

The 108th Annual Meeting of the American Academy of Periodontology
in collaboration with the Japanese Academy of Clinical Periodontology,
and the Japanese Society of Periodontology.

Abstracts of JACP/JSP Poster Session



October 27-30, 2022

Phoenix Convention Center, Phoenix, Ariz, USA

The Japanese Academy of Clinical Periodontology
The Japanese Society of Periodontology

第108回アメリカ歯周病学会共催
日本臨床歯周病学会・日本歯周病学会
2022年大会

**The 108th Annual Meeting of the American Academy of Periodontology
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Periodontology, the Japanese Society of Periodontology.**

JACP/JSP ポスターセッション抄録集
一般演題（基礎研究，臨床研究），症例報告，歯科衛生演題

Abstracts of JACP/JSP Poster Session
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JACP/JSP ポスター発表協賛企業

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General (Basic Research)

GB-01

TNF- α regulates human odontogenic ameloblast-associated protein gene transcription in gingival epithelial cellsYorimasa Ogata^{*1,2}, Arisa Yamaguchi¹, Mizuho Yamazaki-Takai^{1,2}, Hideki Takai^{1,2},
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Background and objective: Odontogenic ameloblast-associated protein (ODAM) is produced by junction epithelium (JE) and maturation stage ameloblasts. Function of ODA M is thought to be involved in the attachment of JE and teeth. To investigate transcriptional regulation of human ODA M gene in inflamed gingiva, we have analyzed the effects of TNF- α on the expression of ODA M gene in Ca9-22 gingival epithelial cells.

Materials and Methods: Total RNAs and proteins were extracted from Ca9-22 cells after stimulation by TNF- α (10 ng/ml), and mRNA and protein levels of ODA M were analyzed by qPCR and Western blot. Luciferase (LUC) analyses were performed using LUC constructs inserted in various lengths of ODA M gene promoter. Gel shift and chromatin immunoprecipitation (ChIP) assays were carried out.

Results: TNF- α increased ODA M mRNA and protein levels at 3 to 24 h. TNF- α induced LUC activities of the ODA M gene promoter constructs, and the activities were inhibited by PKA, tyrosine kinase, MEK1/2, PI3-kinase and NF- κ B inhibitors. Gel shift and ChIP assays revealed that TNF- α increased CCAAT/enhancer binding protein (C/EBP) β and Yin Yang1 (YY1) binding to three kinds of C/EBPs and YY1 elements.

Conclusion: These results demonstrate that TNF- α stimulates ODA M gene transcription via C/EBPs and YY1 elements in the human ODA M gene promoter.

GB-02

Osteoclastogenic and anti-osteoclastogenic cytokines induced by dental calculusMegumi Mae^{*}, Mohammad Ibtehaz Alam, Yasunori Yamashita, Yukio Ozaki,
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Background and objective: Dental calculus (DC) is frequently found in periodontitis patients and composed of bacterial components and calcium phosphate crystals. We have shown that the crystal components of DC promote IL-1 β production via NLRP3 inflammasome in macrophages. Because IL-1 β is known to promote osteoclastogenesis, we investigated the effects of cytokines produced by mouse macrophages stimulated with DC on osteoclastogenesis.

Materials and Methods: DC from periodontitis patients was pulverized, treated with 10% sodium hypochlorite, and extensively washed with distilled water. Wild-type (WT) and NLRP3-deficient mouse macrophages were stimulated with DC and the culture supernatants were harvested. M-CSF and RANKL-primed mouse bone marrow-derived macrophages (BMMs) and RAW-D cells were incubated with these supernatants. Following TRAP staining, the number of multinuclear TRAP positive cells was counted. The concentrations of IL-1 β , IL-18, and IL-10 in the culture supernatants were measured by ELISA. To analyze the effects of these cytokines, osteoclasts were generated from BMMs and RAW-D cells in the presence or absence of recombinant (r) IL-1 β , IL-18, or IL-10.

Results: The culture supernatant from WT mouse macrophages promoted osteoclastogenesis of BMMs but inhibited that of RAW-D cells. WT mouse macrophages stimulated with DC produced IL-1 β , IL-18, and IL-10 dose-dependently whereas NLRP3-deficient mouse macrophages produced IL-10, but not IL-1 β and IL-18, in response to DC. rIL-1 β promoted osteoclastogenesis of RANKL-primed BMMs and RAW-D cells, but rIL-18 and rIL-10 inhibited their osteoclastogenesis.

Conclusion: DC may promote alveolar bone resorption via IL-1 β induction in periodontitis patients, but suppress resorption via IL-18 and IL-10 induction in some circumstances.

GB-03

Role of Piezo1 in mechanical stress-mediated bone resorption with periodontitis

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Background and objective: Excessive occlusal force with periodontitis results in rapid alveolar bone resorption. However, the molecular mechanism underlying the interaction between inflammation and mechanical stress has yet to be completely elucidated. To clarify the mechanism, we focused on Piezo1, which is a mechanosensitive ion channel expressed on osteoblasts. The changes in the RANKL/OPG ratio in osteoblast-like MC3T3-E1 cells cultured with lipopolysaccharide from *Porphyromonas gingivalis* (*P.g-LPS*) in which Piezo1 was activated by mechanical stress.

Materials and Methods: MC3T3-E1 cells were cultured in osteogenic medium with *P.g-LPS*. After 3 days of culture, shear stress induced by an orbital shaker was applied intermittently as mechanical stress to the cells at 200 rpm for 20 min per cycle. The stress was loaded for five cycles at 10-min intervals. Piezo1 function was subsequently inhibited by the addition of the Piezo1 antagonist GsMTx4 or by knockdown via *Piezo1* siRNA transfection. After loading, total RNA was isolated from the cells, and real-time PCR was performed to assess the mRNA expression levels of Piezo1, RANKL, and OPG.

Results: In cells cultured with *P.g-LPS*, no significant change was seen in the *Piezo1* mRNA expression level, whereas the RANKL/OPG ratio significantly increased after loading when compared to no loading. The increase in the RANKL/OPG ratio was suppressed by the addition of GsMTx4 and by Piezo1 knockdown.

Conclusion: These results suggest that Piezo1 is involved in the mechanical stress-induced increase of the RANKL/OPG ratio in MC3T3-E1 cells cultured with *P.g-LPS*.

GB-04

Combined effects of FGF-2+DBBM on periodontal healing of poorly-contained defects

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Aim: In our previous study, the use of FGF-2 with DBBM was similarly effective as FGF-2 alone in the healing of experimental periodontal defects in rats. It was suggested that the combined use of FGF-2 and DBBM enhances healing via promotion of cell proliferation, angiogenesis, and osteogenic differentiation. Combined use of signaling molecules and bone substitutes is clinically recommended for the treatment of poorly-contained defects. The purpose of this study is to investigate the effects of the combined use of FGF-2 and DBBM on the periodontal healing of poorly-contained defects in rats.

Materials and Methods: Poorly-contained (2-wall) periodontal defects were created mesially to the maxillary first molars in Wistar rats. Defects were filled with FGF-2, DBBM, FGF-2+DBBM, or left unfilled. Histological examinations and microcomputed tomography were used to evaluate healing at 4 weeks postoperatively. In vitro, the positive VEGF expression of rat bone marrow mesenchymal stem cells (BMSCs) after 72 h of seeding on DBBM with/without FGF-2 was assessed by confocal laser scanning microscopy (CLSM).

Results: Histologically, greater bone formation was observed in FGF-2 and FGF-2+DBBM groups than in Unfilled or DBBM groups. Bone volume fraction was significantly greater in FGF-2+DBBM groups than that in Unfilled group. In vitro, CLSM images revealed that the positive staining for VEGF in BMSCs was more frequently observed in FGF-2+DBBM group compared with that in DBBM group.

