed. At the CEJ, no significant relationship was observed between the thickness of the buccal plate and the inclination of the tooth. In the central tooth, there was a direct and significant relationship between the thickness of the buccal plate and its inclination in the region 4 mm below the CEJ and in the apex region.

**Conclusion:** In the mandible, the most critical areas were the CEJ of canine, lateral, and central incisors whose buccal wall was  $<0.6$ . In  $>80\%$  of evaluated cases, regeneration treatments were required to maintain the hard and soft tissue volume.

**Keywords:** Buccal bone thickness, mandibular anterior teeth, CBCT, dental implant, bone resorption.

#### Abstract 63

### Reconstruction of Lingual Sulcus in a Severely Atrophic Mandible Using a Modified Approach as a Pre-prosthetic Surgery: Case Aeries

**Yasmin Karabalaee Kamran**

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**Background:** Patients with severe mandibular ridge resorption pose challenges for conventional complete denture therapy due to retention and stability issues. Implant-supported overdentures are a viable alternative. However, shallow lingual vestibules and lack of keratinized attached mucosa are risk factors for long-term dental implant success. This study describes a modified surgical approach accompanied by free gingival grafts to correct these issues and increase the peri-implant keratinized tissue.

**Methods:** Two cases with severe mandibular ridge resorption, lack of keratinized tissue width (KTW), and shallow buccal and lingual vestibule were referred to the Department of Periodontics. The cases included a 70-year-old male and a 60-year-old female. The chief complaint of the former was inadequate retention of the mandibular prosthesis, and the latter complained of mobile dental implants and discomfort with the overdenture. Lingual sulcoplasty was carried out for these patients according to Trauner's method, along with the button-suture technique. Soft tissue grafts were performed after implant placement.

**Results:** The quantitative measurements of the outcomes in the short-term follow-up showed that button-suture lingual sulcoplasty might effectively enhance the lingual sulcular depth in the severely resorbed mandibular ridge. Additionally, the lack of KTW was increased with a free gingival graft.

**Conclusion:** In patients with severe mandibular ridge resorption, the shallow lingual vestibular depth could be managed with the button-suture technique for lingual sulcoplasty, and the lack of keratinized tissue width could be increased with a free gingival graft. These procedures might allow better peri-implant tissue health and a more predictable prosthetic reconstruction.

**Keywords:** Alveolar bone loss, dental implants, denture overlay, mouth floor, suture technique.

#### Abstract 64

### Laterally Closed Tunnel as a Novel Surgical Technique for Deep Isolated Mandibular Recessions: A Systematic Review

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The root coverage of gingival recessions in the anterior region of the mandible has limited predictability because the mandibular incisors often have a thin phenotype, lack keratinized tissue, and have low vestibular depth with high frenal attachment. Sculean et al. described a novel surgical technique, the laterally closed tunnel (LCT), specifically intended for deep isolated mandibular Miller CI, II, and III recessions. This article aimed to provide an overview

of existing clinical literature on the laterally closed tunnel technique. A systematic search was conducted in Medline and Google Scholar up to May 2024. Seven English papers examining the clinical efficacy of LCT with available full texts were included. A total of 56 patients and 56 defects were treated in these studies. Fifty-five defects were in the buccal and one in the lingual aspect of the anterior mandibular teeth. Six defects were in the mandibular canine, and 50 were in the mandibular incisors. The range of follow-up treatments in the studies was 3-36 months. Studies reported >80% complete root coverage (CRC) in follow-ups, and 100% CRC was reported in just one defect. In all studies, keratinized tissue width increased significantly during the follow-up period after LCT. In one study, symptoms of root sensitivity after LCT disappeared completely. In one study, LCT did not leave scars and had a better esthetic appearance compared to the double lateral sliding bridge flap.

**Keywords:** Connective tissue graft, gingival recession, laterally closed tunnel.

#### Abstract 65

### Efficacy of Leukocyte and Platelet-rich Fibrin (L-PRF) in Intra-bony Defects: A Meta-Analysis

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**Background:** Leukocyte- and platelet-rich fibrin (L-PRF) has been suggested as an effective adjunct to open flap debridement (OFD) for treating periodontal intra-bony defects. This systematic review aims to evaluate the efficacy of L-PRF in pocket depth (PD) reduction, clinical attachment level (CAL) improvement, and intra-bony defect (IBD) depth reduction.

**Methods:** A comprehensive search was conducted across several databases to identify randomized controlled trials. Data were extracted and meta-analyzed for outcomes, including PD reduction, CAL improvement, and IBD depth reduction over follow-up periods of 9 and 12 months. Meta-analysis was performed using random-effects models. The risk of bias was assessed using the Rob2 tool.

**Results:** The meta-analysis included 21 studies with varying follow-up periods. The analysis demonstrated significant improvements in PD, CAL, and IBD depth reductions over time. At 9 months, PD reduction was 1.11 mm ( $\pm 0.14$ ), CAL reduction was 1.15 mm ( $\pm 0.30$ ), and IBD depth reduction was 1.84 mm ( $\pm 0.46$ ). At 12 months, PD reduction increased to 2.03 mm ( $\pm 0.28$ ), CAL reduction to 2.53 mm ( $\pm 0.50$ ), and IBD depth reduction to 1.63 mm ( $\pm 0.46$ ). Significant heterogeneity was observed across the studies.

