PANORAMA 6/2025

Special Issue - Aspects of Periodontology in Various Contexts

In this issue, we highlight several important yet often overlooked areas of periodontology. Our first focus lies on periodontal health related aspects during pregnancy, including pregnancy-related changes in the oral microbiome and their potential implications for both maternal and fetal outcomes. We also present key findings from a recent master's thesis evaluating the effectiveness of periodontal therapy at different stages of pregnancy, alongside current scientific insights into the biological mechanisms that may underlie the well-documented association between periodontitis (PD) and adverse pregnancy outcomes.

The second part of this issue turns to another clinically relevant challenge: the orthodontic management of patients with periodontal compromise. Because orthodontic forces may pose additional risks in the presence of reduced periodontal support, tailored strategies are essential. On page 6/7, we summarize the results of a master's thesis that examined the biological differences in tooth movement between healthy and periodontally affected teeth, comparing aligner-based and conventional fixed appliance therapies to identify optimized treatment approaches for individuals living with periodontitis. We also present a concise overview of a recent expert consensus on treatment sequencing for such complex cases - guidance we hope will inspire confidence and support in your daily clinical decision-making.

Prof. Dr. Dr. Dr. h. c. mult. Joos (Editor)

What's new at IMC?

We are pleased to announce a significant advancement in the organizational development of the **International Medical College (IMC)**. IMC is now officially integrated into the **Deutsche Chirurgie Stiftung (German Surgery Foundation)**. This integration was made possible through IMC's simultaneous affiliation with the University of Excellence **Technische Universität Dresden (Dresden University of Technology)**, which now serves as the degree-awarding university for IMC's Master's programmes.

Technische Universität Dresden (TUD), one of Germany's leading research-intensive universities, offers outstanding academic and clinical infrastructure, including an excellent dental clinic. In close cooperation with the Deutsche Chirurgie Stiftung and TUD, this integration creates strong new opportunities to further expand and sustainably strengthen the IMC.

This important transition significantly enhances IMC's academic governance, research capacity, and the international collaborative framework. Under the umbrella of the Deutsche Chirurgie Stiftung, IMC will continue to advance its mission in high-level medical and dental education, surgical innovation, and global academic development.

At the same time, the TUD benefits by incorporating IMC's well-established and internationally recognized study programmes, thereby expanding its postgraduate dental education portfolio. This collaboration makes a valuable contribution to the Faculty of Medicine's profile, internationalisation, and scientific excellence. The combination of academic standards, clinical practice, and research-oriented dentistry aligns seamlessly with TUD's commitment to academic and clinical excellence.

IMC's affiliation with TUD marks a decisive step forward in its academic vision and global partnerships. Founded in 1828, TUD is one of Germany's largest and most prestigious public research universities and a designated Excellence University, renowned for its outstanding research performance, interdisciplinary innovation, and international academic impact. Of particular importance to IMC is TUD's Faculty of Medicine, Carl Gustav Carus, which is widely respected for pioneering advancements in surgical sciences, biomedical engineering, and translational medicine. This strong scientific foundation makes TUD an exceptionally well-aligned academic partner for IMC's continued educational, clinical, and research initiatives.

New Course Options

Do not miss the opportunity to participate in our new curricula on Orthodontics, one of them offered as a precourse to the IMC Master Course in Specialized Orthodontics. This European Programme in Orthodontic Principles & Clinical Skills begins on January 1, 2026, including the option to start a regular Master's Program in April, even if the precourse is still ongoing. If you are interested in advancing your expertise through this structured and practice-oriented curriculum, please visit our website for detailed information.

Topic I - Periodontology & Pregnancy

Oral diseases affect billions globally, with periodontal diseases impacting about 11% of all people according [Needleman et al.]. These conditions often go unnoticed, especially in women whose hormonal changes can worsen periodontal health. Pregnancy induces some of the most profound hormonal changes in women, prompting decades of clinical research examining its associations and with the prevalence of periodontal disease and respective consequences. However, consensus on several aspects has yet to be reached. On this double side, we summarize recent evidence synthesized across multiple original articles and reviews on this topic, while the subsequent section (pages 4–5) presents findings from a recent master's thesis investigating the impact of periodontal treatment on adverse pregnancy outcomes.