Conclusions: It was suggested that DBBM acted as a scaffold, spacemaker, and carrier of FGF-2, and thereby accelerates healing of poorly-contained defects in FGF-2+DBBM group.

GB-05

Endothelial insulin resistance contributes to the exacerbation of diabetes-related periodontitis

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Background and objective: Local insulin resistance is suggested to contribute to the exacerbation of periodontitis under diabetes. However, it remains unclear how periodontal insulin resistance is involved in the pathogenesis of diabetes-related periodontitis. In this study, we investigated the pathogenic role of insulin resistance on vascular endothelial cell function that mediates the recruitment of inflammatory immune cells.

Materials and Methods: Using murine vascular endothelial cell line (TKD2), the inhibitory effect of insulin (100nM) on *E.coli* LPS and TNF α (10ng/ml, respectively)-induced cell adhesion molecules (CAMs) expression and cellular adhesion with human leukocyte cell line (THP-1) were assessed. Then, potential regulatory signaling pathway of insulin on CAMs expression was investigated. Furthermore, using vascular endothelial cell-specific insulin receptor knockout (KO) mice, 7-0 silk ligature-induced alveolar bone loss and insulin signaling in mice gingiva were compared.

Results: Western blot analyses showed LPS and TNF α -induced VCAM-1 expression was significantly suppressed by insulin pretreatment via the PI3K-Akt-FoxO1 pathway. Subsequently, insulin significantly downregulated cellular adhesion of LPS and TNF α -treated TKD2 with THP-1. High (25mM) glucose treatment for 48 hours significantly inhibited insulin-mediated activation of PI3K-Akt-FoxO1 pathway and abolished its regulatory effect on VCAM1 expression. KO mice showed significantly less insulin action in the gingiva and exacerbated alveolar bone loss compared to WT mice.

Conclusion: These results suggest that insulin resistance in the vascular endothelial cells may promote the recruitment of inflammatory immune cells in the gingiva by disturbing the regulatory effect on VCAM-1 expression by insulin, resulting in the exacerbation of periodontal tissue destruction.

GB-06

miR-1260b inhibits periodontal bone loss by targeting ATF6 β

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Background and objective: We recently demonstrated that TNF- α stimulation enhanced the expression of miR-1260b in human gingival MSCs (hGMSCs)-derived exosomes and these exosomes successfully inhibited periodontal bone loss in mice model (Nakao Y, *et al.*, *Acta Biomater*, 2022). It is also reported that ER stress-related genes are up-regulated in periodontal lesion (Yamada H, *et al.* *J Periodontal Res.*, 2002), and database analysis suggested that miR-1260b could be a possible regulator of ER stress by targeting ATF6 β . In this study, we, therefore, investigated the therapeutic effect of miR-1260b in periodontal lesion by targeting ATF6 β .

Materials and Methods: Human periodontal ligament cells (hPDLs) were transfected with miR-1260b to confirm the inhibition of ATF6 β . The effect of miR-1260b on inflammatory bone loss were validated in mouse ligature-induced periodontitis model (Kyushu University, #A21-131-2). The expression of ATF6 β in mice gingiva was observed by immunohistochemistry and periodontal bone loss was evaluated by microCT analysis. PBMCs and RAW-D cells were cultured with supernatants of hPDLs transfected by ATF6 β siRNA and the number of TRAP positive cells were counted.

Results: Transfection of miR-1260b mimic inhibited ATF6 β expression and knock-down of ATF6 β decreased the expression of RANKL in hPDLs. Increased expression of ATF6 β was observed in the ligated periodontal lesion, and the local injection of miR-1260b mimic decreased periodontal bone resorption in mice model. Supernatants of hPDLs transfected by ATF6 β siRNA inhibited osteoclast formation.

Conclusion: miR-1260b inhibited periodontal bone loss by targeting ER stress. Thus, miR-1260b therapy can be a novel strategy against periodontal bone loss.

GB-07

The potential mechanism of CTLA-4-Ig-mediated osteoclast differentiationSaki Nakane-Koyachi^{*1}, Kentaro Imamura¹, Tasuku Murakami¹, Rio Hisanaga¹,
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Background and objective: Cytotoxic T lymphocyte-associated antigen-4 (CTLA-4) is one of the immune checkpoint receptors expressed on the surface of T cells. In our previous study, we showed that the administration of CTLA-4-Ig reduced the bone resorption and the number of osteoclasts in a mouse periodontitis model. The expression of protein phosphatase 2A (PP2A) was increased by CTLA-4-Ig. However, the mechanism remains unclear. The purpose of this study is to investigate the potential mechanism by which CTLA-4-Ig regulates osteoclast differentiation.

Materials and Methods: RANKL and CTLA-4-Ig were added to RAW264.7 cells. The effect of CTLA-4-Ig on nuclear factor kappa B (NF-κB) activation was evaluated by western blot analysis. Gene expression of PP2A in RAW264.7 cells was suppressed by siRNA transfection. Cell viability was evaluated by WST-8 assay. The expression of osteoclast differentiation markers (*Cathepsin K*, *Trap*) was assessed by qRT-PCR, and the number of osteoclast-like cells was evaluated by TRAP staining in transfected cells.

Results: NF-κB phosphorylation was suppressed by the treatment of CTLA-4-Ig. The siRNA transfection had no significant effect on cell viability. In the PP2A siRNA transfected group, CTLA-4-Ig induced no significant suppression of *Cathepsin K* and *Trap* expressions. The number of osteoclast-like cells tended to increase in the PP2A siRNA transfected group compared to the control siRNA transfected group.

Conclusion: These data suggested that regulation of the NF-κB pathway via modulation of PP2A expression is one of the mechanisms by which CTLA-4-Ig inhibits osteoclast differentiation.

GB-08

Effects of senolytic drugs on aged miceNaoto Koyama^{*1,2}, Shinya Kato¹, Yasuhiro Tai², Ryusuke Sako², Suguru Nakamura²,
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Background and objective: Senescent cells induce chronic inflammation in various organs and are a reported cause of aging. Controlling chronic inflammation by eliminating senescent cells may lead to the development of comprehensive therapies for periodontal disease and atherosclerosis, which are based on chronic inflammation. In this study, we examined the effects of senescence inhibition by senolytic drug treatment in an animal model of aged mice.

Materials and Methods: Twenty-five 69-week-old wild-type C57BL6 mice and eight 89-week-old ApoE^{-/-} mice, a model of genetic hyperlipidemia, were used. These mice were further divided into a treatment group (12 C57BL6 and 3 ApoE^{-/-} mice) and an untreated control group (13 C57BL6 mice and 5 ApoE^{-/-} mice). The treatment group received the senolytic drug for 2.5 months, followed by euthanization and removal of periodontal tissue and the aorta. Periodontal tissues were examined for alveolar bone resorption using micro-computed tomography imaging. Maxillary bones were stained with β-galactosidase, a marker of cellular senescence. Aortas were stained with Zudan IV stain to measure the fat deposition rate.

Results: Between-group comparisons of alveolar bone resorption showed that age-related resorption was suppressed in the treatment group. Among the ApoE^{-/-} mice, the fat deposition rate in the treatment group was decreased compared with that in the control group.

Conclusion: The inhibition of alveolar bone resorption and the reduction in aortic fat deposition in senolytic drug-treated ApoE^{-/-} mice may serve as a model for studying the relationship between periodontal disease, atherosclerosis and aging, all of which involve chronic inflammation.