**Conclusion:** L-PRF as an adjunct to OFD significantly



enhances periodontal healing in intrabony defects, improving PD, CAL, and IBD across multiple time points. Despite some heterogeneity and methodological limitations, the findings support using L-PRF in periodontal regeneration strategies. Future research should aim to standardize treatment protocols and expand long-term follow-ups to fully establish the clinical utility of L-PRF.

**Keywords:** Intrabony defects, leukocyte- and platelet-rich fibrin, meta-analysis, periodontal regeneration, systematic review.

#### Abstract 66

#### Common Protocols and Indications of Immediate Implant Loading; an in-vitro study

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**Background:** Immediate loading has become a predictable and excellent option to reestablish function and esthetics in a short time. This presentation addresses the most common immediate implant loading protocol and introduces its requirements in the corresponding applications/treatments. All the critical features and requirements that could affect the outcome of this treatment will also be discussed.

**Methods:** An articulated partially edentulous dental model that needs implants in the maxillary esthetic region, central incisors and left lateral incisor, was used in this study. Five common conventional and digital methods for immediately loading the implants were performed and presented.

**Results:** The success of the immediate loading technique depends on many factors, of which primary stability is the most important. Furthermore, the prosthetic method used depends on the surgical situation and edentulous condition, and similar to some investigations, the digital approach seems more comfortable and predictable with favorable outcomes.

**Conclusion:** Consistent with studies on immediate implant loading, this study showed that successful outcomes can be expected if the necessary criteria are fulfilled. The use of different surgical processes, types of prostheses, and loading times have a critical impression on the success rate of this procedure. Further studies and statistical analyses are necessary to compare the results of the introduced protocols.

**Keywords:** Dental implant loading, immediate, immediate dental implant loading, loading.

#### Abstract 67

#### Recent Advances in the Application of Oral Cavity Stem Cells in GBR Therapies: A Systematic Review

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**Background:** Oral and maxillofacial fractures can lead to bone defects. Conventional treatments do not regenerate lost tissues, so alternative procedures such as bone grafting, guided tissue regeneration, and growth factors are necessary. However, these methods cannot restore the original tissue anatomy completely. To solve this issue, a new therapeutic approach using mesenchymal stromal cells (MSCs) has been proposed. MSCs are multipotent cells found in various adult connective tissues that can promote better regeneration of both soft and mineralized tissues. Due to their high potential for deriving MSCs from bone marrow and the ease of obtaining an adequate number of these cells, there is a growing demand for their application in cell therapy and regenerative medicine.

**Methods:** Relevant data for this study is collected through a comprehensive search of databases, including Scopus, PubMed Central, Science Direct, and Google Scholar. The search was limited to articles published between 2012 and 2023. Keywords such as 'bone regeneration,' 'stem cells,' 'MSCs,' 'regenerative medicine,' 'oral,' and 'dentistry' were used in the search process.

**Results:** According to the results, MSCs were extracted from different parts of the mouth. Bone regeneration potential is seen in all types of MSCs, but mineralization, cell divisions, and expression of osteogenic marker genes are slightly higher in bone marrow mesenchymal stromal cells (BM-MSCs).

**Conclusion:** MSCs may be helpful in bone regeneration, but reliable long-term studies on the combined use of MSCs in bone regeneration are necessary.

**Keywords:** Stem cells, mesenchymal stem cells, oral cavity, bone regeneration, regenerative medicine.

#### Abstract 68

#### Soft Tissue Evaluation Using PRF on Immediate Implant for Posterior Region: A Randomized Clinical Trial

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**Background:** Immediate implants are increasingly preferred due to reduced surgical appointments and shorter treatment duration. However, one notable drawback is the inadequate dimension of soft tissues around the implant, especially in posterior teeth, which



complicates the immediate implantation process. Consequently, patients often require soft tissue augmentation to prevent complications. This study aimed to evaluate the effectiveness of a minimally invasive procedure using platelet-rich fibrin (PRF) to enhance soft tissue thickness and keratinized tissue width during immediate implantation in the posterior jaw area.

**Methods:** Twenty patients underwent immediate implantation, with 20 submerged implants placed. The test group (10 patients) received PRF treatment for soft tissue augmentation, while the control group (10 patients) received connective tissue grafts (CTG). All the implants were uncovered three months after implantation, and healing abutments were placed. Keratinized tissue width was measured at baseline and one and three months after implantation, while soft tissue thickness was measured at baseline and three months after implantation using a periodontal probe.

**Results:** All treatments were successful. The average keratinized tissue width for the test and control groups was 3.45 mm and 2.65 mm at baseline, 4.00 mm and 3.40

mm at one month, and 4.20 mm and 3.85 mm at three months, respectively. The average soft tissue thickness was 2.45 mm and 2.05 mm at baseline and 3.20 mm and 3.25 mm at three months, respectively. The average increase in keratinized tissue thickness from baseline to three months was 0.75 mm for the test group and 1.20 mm for the control group. The average increase in keratinized tissue width from baseline to one month was 0.55 mm for the test group and 0.75 mm for the control group, and from baseline to three months was 0.75 mm for the test group and 1.20 mm for the control group. The data for both parameters from baseline to three months was statistically significant. However, the difference in keratinized tissue thickness ( $P=0.077$ ) and width ( $P=0.089$ ) between the two groups was not statistically significant.

**Conclusion:** PRF can be used as a minimally invasive technique for soft tissue augmentation in the posterior jaw area at the site of immediate implant placement.

**Keywords:** Immediate implant, keratinized gingiva width, platelet-rich fibrin, soft tissue thickness.