

I confirm that ethical permits and approvals are in place in accordance with regulations: Yes, I confirm that ethical permits and approvals are in place.

Disclosure of Interest: None Declared.

Keywords: Abutment, Alveolar ridge preservation, Digital workflow

EAODGI2023-472/PO-PIB-006 | Effective decontamination of fixture-abutment interface using manganese oxide nanozyme-doped diatom microbubbler

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Background: When a prosthetic abutment is connected to an implant fixture, a microgap is created. The fixture-abutment interface (FAI), where microorganisms grow, has the potential to become a bacterial reservoir, leading to both biological and mechanical issues. Therefore, there is a need for an effective method to decontaminate the FAI. Manganese oxide nanozyme-doped diatom microbubbler (DM) generates oxygen gas and moves in the hydrogen peroxide solution, resulting in the mechanical removal of biofilms.

Aim/Hypothesis: The objective of this study is to evaluate whether DM can effectively remove biofilms in the FAI.

Material and Methods: The characterization of DM was analyzed. Biofilms formed in the FAI, and were treated for 2 min with phosphate buffered saline, 0.12% chlorhexidine, 3% hydrogen peroxide, and co-treatment of 3 mg/mL of DM and 3% hydrogen peroxide. The viability of the remaining biofilms was analyzed using cell counting kit-8. The biofilms were stained with FITC-conjugated Concanavalin A, visually analyzed using a fluorescence imaging system, and quantitatively measured. The biofilms on the surface of decontaminated cross-sectioned implants were visualized using scanning electron microscope. The remaining biofilms were stained and examined using confocal laser scanning microscopy (CLSM). Cement-retained abutments were connected to decontaminated implants with a torque of 30 Ncm, and the reverse torque value (RTV) was measured. After each treatment, the physicochemical surface properties of titanium disks were analyzed by X-ray photoelectron spectroscopy and CLSM.

Results: According to electron microscopy and energy dispersive spectroscopy analysis, manganese oxide-nanozymes were well-doped on DM surfaces. The biofilms in the FAI were effectively removed in the DM group compared to the other groups. Although chlorhexidine effectively killed the bacteria, the structure of the dead bacteria and biofilms remained. Hydrogen peroxide was not effective in killing or removing the bacteria. With the exception of the DM group, the RTV significantly decreased compared to the control group. The physicochemical properties of the titanium surfaces were not altered by the co-treatment of hydrogen peroxide and DM.

Conclusion and Clinical Implications: The novel therapeutic approach using hydrogen peroxide and DM effectively removed biofilms in the FAI compared to conventional antiseptic approaches. This can reduce the risk of biological and mechanical complications that may occur due to biofilms in the FAI of implants.

Disclosure of Interest: None Declared.

Keywords: Biomaterial, Dental implants, Peri-implantitis

EAODGI2023-768/PO-PIB-007 | Immediately loaded posterior single implants with definitive or temporary abutment: A randomized controlled clinical study

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Background: In implant dentistry, immediate loading protocols of single posterior mandibular implants is safe and predictable treatment option in proper patient selection. The studies have demonstrated that the use of definitive abutments (DA), instead of temporary abutments (TA), prevents further bone loss over time. It is also pivotal to establish a stable occlusal scheme, with proper force loading on implant-supported restorations so that the success of immediately loaded restorations could be provided.

Aim/Hypothesis: The aim was to assess mid-term clinical, radiological and occlusal parameters after immediate loading of single implants in the posterior mandible, as well as the reliability of computer-assisted occlusal analyses in bilateral immediate loading.

Material and Methods: This was a randomized, controlled clinical trial, with a split-mouth design including 24 patients in need of two implants in the posterior mandible. After the simultaneous placement of two bone level implants on contralateral sites, implants were immediately loaded. The test group (TG) was loaded by means of a DA, within the concept of one abutment one time protocol (OAT), while another implant received TA (CG). A periapical radiograph was taken after the implant placement to assess the peri-implant bone level, and the same procedure was carried out at 6 months control. Both implants were restored with screw retained PMMA crowns and computerized occlusal analysis was performed. Clinical parameters such as probing depth (PDi), clinical attachment level (CALi), bleeding on probing (BOPi) and plaque index (PLi) were also evaluated. After three months, CG received a definitive abutment and both restorations were replaced by monolithic screw-retained zirconia crowns.