GB-09

***P.gingivalis* gingipains potentially affects MUC5AC expression in respiratory epithelial cells**Yukihiro Karahashi^{*1,2}, Kenichi Imai², Syuichi Sato¹¹Department of Periodontology, Nihon University School of Dentistry, ²Department of Microbiology and Immunology, Nihon University School of Dentistry

Background and objective: It has long been established that periodontal diseases contribute to a particular set of pulmonary diseases, such as pneumonia and COPD. However, a causal relationship between periodontopathic bacteria and the onset of pneumonia and COPD has not yet been established. Under normal conditions, mucus clearance occurs in a host as a first line of defense against airborne pathogens and pollutants, however, under pulmonary disease conditions like pneumonia and COPD, mucus hypersecretion occurs, potentially contributing to disease pathology and mortality. In addition, of the numerous mucins found in airway epithelial cells, MUC5AC and MUC5B comprise approximately 90% of overall mucin content and more importantly, MUC5AC expression and protein levels are elevated in pneumonia and COPD patients. Therefore, *Porphyromonas gingivalis* (*P.g.*) may influence both MUC5AC expression and protein levels in airway epithelial cells, potentially contributing to the aggravation of pneumonia and COPD. Here, the remit of this study was to establish whether *P.g.* virulence factors affected MUC5AC in immortalized and primary bronchial cells.

Results: MUC5AC gene expression and protein levels are affected by *P.g.* culture supernatant, but not by lipopolysaccharide or FimA fimbriae. Cells treated with either *P.g.* single (Kgp or Rgp) or double (Kgp/Rgp) mutants had altered levels of MUC5AC gene expression and protein levels, and MUC5AC staining of double mutant-treated mouse lung cells showed that MUC5AC protein levels were unaffected.

Conclusion: *P.g.* gingipains may be the primary virulence factor that influences both MUC5AC gene expression and protein levels, potentially contributing to pneumonia and COPD aggravation.

GB-10

Characterization of the genes associated with stress response in *Treponema denticola*Keiko Yamashita^{*1}, Yurie Kitamura¹, Rio Hisanaga^{1,2}, Yuichiro Kikuchi^{2,3}, Eitoyo Kokubu^{2,3}, Takashi Namba⁴, Kazuyuki Ishihara^{2,3}, Atsushi Saito^{1,2}¹Department of Periodontology, ²Oral Health Science Center, ³Department of Microbiology, Tokyo Dental College, Tokyo, Japan, ⁴Private Practice, Tokyo, Japan

Background and objective: The stress-response mechanism in *Treponema denticola*, one of the major periodontal pathogens, has yet to be elucidated. Previously, we found that the expression of a potential transcriptional regulator was significantly increased in the *T. denticola* mutant deficient in major outer sheath protein (Msp). Because loss of Msp may cause stress on outer sheath of *T. denticola*, we hypothesized that the gene might be involved in the stress response. Therefore, we focused on an operon including the potential transcriptional regulator. The aim of this study is to elucidate the part of stress-response mechanism in *T. denticola*, through analyzing the function of this operon.

Materials and Methods: We constructed two mutant strains deficient in each gene located in the operon from *T. denticola* ATCC35405 (wild-type strain). The gene-expression profiles of the mutants were analyzed by DNA microarray and qRT-PCR. Based on the results of the genetic analyses, we investigated some phenotypic changes of the mutants.

Results: In the genetic analyses, we observed the differential expression of the genes involved in the motility of *T. denticola*. The mutant deficient in the potential transcriptional regulator showed no change in growth, while that of the mutant deficient in the downstream gene was attenuated. Furthermore, the motility of both mutant strains was significantly decreased compared with that of wild-type strain.

Conclusion: The target genes in the operon might be involved in the response against the stress on outer sheath of *T. denticola*, through regulating the motility of this bacterium.

GB-11

Effect of *Porphyromonas gingivalis* on gut in relation to agingSarita Giri^{*1}, Osamu Uehara², Ayuko Takada³, Durga Paudel⁴, Tetsuro Morikawa⁵,
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Background and objective: Periodontal tissue destruction is more frequently observed in the elderly. The translocation of periodontal pathogens, including *P. gingivalis* to the gut has been shown to alter the gut microbiome. However, the effect of *P. gingivalis* on the gut environment in relation to aging has not been demonstrated. We hypothesize that *P. gingivalis* has a more detrimental effect on the gut environment with increased age.

Materials and Methods: C57BL/6J mice aged 4 weeks (young) or 76 weeks (old) were divided into four groups: control-young, control-old, *P. gingivalis*-administered young, and *P. gingivalis*-administered old. The *P. gingivalis* group were orally administered with *P. gingivalis* thrice weekly for 5 weeks. After 30 days of the last *P. gingivalis* administration, the gut microbiome was studied using 16S rRNA sequencing. The mRNA expression of intestinal junctional barrier molecules and the levels of the inflammatory cytokines IL-1 β and TNF- α in the serum was evaluated.

Result: Significant differences in the gut microbiomes between the groups, in terms of taxonomic abundance, bacterial diversity, and predicted metagenome function was observed. A significant reduction in the alpha diversity and in the abundance of beneficial bacteria, such as *Akkermensia* and *Clostridiaceae*, in the *P. gingivalis*-administered old mice was observed. The mRNA levels of Claudin-1 and Claudin-2 in the intestine were significantly elevated in *P. gingivalis*-administered old mice, as were the serum levels of IL-1 β and TNF- α .

Conclusion: The effect of *P. gingivalis* on the gut environment is more pronounced in old mice than in young mice.

GB-12

Local delivery of Backpack-bound M2 macrophages –Cellular immunotherapy against periodontitis–Mayuka Nakajima^{*}, Koichi TabetaDivision of Periodontology, Department of Oral Biological Science, Niigata University Graduate School of Medical
and Dental Sciences

Background and objective: Proinflammatory M1 macrophages are the predominant type in periodontitis. It was demonstrated that inducing anti-inflammatory M2 macrophages prevented the disease progression in a mouse periodontitis model. Cellular immunotherapy, transfer immune cells, is expected to have a more direct and specific effect than using drugs; however, adopted immune cells can alter their function in undesirable directions in response to environmental conditions. Herein, we developed micro particles referred to as a “backpack (BP)” that adhered to macrophage helping the cells to maintain M2 phenotype in the disease site and tested its efficacy against experimental periodontitis.

Materials and Methods: BPs are fabricated with spin-coating method. IL-4 (200fg/BP) loaded BPs were attached to bone marrow-derived macrophages (BMDMs, C57BL/6) by incubation on dishes. Polarization of BP-bound MBDMs to M2 was observed by flow cytometry. The BP-bound M2 cells (BP-M2), BPs or M2 cells were injected to the periodontal region that induced by ligation and inoculation of *Porphyromonas gingivalis* W83, and therapeutic efficacy was assessed by alveolar bone loss measurement. Additionally, localization and phenotype of the macrophages in the disease sites were observed by immunohistology.

Results: BPs polarized BMDMs to M2 *in vitro*. Injected BP-M2 cells were localized in the disease sites over 5days and high ratio of M2 to total macrophages was observed only in BP-M2 injection group. Alveolar bone loss was significantly reduced in the BP-M2 group when compared with the other groups.

Conclusion: Transferred BP-bound macrophages localized and maintained M2 phenotype in periodontal region, and thereby prevent the disease progression.

GB-13

Determining the best approach for sequencing analysis of oral microbiotaTakahiko Nagai^{*1}, Takahiko Shiba^{1,2}, Keiji Komatsu³, Nemoto Takashi¹,
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Background and objective: 16S rRNA gene amplicon sequencing analysis is widely used to investigate the diversity and complexity of microbial communities in oral diseases. However, the selected amplification regions may distort the accurate data assessment. This study aimed to evaluate the bias of 16S rRNA gene amplicon analysis using primers targeting different hypervariable regions.