Changes in oral health during pregnancy

Hormonal changes during pregnancy are crucial for maintaining the stable condition of the mother and fetus but can also alter the risk of periodontal disease and caries [Silva de Araujo Figueiredo et al.]. These changes influence the oral microbiome, a diverse community of over 700 commensals identified in the Human Oral Microbiome Database (HOMD) and extended HOMD [Escapa et al.], which plays a key role in maintaining oral and systemic health. Alterations in this microbial balance may affect maternal oral health, birth outcomes, and infant health [Xiao et al.]. Findings on pregnancy-related microbiome shifts remain inconsistent: some studies report microbial stability [DiGiulio et al.; Balan et al.], while others note increases in *Streptococcus mutans* and periodontal pathogens such as *Aggregatibacter actinomycetemcomitans, Porphyromonas gingivalis,* and *Prevotella intermedia* [Kamate et al., Borgo et al.]. Periodontal disease in pregnancy may heighten the risk of serious dental problems [Keshava et al.], and inflamed periodontal tissues can harbor bacteria capable of crossing the placental barrier [Stadelmann et al.].

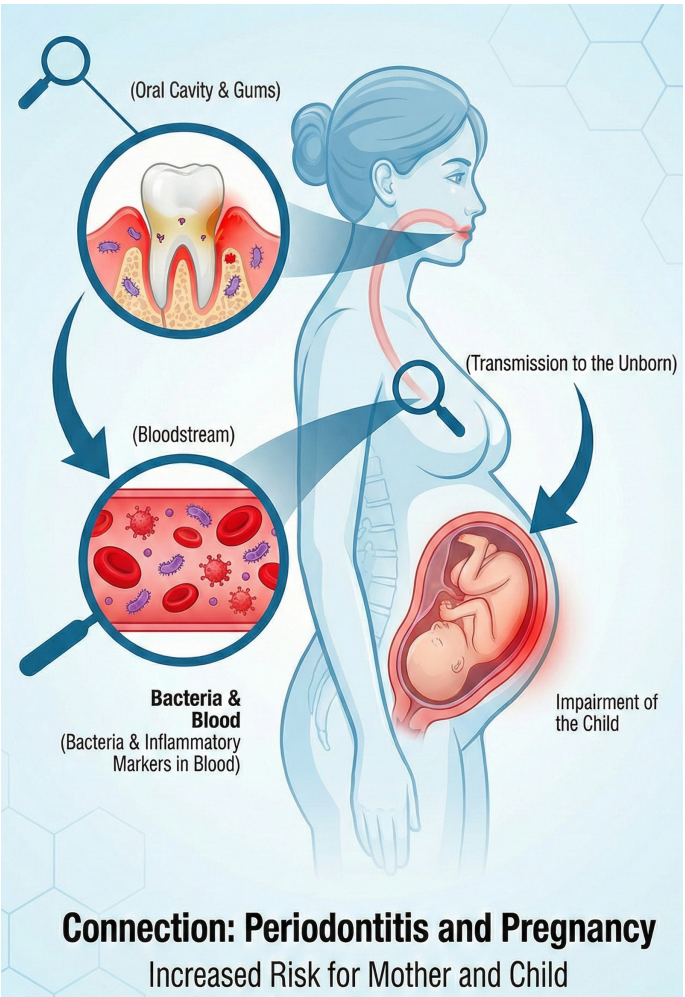

Fig. 1: Association of periodontitis and pregnancy (generated with Google Gemini Nano Banana Pro by M. Krautwurst & C. Wolf-Brandstetter)

This ongoing debate provided the impetus for an actual PhD thesis that is currently running at the IMC, with the focus on the analysis of (a) changes in the oral microbiome during pregnancy and (b) the relationship between the presence of oral microorganisms during pregnancy and maternal periodontal disease. Although this work has not yet been fully completed, some key points can already be implemented here. Indeed, a majority of included studies reveal the occurrence of changes in the oral microbiota. Specifically, it has been found that certain oral pathogens, such as specific types of bacteria, occur more frequently or in altered frequencies during pregnancy. These changes can potentially increase the risk of developing periodontal disease, especially if they are not detected and treated in time.

Another recent review by Thomas et al. reported that nearly half of women in their first trimester show poor periodontal status and that many pregnant women are unaware of their condition because periodontitis progresses silently but can contribute to serious systemic diseases. Hormonal peaks later in pregnancy can exacerbate inflammation and alter oral microbes, yet the first trimester may be the critical window for prevention. Thus, regular dental check-ups, comprehensive preventive measures, and therapeutic interventions, if necessary, are required to minimize the risk of periodontal disease and maintain healthy oral microflora. This includes educating pregnant women about the importance of oral health, performing regular dental cleanings, and applying targeted antimicrobial treatments when necessary.

Risk of adverse pregnancy outcomes

A substantial number of observational studies and meta-analyses report that maternal periodontitis is associated (but not definitively causal) with:

- Preterm birth
- Low birth weight
- Pre-eclampsia
- Gestational diabetes mellitus
- Fetal growth restriction

compared with women without periodontitis.