Results: 19 patients have completed the six-month follow-up and were included in the analysis. No mechanical or biological complications were reported. Peri-implant clinical parameters PDi, CALi, BOPi and PLi were equal to 2.52 mm, 2.43 mm, 12% and 16% for TG and 2.54 mm, 2.42 mm, 13% and 15% for CG, respectively. Bone loss was equal to 0.05 mm for both examined groups. There were

no statistically significant differences between groups in terms of clinical and radiological parameters at 6 months. Both clinical occlusal analysis and computerized analysis showed no statistically significant differences in the presence of premature occlusal contacts between the TG and CG.

Conclusion and Clinical Implications: Both loading protocols proved to be successful and efficient in restoring posterior mandibular single implants in terms of clinical and radiological parameters. The computerized analysis is a valuable tool for adjusting occlusal contacts and subsequently establishing the desired occlusion, so that excessive loading or biomechanical complications are to be avoided. The results of this study are preliminary and must be confirmed after a longer follow-up period.

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Keywords: Abutment, Dental implants, Marginal bone loss

EAODGI2023-226/PO-PIB-008 | Cytokine response of lymphocytes and monocytes to titanium particles in association with genotype and clinical characteristics of titanium implants

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Background: Any titanium dental implant will be faced by immune cells like lymphocytes and monocytes/macrophages both resident in peri-implant tissue and recruited from the circulation. The cytokine network contributing to tolerance and good long term results of the implant as foreign body is only partially understood.

Aim/Hypothesis: Within a multicenter study on clinical and immunological characteristics of titanium dental implant patients one goal was to examine the cytokine response of blood lymphocytes and monocytes (PBMC) to titanium particles in vitro in association with clinical conditions and the patient's genotype.

Material and Methods: In a consecutive series of 139 patients (80 female) the Ti implants were evaluated and described as normal condition, mucositis (M) or periimplantitis (P). From heparinized peripheral blood probes PBMC were isolated and cultured in the absence or presence of TiO₂ particles (rutile and anatase type). The

production and release of cytokines linked to innate immune response (IL-1 β , IL-6, IL-8, TNF- α) or adaptive response (IFN- γ , IL-4, IL-5, IL-10) into the culture supernatant were assessed by cytometric beads assay in flow cytometry. Genotype analysis regarding IL-1 polymorphism (IL-1A: -Allel 1 (-C889) -Allel 2 (-889T); IL-1B: -Allel 1 (+C3953) -Allel 2 (+3953T); Interleukin 1RN: -Allel 1 (+T2018) -Allel 2 (+2018C)) was done by using a commercial assay giving 4 genotype scenarios (no risk, increased risk, strong risk, diminished risk for periodontitis).

Results: 115 patients had normal implant status and 24 suspicious findings (13 M, 4 BOP, 7 P). There was a higher immunological response to titanium rutile particles in comparison to anatase particles (IL-1B: 92pg/mL vs 15pg/mL; IL-6: 641pg/mL vs 74pg/mL; IL-8: 7874pg/mL vs 2403pg/mL). There was no difference in the IL-1 polymorphism genotypes in the complication group in comparison to the patients with well tolerated implants. There were high inter-individual differences in the IL-1B response of the patients PBMC to titanium particles depending on the genotype. This data interpretation is with the restriction of the group of patients with complications being relatively small.

Conclusion and Clinical Implications: The structure of titanium particles has great influence on the strength of the PBMCs immune response. There is no increased incidence of a here assessed IL-B polymorphism in the patient group with mucositis or periimplantitis. The high interindividual differences in the IL-1B response to titanium particles in the different IL-1B polymorphism group need further evaluation in future studies.

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EAODGI2023-402/PO-PIB-009 | Clinical and histomorphometric analysis of freeze-dried bone allografts for alveolar ridge preservation: A prospective study

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Background: Tooth extractions leads to alveolar bone resorption which may complicate or reduce the possibility to rehabilitate the edentulous area with dental implants. Alveolar Ridge Preservation (ARP) procedures have been introduced to minimize the dimensional changes following tooth extractions: the main feature of ARP is to