Materials and Methods: Bacterial DNA samples were prepared from mock1 community comprising of 15 bacteria from various environments, mock2 community comprising of 6 major oral bacteria, and samples from the dental calculus of 5 patients. DNA samples were amplified with 9 primers and sequenced with 300 bp paired ends on Illumina Miseq platform, and the data was analyzed using QIIME2 with databases : SILVA, Greengenes, and Human Oral Microbiome Database databases (HOMD).

Results: In the genus-level analysis of mock1 community, the similarity of relative bacterial abundance ratio to the theoretical value was highest in V1-V2 region with SILVA. In the analysis of mock2 community, the highest levels were evident in V4-V5 region with HOMD at the genus-level and V1-V2 region with HOMD at the species-level. In the species-level analysis of the dental calculus sample, the number of detected bacteria was highest in V1-V2 region with HOMD. The relative bacterial abundance was more influenced by the samples compared to the primer type.

Conclusion: The use of primers targeted V1-V2 region, 300 bp paired ends sequencing, and HOMD database might show the most reliable result for 16S rRNA gene amplification sequencing analysis of the oral microbiome.

GB-14

Fabrication of stem cell-based scaffold-free bone-like 3D structuresMasaaki Toyoda^{*1}, Shunichi Kajioka², Ryota Fujimoto³, Chikako Hayashi¹, Kentarou Kawakami¹,
Yukari Watanabe¹, Yuki Nakao¹, Karen Yotumoto¹, Terukazu Sanui¹, Takao Fukuda¹,
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Background and objective: Although periodontal tissue regenerative therapy has been widely used to recover alveolar bone absorbed by periodontal disease, its indications are limited. In this study, we aimed to establish a new strategy to regenerate alveolar bone by creating cellular structures using mesenchymal stem cells with bone differentiation ability by using a bio-3D printer by "Kenzan Method" that can create scaffold-free cellular structures.

Materials and Methods: Cell clusters (spheroids) were prepared from human gingival stem cells (hGMSCs) using cell-low attachment surface 96-well plates. Cluster size measurements were performed and expression of stem cells (CD73) and apoptosis (Cleaved Caspase-3) markers were confirmed by fluorescent immunostaining. After 4 weeks of osteogenic differentiation, frozen sections were prepared for evaluation of calcification by Alizarin Red and Von Kossa staining. μ CT analysis was also performed to measure the bone mineral density (BMD).

Results: 4.0×10^4 cells/well were seeded, and spheroid with a diameter of 500-600 μ m was successfully created to enable structure formation. Immunofluorescent staining revealed the expressions of stem cell markers, and a small amount of apoptosis markers without affecting the growth of spheroid were observed. Four weeks after osteogenic differentiation, calcification of the bio-3D printed spheroids was confirmed by Alizarin Red staining and Von Kossa staining. μ CT analysis further revealed that the BMD of the calcified structure was almost identical to that of trabecular bone.

Conclusion: Using a bio-3D printer, scaffold-free bone-like structures were successfully fabricated from gingival-derived stem cells.

General (Clinical Research)

GC-01

Evaluation of oral health-related quality of life following free gingival graft procedure

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Background and objective: The free gingival graft (FGG) procedure is a commonly used approach in clinical practice for increasing vestibular depth and width of the attached gingiva. FGG is considered more invasive and a heavier burden on patients compared to other periodontal surgical procedures because of its open wounds. The aim of this study was to quantitatively examine patient burden following FGG through questionnaires that evaluated the oral health-related quality of life (OHQoL) and pain.

Materials and Methods: The study evaluated 21 patients who underwent FGG or open flap debridement (OFD) on their mandibular molars. The questionnaires used the General Oral Health Assessment Index (GOHAI) for OHQoL, visual analogue scale (VAS) for pain. Subjects were also evaluated using three subscales of GOHAI (physical function, psychosocial function, and pain and discomfort).

Results: There was a significant decrease in the GOHAI score at day 3 after FGG as compared to baseline. Physical and psychosocial function scores at day 3 were significantly lower in FGG versus OFD. Furthermore, the VAS score increased significantly at day 3 in both groups and no difference between the groups during the evaluation period.

Conclusion: These results suggest that FGG causes a temporary decline in OHQoL due to physical and psychosocial function effects. This study demonstrated that FGG requires postoperative follow-up for not only pain but also physical and psychosocial function.

GC-02

Interfacial findings of implants removed because of peri-implantitis

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Background and objective: The pathogenesis and course of peri-implantitis (PI) have not been fully clarified. Furthermore, few reports have described the implant surfaces affected by PI. We herein report our histological observations of the surfaces of implants that were removed after 30 years because of PI.

Materials and Methods: Two implants were cut in the remaining osseointegration area using a carbide bar and extracted. The implant samples were immersed and fixed in a 10% neutral formalin solution. The sample of the first molar area was encapsulated in resin, and a polished specimen was prepared for observation under an optical microscope. The sample of the second bicuspid area was dehydrated and freeze-dried, and specimens for scanning electron microscopy (SEM) were prepared.

Results: The surface of the extracted implant showed black discolored areas with no attachment of tissue other than inflammatory tissue, including a small piece of bone, under SEM examination. In the polished specimen, inflammatory tissue and exfoliated bone tissue were observed on the implant interface. SEM observation also showed numerous foci of bacterial adherence, mainly filamentous bacteria. Sulfide reactions were observed in areas that appeared black microscopically. In addition, the degenerated bone tissue showed many fatty droplets, which are seen in poorly metabolized tissue.

Conclusion: The PI-implant interface was contaminated by sulfide adherence and bacterial infection, and degenerated bone tissue was also observed. These findings, when considered in conjunction with clinical symptoms, may assist in the selection of treatment for PI.

GC-03

Relationship between periodontal disease, diabetes mellitus, and liver diseaseToshiya Fujii^{*}, Norio Aoyama, Sayuri Kida, Kentaro Taniguchi, Tomomi Yata, Motohiro Komaki

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Background and objective: A bidirectional relationship between diabetes and periodontitis and a higher incidence of liver disease in periodontitis patients have been shown. The proportion of patients with diabetes who progress from nonalcoholic fatty liver disease to liver cancer was twice as high as that of healthy individuals. However, there are still few reports that comprehensively analyzed the relationship between diabetes, liver function, and periodontal disease. The purpose of this study was to clarify the relationship of those diseases, focusing on diabetes index (HbA1c), periodontal index (PISA), and liver function markers.

Materials and Methods: Subjects were recruited from 2018 to 2021 at the Medical and Dental Collaboration Centre, Kanagawa Dental University Hospital. HbA1c was measured to assess diabetes. PISA was calculated from periodontal clinical examination. AST, ALT and γ -GTP were measured as liver function markers. The correlation between diabetes, periodontal disease and liver function markers was examined. The study was approved by the Kanagawa Dental University Ethical Review Committee (No. 553).

Results: A total of 277 subjects (182 women and 95 men) with a mean age of 67 years were included in the study. Higher proportion of high PISA patients was found in the high HbA1c group compared to the low HbA1c group. Only AST was an increased marker among liver function indicators in the high HbA1c group. AST and γ -GTP were also increased in the high PISA group.

Conclusion: The results of the present study confirmed the association between diabetes and periodontitis and showed their association with liver function.

GC-04

Relationship between Meal Sequence, Nutrients and Number of TeethSayuri Kida^{*1}, Norio Aoyama¹, Taizo Iwane², Toshiya Fujii¹, Kentaro Taniguchi¹,
Tomomi Yata¹, Motohiro Komaki¹¹Periodontology, Kanagawa Dental University, ²Kanagawa University of Human Services

Background and objective: Oral diseases are strongly linked with systemic disorders. Eating behavior such as meal sequence is important for maintaining good general health. Poor oral condition could cause malnutrition, however, the effect of oral condition on food intake has not been clarified. The purpose of this study was to assess the relationship between awareness of meal sequence and nutrients in the various oral condition of Japanese people.