Despite consistent associations, studies vary in how they define periodontitis and preterm birth, and many are hospital-based or from specific populations, which can limit generalizability and introduce residual confounding by factors such as smoking, socioeconomic status, and other infections. Interventional trials in which periodontitis is treated during pregnancy have produced mixed results (see also next pages) regarding reduction of preterm birth. So current reviews tend to describe periodontitis as a probable risk factor with biologic plausibility rather than a definitively proven causal determinant of preterm delivery.

For the specific question of the „pure" association of periodontitis and preterm birth, cohort and case–control studies generally point in the same direction (a positive association), but case–

control studies more often report larger effect sizes and show more variability. This is particularly evident in a recent meta-analysis by Castano-Suarez et al., revealing significant effects only for the included case-control studies. This clearly calls into question the relevance of the results. Cohort studies typically classify periodontal status prospectively and follow unselected pregnant populations, which tends to reduce some biases but may dilute effects if exposure definitions are broad or if residual confounding (smoking, socioeconomic status) is not fully controlled.

Interesting insights are available from a recent umbrella review evaluating the methodological quality and strength of evidence on the link between maternal periodontitis and adverse pregnancy outcomes (APOs). To address these issues, statistical tests and sensitivity analyses were applied to detect potential bias.

In total, 71 meta-analyses were assessed, but most of these were based on a limited number of studies (median = 8). About 52% of the reported associations between periodontitis (diagnosis or treatment) and APOs were statistically significant. However, when a more stringent significance level ($p < 10^{-6}$) was applied, only 25.4% of the associations remained significant, suggesting that the overall evidence is not very robust. Notably, one-third of the associations showed high heterogeneity. Using the fail-safe number (FSN) method, it was stated that at least the general findings referring to the association of periodontitis and APOs would likely not be changed, whereas the scientific evidence of the treatment efficacy is not that robust.

It was further reported, that most of the analyzed systematic reviews were judged to be of critically low quality with a high risk of bias, which represents the major limitation of this umbrella review. The evidence base is dominated by observational studies, with few longitudinal or randomized trials. Also moderate to high levels of study overlap were identified. Overall, the current evidence relies more on non-causal associations than on strong causal proof. A further limitation is that most meta-analyses did not adequately adjust for confounding factors. Future studies should therefore report effect sizes that account for these variables.

Biological Mechanism

The presented associations are biologically plausible because periodontitis is frequently discussed to:

- increase systemic inflammation (e.g., elevated IL-6, TNF-α, CRP),
- allow translocation of periodontal pathogens into the bloodstream,
- affect placental function.

However, not all of these points are unanimously accepted among scientists. There is broad agreement on the presence of an indirect mechanism, largely mediated by periodontitis-associated increases in inflammatory markers that can disrupt placental homeostasis. A review by Wen et al. compiled studies examining the link between periodontal disease (PD) and adverse pregnancy outcomes. Elevated levels of prostaglandin E2 (PGE2) and interleukin-6 (IL-6) were found in pregnant women with preterm birth and persistent PD, while animal studies identified additional pro-inflammatory cytokines such as IL-1β, IL-8, IL-17, and TNF-α. These cytokines can induce apoptosis in placental tissues, and increased prostaglandins may trigger cervical ripening and uterine contractions, thereby raising preterm-birth risk.

According to an editorial by Nagihan Bostanci (Karolinska Institutet), inflammatory and immune responses affecting the feto-placental unit may result from microbial translocation into the bloodstream through a compromised gingival barrier and systemic trafficking of virulence factors. A direct pathway has also been proposed, as e.g. *P. gingivalis* and *Fusobacterium nucleatum* have been detected in amniotic fluid of women with preterm labor and intact membranes. This point remains debated, however, because at least in healthy pregnancies it is questionable if the intrauterine environment truly harbors microbial communities. Detected bacteria in such studies might reflect sample contamination rather than genuine infection.

In line with this skepticism, large studies examining multiple oral bacteria found no strong associations between specific periodontal pathogens and APOs. The association with APOs observed in some women may therefore reflect an immune-inflammatory phenotype, with a weaker antibody response to periodontal pathogens during pregnancy.