Materials and Methods: The subjects were recruited at the Medical and Dental Collaboration Center in Kanagawa Dental University Hospital from 2018 to 2021. Clinical examinations such as body composition analysis, periodontal measurement, and assessment of chewing ability were performed and data of meal sequence was collected. Brief-type self-administrated diet history questionnaire (BDHQ) was used to assess nutrients. The Ethics Committee of Kanagawa Dental University approved the protocol of the present study (No. 801).

Results: 238 participants with mean age of 67.5 were enrolled in this study. 79 people had an eating behavior, in which they take meal sequence of vegetables, meat or fish and carbohydrate. On the other hand, 61 people had completely no awareness of the meal sequence. People who had the awareness of the meal sequence obtained proper nutrients in dietary fiber, calcium, and vitamin C compared with those who had no awareness. While people with many teeth obtained sufficient nutrients according to the awareness of food intake, people with less than 20 teeth obtained inadequate nutrients even if they had the awareness of meal sequence.

Conclusion: People with a few teeth could not get enough nutrition even if they are aware of meal sequence.

GC-05

Impaired oral functions in subjects with insufficient recognition of umami

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Background and objective: Oral condition is closely related with systemic health. Oral function directly affects dietary intake, and tasty food intake is an essential function to live; however, scientific data about the association between taste decline and oral health is limited. Thus, the aim of this study was to assess the relationship sensitivity of umami, one of five tastes, and oral condition.

Materials and Methods: Subjects were recruited from January 2018 to June 2021 in Kanagawa Dental University Hospital. Taste inspection with a whole mouth method was performed using tap water, 1% sweet water, 0.3% salty water, and low (0.03%) and high (0.1%) concentration of umami water. Lifestyle habits like miss a meal were asked and clinical tests for oral functions were performed. The study was approved by the Kanagawa Dental University Ethical Review Committee (No. 801).

Results: There was no difference of age according to recognition of umami. Those who could not recognize low concentration of umami water had a tendency of decreased residual teeth. Recognition of umami was associated with occluding area, oral diadochokinesis, and salt recognition. Those who regularly missed a meal had impaired umami recognition.

Conclusion: This study suggests that diminished umami recognition was related with reduction of occluding surface area and lowered tongue and lip motor function. Impaired oral functions were found in the subjects with insufficient recognition of tastes.

GC-07

Effectiveness of antimicrobial photodynamic therapy in the periodontal maintenance phase

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Background and objective: Antimicrobial photodynamic therapy (a-PDT) combined with scaling root planing (SRP) is more effective at improving periodontal status than SRP alone. However, the effectiveness of a-PDT combined with irrigation for patients undergoing periodontal maintenance has not been clarified. This study aimed to evaluate the efficacy of a-PDT in the periodontal maintenance phase compared to irrigation.

Materials and Methods: This study was approved by the Nagasaki University Hospital Certified Review Board (CRB19-013). Thirty patients who visited Nagasaki University Hospital for periodontal maintenance from 2019 to 2020 were included in this study. Patients who had multiple sites with bleeding-on-probing (BOP) and periodontal probing depths (PPD) of 4–6 mm in the maintenance phase were treated with a split-mouth design. These sites were randomly assigned to one of two groups: the a-PDT group or the irrigation group. In the irrigation group, the periodontal pockets were simply irrigated using an ultrasonic scaler. In the a-PDT group, the periodontal pockets were irrigated using an ultrasonic scaler, injected with light-sensitive toluidine blue (FotoSan[®] agent, CMS Dental ApS, Denmark), irradiated with an irradiator, and then once again irrigated using an ultrasonic scaler. After 7 days, the safety and efficacy of a-PDT were assessed.

Results: PPD and BOP significantly improved in the a-PDT group, but not in the irrigation group. No adverse events were observed in any patients.

Conclusion: a-PDT combined with irrigation was effective in improving PPD and BOP in patients undergoing maintenance. a-PDT may be useful as a non-invasive treatment in the maintenance phase.

Case Report

R-01

Periodontal Regenerative Therapy for Severe Bone Defect in Maxillary Canines

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Background: There remains controversy about whether teeth involved with severe bone loss should be saved or extracted. Patients' needs are diverse, but many patients wish to save their teeth. Here we present two cases in which maxillary canines accompanied by severe bone defects.

Case: Case1) A 51-year-old female visited in February 2015. Her chief complaint was to treat periodontitis. #23 had a probing depth (PD) of 10mm at the palatal site and the presence of bleeding. Tooth mobility was grade II.

Case2) A 55-year-old female visited in March 2019. Her chief complaint was gingival swelling. #23 had an over 10mm PD at the palatal site and the presence of bleeding. Tooth mobility was grade II.

Clinical Procedures and Outcomes: After initial therapy, periodontal regeneration using a combination of enamel matrix derivative, deproteinized bovine bone mineral, and collagen membrane was performed. Five mm of PD and the presence of bleeding remained at a re-evaluation 1 year after surgery in case 1, thus additional regenerative therapy was performed. Periodontal tissues in both cases 1 and 2 improved and have been clinically stable for 6 years, and 2 years and 6 months post-surgery, respectively.

Conclusion: The maxillary canine, which has significant role in occlusal relations, seemed to be difficult to achieve periodontal regeneration since there is a severe bone defect. Although it might be one option to extract a hopeless canine, optimal periodontal regenerative therapy could achieve saving the teeth, which led to higher patient satisfaction and the improvement of QOL.

R-02

A case series of periodontal regenerative therapy using a non-incised papillae surgical approach

Kotaro Tsuchida*

Tsuchida dental clinic

Background and objective: Periodontal regenerative therapy is an effective treatment to improve bone loss, inhibit further progression of periodontal disease, and contribute to the oral health of patients. In recent years, various flap designs have been devised with better results. In this report, we present three cases of deep vertical bone defects treated with periodontal regenerative therapy using the non-incised papillae surgical approach (NIPSA) to preserve the interdental papillae.

Cases: Patients were 43, 56, and 76 years old (all female), no underlying disease, one smoker and two nonsmokers, all with Stage IV Grade C severe periodontitis, and vertical bone defects greater than 3 mm.

Results: OHI, scaling, and SRP under local anesthesia were performed. No antimicrobial agents were used. Periodontal regenerative therapy was performed for vertical bone defects using a dental microscope and NIPSA. After debridement, EMD was applied and a bovine bone (Bio-oss) was placed in the bone defect. Sutures were placed with 6-0 polypropylene and removed after 1 week. PPD decreased and attachment level improved. PPD decreased and attachment level improved. The radiographic findings showed improvement of the bone defect morphology.

Conclusion: If the bone defect can be approached from the buccal side, NIPSA is effective in preserving the interdental papillae adjacent to the defect.

R-03

Long-term success for peri-implantitis and peri-implant mucositis through stepwise approaches

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Background: Peri-implant diseases are common inflammatory bacterial infections. Standard therapy has not yet been established. This report presented the successful management of peri-implant mucositis and peri-implantitis through stepwise approaches for more than eight years.

Case: A 62-year-old, systemically healthy, non-smoker, Japanese woman with generalized periodontitis (stage III, grade B) in March 2009. The patient's periodontitis was well controlled with regular periodontal therapy. Implants were placed at #31, #30, #28, #20, and #18 tooth sites. Mucositis around all the implants were overlooked in March 2010. Peri-implantitis developed around #31, #30, and #18 implant sites.

Clinical Procedures and Outcomes: Peri-implant mucositis was actively treated through non-surgical therapy and peri-implantitis through non-surgical therapy followed by additional surgical therapy, since November 2013, consecutively: OHIs, repetitive and meticulous nonsurgical debridement of implants, modification of prosthesis to improve oral hygiene, resective surgery through decontamination with implantoplasty, air-abrasion using β -TCP powder, and a mesio-apically positioned flap; supportive peri-implant therapy with repetitive debridement of the implant surfaces every one to two months. The peri-implant inflammation and bone resorption resolved seven years after the surgical therapy. A small amount of exudate dominant with neutrophils was occasionally observed at the #18 implant site.

Conclusion: These consecutive therapies were effective in achieving long-term resolution of both peri-implant mucositis and peri-implantitis. The practical goal for therapy of peri-implantitis should be cessation of progressive bone loss with mild mucosal inflammation. Complete elimination of inflammation can be that for peri-implant mucositis. It should be important to detect and initiate peri-implant therapy in early peri-implant mucositis.

R-04

Multiple implant-supported occlusal reconstruction case utilizing digital and analog technology

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Namikidori Dental Clinic

Background: Implant overdenture is a treatment option for cases of edentulous or multiple missing teeth. However, the method requires numerous diagnostic procedures, particularly when the tooth in the intercuspal position is missing. Using digital simulation, a treatment plan can be visualized and treatment duration can be shortened. Furthermore, patients can better understand their treatment goal beforehand. Here, we report about digitally simulated occlusal reconstruction that may help make treatment procedures less complex and shorten treatment durations for edentulous patients.

Case: A 72-year-old woman complained of misfit in her two dentures. She had lost her only remaining tooth when undergoing retention for maxillary denture. She was also dissatisfied with her previous mandibular denture. Because of her vomiting reflex, she asked for a palate-less denture.

Clinical Procedures and Outcomes: The patient was not particularly dissatisfied with the removable dentures; therefore, we planned to fit a maxillary palate-less overdenture and a mandibular implant-assisted removable partial denture. We started the procedure with digital simulation based on the information of vertical dimension, occlusal plain, stable jaw position, and implant position. After deciding the vertical dimension, the implant position and final prosthesis were determined. After the implant was placed exactly at the planned position less invasively, the frame was prepared using laser sintering based on the prosthesis design obtained through digital simulation, and the final prosthesis was set successfully.

Conclusion: The use of digital simulation can visualize a treatment plan and is sufficient to obtain functional and aesthetically satisfactory results even for a occlusal collapse case.

R-05

A case of generalized severe chronic periodontitis with malocclusion and occlusal trauma

Nobuaki Imaeda *

Imaeda Dental clinic

Background and objective: we report a case of severe chronic periodontitis within a dentition demonstrating secondary occlusal trauma, which was improved by periodontal and orthodontic treatment.

Case: 51-year-old woman housewife

First visit: January 9, 2015

Chief complaint: "The upper front teeth are mobile from several months ago. I feel swelling with blood coming out of my gums when brushing my teeth." Opinion: More than PPD 4mm 71.4%, BOP75.0%, #11 Degree of mobility 2, #16, 26 Degree of furcation lesion 3, #45 missing teeth, A stenotic dental arch with marked lingual tilt of the upper and lower molars is observed.

Clinical Procedures and Outcomes: At the first visit, there was a concern of treatment cost, and corrective orthodontic treatment was not desired. The treatment plan involved periodontal treatment only. As the basic periodontal therapy progressed, the patient's awareness changed, and a modified treatment plan involving orthodontic treatment was incorporated. This time by utilizing orthodontic treatment, the continuity of the dentition could be maintained and function was favorable by keeping tooth extraction to a minimum. The patient was satisfied with this outcome.

Conclusion: Orthodontic treatment as a pretreatment for prosthetic treatment leads to preservation of enamel, pulp and teeth, and ultimately has the potential to be minimally invasive when re-intervention is considered in future. Orthodontic treatment is not suitable for all patients, but we believe that it will continue to be an effective method for preserving many teeth. The dentition of the patient remained stable, even after the conclusion of treatment due to the patient's improved health awareness during initial periodontal treatment. We would like to continue reviewing the patient's long term prognoses in the future.

R-06

Successful regenerative response of severe bone defect with cemental tearTakayoshi Nagahara^{*1}, Katsuhiko Takeda², Hideki Shiba²

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Background: Cemental tear involves complete or incomplete separation within the root surface along the cementodental junction that can lead to loss of periodontal attachment. This case report showed the course of regenerative treatment for alveolar bone defects with cemental tear in a right lower central incisor (#25).

Case: Cone-beam computed tomography (CBCT) and clinical examinations including pulp vital testing and pocket probing depth showed a cemental tear with a severely labial alveolar bone defect, but no endodontic lesions in #25, which had a sinus tract at the labial site, in a 75-year-old woman. This cemental tear was diagnosed as Class 3/Stage C based on the classification by Lee *et al.*, 2021.

Clinical procedure and outcome: Clinical management of this case based on the treatment decision-making (Lee *et al.*, 2021) included complete removal of the torn fragments and inflamed granulation tissues, and periodontal regenerative therapy. Recombinant human fibroblast growth factor (rhFGF-2) was used as a biologically regenerative molecule. The treatment yielded the gain of 7-mm-clinical attachment level and reconstruction of the labial bone wall and proximal bone walls 2 years after the surgery. In particular, the regenerated labial bone had a similar height to the lingual bone. Histopathological examination of the removed cemental fragment and granulomatous tissue showed they both had bacterial colonies.

Conclusion: Successful clinical and radiographic outcomes for severe periodontal tissue destruction with cemental tear were achieved through the clinical management based on the new classification and treatment decision-making by Lee *et al.*, 2021.

R-07

Periodontal regenerative therapy using FGF-2: a 3-year follow-up case report

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Background: In Japan, fibroblast growth factor-2 (FGF-2) has been clinically used as a periodontal regenerative therapy. We report a 3-year follow-up of a patient with chronic periodontitis who received regenerative therapy using FGF-2.

Case: The patient was a 41-year-old woman who complained of mobile teeth in the anterior region. Initial examination revealed 30.9% of sites with a probing depth (PD) of ≥ 4 mm, full-mouth mean PD was 3.3 mm. The O'Leary plaque control record was 67.9%. Radiographic examination revealed angular bone resorption in #13,16,22,47. A clinical diagnosis of generalized chronic periodontitis (Stage III, Grade C) was made.

Clinical Procedures and Outcomes: The patient underwent initial periodontal therapy including plaque control, scaling and root planing. After reevaluation, a series of surgical interventions were performed in #13,16,22,47. Regenerative therapy using FGF-2 (Regroth) was performed on the narrow intrabony defect of #13, and the combination therapy using FGF-2 and deproteinized bovine bone mineral (Bio-Oss) was performed on the wide and deep intrabony defects of #16,22,47. Following reevaluation, then the patient was placed on supportive periodontal therapy. At 3 years postoperatively, #13 yielded clinical attachment level (CAL) gains of 4.0 mm and #16,22,47 yielded CAL gains of 5.2 ± 1.0 mm, respectively. Distinct radiographic bone fill was observed following the treatment with FGF-2. No sites showed PD of ≥ 4 mm, and the mean full-mouth PD was reduced to 2.2 mm.

Conclusion: At 3 years postoperatively, the regenerative therapy using FGF-2 yielded improvements in clinical parameters and radiographic bone fill.

R-08

A Case Report of a Patient with Severe Chronic Periodontitis and Early Occlusal Breakdown Treated with Periodontal Regeneration and Implant Therapy

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Background: This is a case report of a patient with severe chronic periodontitis and early occlusal breakdown that was successfully treated with periodontal regeneration and implant therapy,

Case: A 68-year-old female visited our dental office in May 2014 with a chief complaint of a poor response to initial periodontal treatment. The patient was a non-smoker and had been taking Fosamax[®] (alendronate sodium) for 10 years for osteoporosis. The Plaque Control Record (PCR) at the initial visit was 84%. Teeth #14, #15, and #18 had Class 3 mobility. Teeth #3 and #18 had Class I and Class II furcation involvement. The occlusal relationship was Skeletal Class II with Angle class II. Occlusal interferences were noted on teeth #15 and #18. The patient was diagnosed with Generalized Periodontitis Stage III Grade C.

Clinical Procedures and Outcomes: Following initial treatment, a re-evaluation was performed. Fosamax was discontinued prior to the surgical phase, and periodontal regeneration was performed for teeth #3, #18, and #19. A dental implant was placed at site #30. Teeth #14 and #15 were extracted and GBR was performed, followed by implant placement. After occlusal function was restored, a re-evaluation was completed and the patient was transitioned to SPT (supportive periodontal therapy). The PCR score continually decreased and the periodontal condition stabilized. The patient has been in SPT for 6 years and the periodontal condition remains stable.

Conclusion: Further occlusal breakdown was prevented through periodontal regeneration and implant therapy, which allowed for occlusal stabilization. It could be suggested that long-term stability will remain with continued SPT.

R-09

A case of periodontal orthodontic treatment for a patient with Stage III–Grade C extensive chronic periodontitis with esthetic disturbance

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Kawanabe Dental Clinic

Background and Objectives: Patients with severe periodontal disease may have pathological tooth movement, often resulting in secondary occlusal trauma and esthetic disturbance. We report here a case for whom the combination of orthodontic treatments not only met the esthetic requirements but also improved the periodontal disease.

Materials and Methods: A 62-year-old female patient came to the hospital with a chief complaint of halitosis. Root bifurcation lesions in #24, #27, and #47, and vertical bone defects in #23, #24, #37, and #47 were observed by radiography. In addition, #24 and #27 showed degree III and degree II agitations, respectively. After examination, a diagnosis of extensive chronic periodontitis, Stage III–Grade C was made.

Results: The results of the reevaluation showed significant improvement in BOP and PPD. Vertical bone defects in #23 and #37 were treated with periodontal tissue regeneration therapy using enamel matrix derivatives. The root bifurcation lesion in #27 was addressed with a trisection. After periodontal surgical treatment, orthodontic treatment was performed for the vertical bone defect in #47. Significant improvement in periodontal pathology was achieved after the treatment.

Conclusion: In this case, orthodontic treatment was able to improve secondary occlusal trauma and esthetic disorders. This suggested that the use of orthodontic treatment for periodontal disease can improve periodontal disease as well as esthetic disorders.

R-10

A case of Non-surgical periodontal therapy and orthodontic treatment for periodontitis, which is presumed to have progressed bone resorption due to occlusal trauma

Kimitaka Kusunoki*

Kusunoki Dental Clinic

Background: A patient with moderate generalized periodontitis was treated with basic periodontal therapy, but deep bone defects remained in the mandibular anterior teeth. After improvement in bone levels, the patient underwent orthodontic and prosthetic treatment to restore full oral function.

Cases: Patient: A 61-year-old, female First visit: May 2018 Chief concern: swollen and painful gums in the lower left canine tooth region.

General history: Unremarkable, non-smoker

Dental history: She last had a restoration 2 years ago.

Diagnosis: Moderate to severe generalized periodontitis; Stage III Grade B

Treatment and results: After basic periodontal treatment (including removal of an ill-fitting prosthesis and root canal treatment), a deep bone defect remained in the mandibular anterior teeth region. The anterior teeth had a close occlusal relationship with plexus and crossbite, whereas the molars had an improper occlusal relationship due in part to an ill-fitting prosthesis. The occlusal contact of the anterior teeth was eliminated by elevating the occlusal part of the molars with provisional restorations, and re-SRP was performed. After improvement in the bone levels, teeth with poor prognosis were extracted, and orthodontic treatment with multi-bracket was started. Eventually, the patient's occlusal condition improved with prosthetic treatment. It is now 6 months since the completion of treatment and the patient's occlusion remains stable.

Conclusion: SRP after occlusal elevation of the molars showed early improvement in bone levels, but it cannot be clearly shown whether it was due to SRP or the result of occlusal elevation. However, we believe that occlusal force is not irrelevant. The buccal bone of the mandibular anterior teeth was originally quite thin, and orthodontic treatment caused considerable gingival recession. However, the improvement of the dentition facilitated plaque control, and the condition of the periodontal tissues has progressed favorably.

R-11

Efficacy of re-entry surgery after regenerative therapy from long-term prognosis over 10 years

Tokuo Matsui*

Kiwakai Dental Clinic

Background and Objective: With the clinical application of cytokines, such as EMD and FGF-2, regenerative therapy has become widely applied for various bone defects. In addition, advances in materials and technology have made periodontal regenerative therapy increasingly predictable, but It is difficult to obtain 100% bone regeneration. In this poster, I present efficacy of re-entry surgery after regenerative therapy from long-term prognosis over 10 years.

Case: (1) A 54-year-old female. Significant bone defects were observed in many teeth and regenerative therapies were performed. I attempted to obtain as much physiological bone morphology as possible for the bone defects by regenerative therapy. For residual bone defects after regenerative therapy osseous surgery was done to acquire physiological bone morphology. As a result, long-term stability of the periodontal tissue has been maintained. Case : (2) 62-year-old male. He had moderate to severe periodontal disease in both maxilla and mandibula. The maxillary hopeless teeth were extracted, and apically positioned flap (APF) was performed to eliminate periodontal pocket for the residual teeth. I treated the mandible with regenerative therapy for all teeth except those diagnosed as hopeless. After the regenerative therapy, to solve the problem of the remaining periodontal tissues, osseous surgery was performed and the remaining periodontal pockets were eliminated by free gingival grafting and adequate width of attached gingiva was obtained.

Result: In both cases, shallow gingival sulcus, physiological bone morphology, and adequate width of attached gingiva were obtained and remained stable for a long period by re-entry surgeries.

Conclusion: Re-entry surgery after regenerative therapy is effective in obtaining shallow gingival sulcus, physiological bone morphology and attached gingiva necessary for stabilization of periodontal tissue.

R-12

The importance of a thorough periodontal examination before beginning orthodontic treatment

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Background: As the number of adult patients seeking orthodontic treatment has increased in recent years, orthodontists are increasingly encountering patients with periodontal disease. Orthodontic treatment is not recommended for patients with periodontal disease because it involves tooth movement caused by orthodontic forces compressing and resorbing the periapical bone. There hasn't been a consensus on how to treat periodontitis after orthodontic treatment has begun.

Case: An orthodontist sent a 32-year-old woman to the Department of Dentistry and Oral Surgery after noticing acute signs of periodontitis in the maxillary molars, which necessitated a periodontal examination and treatment. Localized severe periodontitis (Stage III grade B) was revealed in the maxillary left first and second molars, as well as the mandibular right second molar.

Clinical Procedures and Outcomes: After consulting with the orthodontist, the orthodontic treatment was put on hold to allow for periodontal treatment based on the results of the bacteriological examination. Oral sitafloxacin was used to perform Full-mouth disinfection. After therapy, periodontal and bacteriological exams revealed signs of bone regeneration and regression of localized periodontitis. The patient's orthodontic therapy was then continued, with excellent results.

Conclusion: Asymptomatic patients with localized severe periodontitis may pass the screening test before orthodontic treatment; nevertheless, acute symptoms with bone resorption may occur during orthodontic treatment, causing treatment suspension. On the other hand, a temporary orthodontic treatment interruption and rigorous periodontal intervention may aid in recovery. All patients who need orthodontic treatment should see a periodontist rule out any periodontal problems that could obstruct the orthodontic treatment.

R-13

A Case Report; Severe chronic periodontitis progression after treatment of intraosseous defects

Shoji Ishitani*

Ishitani Dental Office

Background and objective: Since, intraosseous defects take many forms, their treatment requires detailed examinations with strong site specificity awareness to determine defect morphology, preferably three-dimensionally. Furthermore, an appropriate treatment plan must then be established.

Materials and Methods:

Case: Patient: 48 years old, female, department store employer, smoker (10 cigarettes/day)

First examination in May 1997. Chief complaint: crown of 26, dehiscence of each dowel core, subjective awareness of clenching.

Diagnosis: Severe, chronic, extensive periodontitis, Stage III, Grade B

Results:

Treatment and results: 22: 24 extracted due to caries, so 23 was moved distally to alleviate crowding and achieve spontaneous extrusion.

15: After orthodontic extrusion, periodontal surgery was performed for osteoplasty and ostectomy.

47: Periodontal tissue regeneration therapy was performed by autologous bone grafting.

Immediately after surgery, all PD values were within 3 mm, there was no bleeding, and X-radiography showed alveolar bone stability.

Conclusion: The treatment of intraosseous defects should be on a tooth-by-tooth basis, with awareness of site-specificity. Furthermore, individual teeth should be treated flexibly, based on an understanding of the intraosseous defect morphology. Although it is important to fill intraosseous defects, in clinical terms, it is more important to achieve a state with stable PD values, absence of bleeding, and alveolar bone stability. To date, 22 years since treatment, completion the patient has lost one tooth due to root fracture, but her prognosis remains generally favorable.

R-14

A case of periodontal regeneration therapy for cemental tear

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Aozora Dental Office

Background and objective: Cemental tear is defined as deep periodontal pockets and attachment loss with radiograph periapical lesion. There are two possible mechanisms for cemental tear: internal factors due to the structural weakness at the cementum-dentin interface and external factors due to stress such as dental trauma, occlusal trauma, and excessive occlusal forces, but there is no clear evidence. This case is a case in which periodontal regenerative therapy was performed on a tooth with cemental tear during the regular maintenance.

Materials and Methods: The patient, a 49-year-female, had no periodontal disease and had been receiving regular maintenance for 15 years. Abscess and deep periodontal pocket of the distal #13 were noted. There was no subgingival calculus, pulp vital test was positive, CT images showed the distal and palatally of #13 with vertical bony defects, no part of the cementum fragment could be detected on the radiographs. Cemental tear was observed when the flap was reflected and the root surface was debrided. Periodontal regeneration therapy was performed with enamel matrix derivative (EMD) and bone graft (Cytrans Granules®).

Results: One year after periodontal regeneration surgery, CT images showed improvement of the vertical bony defects. No periodontal inflammation was observed and the patient's progress is good.

Conclusion: Cemental tear is rare, the exact aetiology, predisposing factors are not clear. Also, in many cases, preoperative radiograph do not show a part of the cementum fragment. The pulpal status of the affected tooth should be assessed, and the possibility of preserving the tooth should be diagnosed based on the extent of the radiographic lesion and the location, size of the fragment, and the treatment plan should be considered.

Dental Hygiene

H-01

A case report of periodontal treatment for a patient with dental phobia

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Background and objective: Dental phobia is a disorder characterized by fear of the dental clinic and dental treatment itself, difficulty in treatment, and poor oral hygiene. In this report, we describe a case in which a patient with moderate periodontal disease with dental phobia was treated with periodontal therapy and showed improvement.

Materials and Methods: The patient is a 43-year-old male. He had not seen a dentist in 35 years, and presenting symptoms included gingival swelling, redness, and supragingival calculus. Clinical findings were PCR 100%, BOP 100%, periodontal pockets ≥ 5 mm (10%). The patient was a non-smoker. The diagnosis was localized moderate chronic periodontitis, and treatment consisted of TBI, full mouth disinfection (FMD), and extraction of wisdom teeth in the left and right upper and lower jaws. FMD and extraction were performed under intravenous sedation. After reevaluation, the patient's condition stabilized, and followed by SPT for a year.

Results: After thorough oral hygiene instruction and non-surgical periodontal treatment, PCR was 15%, no periodontal pockets larger than 5 mm, and BOP was 10%. One year has passed since the patient started SPT, and the condition has remained stable. Although the patient was fearful of the treatment, he was relieved that the treatment was completed without pain or unpleasant sounds by using intravenous sedation. The improvement in gingiva and halitosis were noticed and the patient's lifestyle was also affected.

Conclusion: This patient had moderately advanced periodontitis due to poor plaque control without long-term dental intervention. Improvement of plaque control and application of pharmacotherapy, FMD and SPT, led to improvement of periodontal tissues with maintenance of the quality of professional care. It is believed that patients with dental phobia need to be given successful experiences with dental care and to change their own behavior in order to reduce risk factors for periodontal disease.

H-02

Improving the treatment of severe periodontitis by partial OHI

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Background: It is stated in the periodontal treatment guideline that basic periodontal treatment leads to stable condition through establishing rapport with patients. This time, we report a new case in which oral hygiene was improved by narrowing down OHI to the selected periodontally compromised tooth.

Case: A 53-year-old woman with no medical history presented to our clinic for malocclusion and dental checkup on July 2017. Chief complaint was that the tooth filing on the right maxillary molar tooth was misaligned and could not be chewed. Oral findings were that redness and swelling of the gingiva, periodontal pocket of 4 mm or more, and tooth mobility were observed on the whole. The BOP at the first visit was 63% and the PCR value was 52%. Dental X-ray images showed vertical bone resorption in the right first molar and premolar, and left maxillary first premolar.

Clinical Procedures and Results:

1. Response to the chief complaint and perform tooth extraction
2. Basic periodontal treatment
3. Reassessment
4. Oral function restoration treatment
5. Reassessment
6. Supportive periodontal therapy

Thorough OHI limited to the right mandibular first molar led to improvement of the all self oral cleaning ability. The BOP improve to 4% and the PCR value improved to 18% compared to value of the first visit.

Conclusion: The establishment of selected plaque control improved self-care ability, and at the same time increasing motivation for treatment and gaining participation in voluntary treatment, resulting in overall improvement in periodontal tissue.

H-03

A case report of peri-implantitis treatment outcome for recall dropout patient

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Background: This is a case report of peri-implantitis treatment outcome as peri-implant bone defect recovery caused by infection control re-introduction based on re-establish confidence between patient and dental hygienist.

Case: The dropout patient is 60 years old female, first visit date was Feb, 2006, after complete the implant treatment, she dropout the implant maintenance for 9 years. She referred to the hospital in April, 2018 caused by pain and smell around implant. The diagnosis in oral condition was peri-implantitis, peri-implant mucositis, and chronic periodontitis as Stage 4, Grade A.

Clinical procedures and outcomes: We discussed the cause of dropout was lack of understanding for implant maintenance, she understood the peri-implantitis can be treated by infection control based on daily plaque control. And sulcus bleeding index was evaluated by the patient such as no attached bleeding on tooth brush and inter dental brush. After 2 weeks, supra mucosal plaque control was achieved as no sulcus bleeding index. Subsequently, submucosal plaque control was performed by non-surgical therapy using carbon curette. Otherwise, no reacted site by non-surgical implant sites as 15,17,24,25 was performed by open flap debridement. After 1 year, all peri-implant sites demonstrated SBI (-), BOP (-), pocket reduction, and bone fill at bone defect area. And all periodontitis sites showed pocket reduction.

Conclusion: Infection control is very important to treat peri-implantitis and also periodontitis, and regular interval recall is necessary. For the sake of successful implant maintenance, it is most important for dental hygienist to establish good communication and re-establish confidence between patients.

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