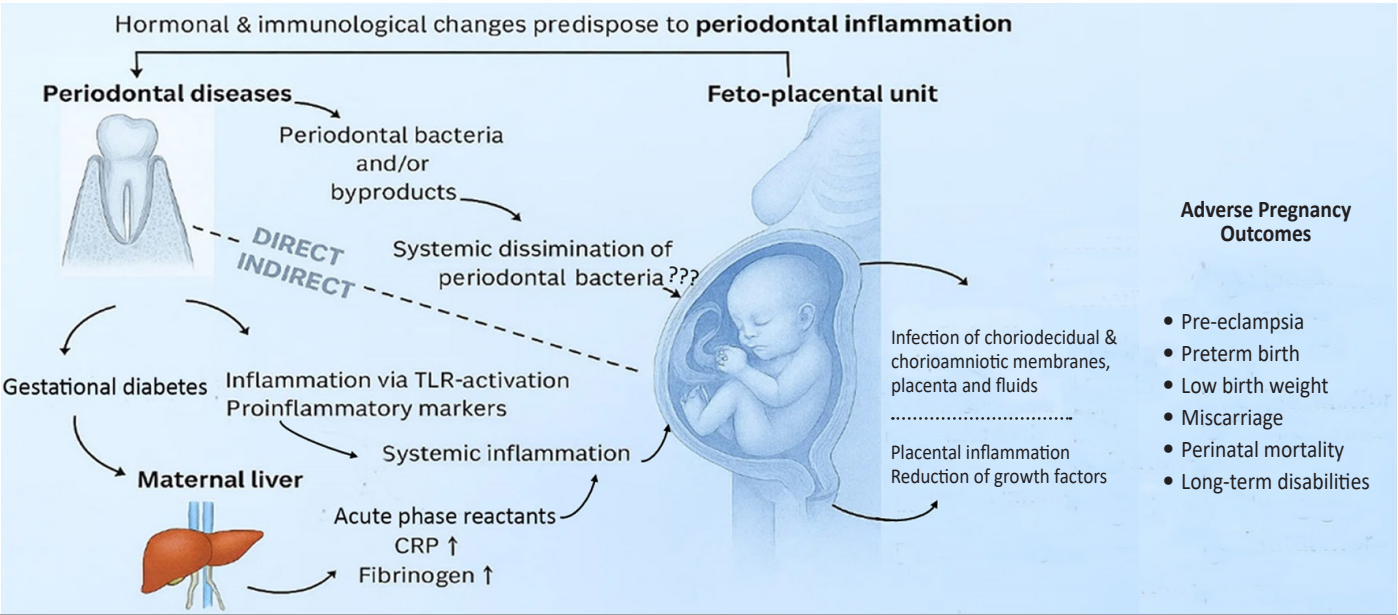

Fig. 2: Model of the association between periodontitis and adverse pregnancy outcomes (modified according to Nagihan Bostanci): The 'indirect pathway' suggests that periodontal inflammation leads to an increase in inflammatory mediators in the blood, which stem directly from periodontal tissues as well as from systemic induction of acute-phase reactants. The 'direct pathway' mechanism is questionable in its final step, namely whether bacteria do indeed colonize the membranes and fluids of the feto-placental unit. In contrast, the first steps are confirmed, as bacteria and their toxins translocate from subgingival biofilm and disseminate via the bloodstream. The "direct" and "indirect" pathways may occur simultaneously and ultimately induce imbalances in thrombogenic factors, impaired placental development, membrane rupture or uterus contraction. Such conditions may further cause adverse pregnancy outcomes. (Abbreviations: CRP: C-reactive protein; TLR: Toll-like receptor.)

Periodontal Therapy & Pregnancy outcomes

Risk of adverse pregnancy outcomes

The frequently reported association between periodontitis and adverse pregnancy outcomes served as the basis for a recent master's thesis conducted at the IMC. The objective of the thesis was to evaluate whether periodontal treatment in pregnant women with periodontal disease could reduce the incidence of such outcomes. A summary of the thesis is provided below, and selected findings are presented in greater detail on the following page. One of the most noteworthy observations arising from the included studies published over the past two decades was that the actual risk of severe adverse pregnancy outcomes – at least when regarding averaged values - appeared lower than anticipated. As illustrated in Figures 3 and 4, only a minority of the included studies reported significant differences when comparing such averaged birth outcomes, such as mean gestational age and birth weight. Slightly more studies demonstrated significant differences when comparing incidence rates between treatment and control groups. For this kind of analysis, 5 of 15 studies indicated a higher risk in untreated participants, mainly based on extremely high risk in the untreated controls of these studies. Yet this still represents a minority. These findings align with the umbrella review presented on the previous page, concluding that particularly the interpretation of reviews dedicated to intervention studies were likely to be changed in future.
However, given the low risk and relatively low cost of non-surgical periodontal therapy, incorporating routine periodontal evaluation and care into prenatal health programs would be a valuable public health measure, especially in populations at high risk for both periodontal disease and adverse pregnancy outcomes.

Master thesis I

How does periodontal therapy during pregnancy influence the risk of adverse pregnancy outcomes?

Sindi Maçi

Master of Science in Periodontology - 2025

Objectives: The goal of this thesis was to explore the impact of periodontal treatment administered to pregnant women and how it may influence potential adverse pregnancy outcomes, with a specific focus on neonatal birth weight and gestational age.
Material & methods: The search was conducted electronically via PubMed to identify all relevant literature published from 2005 to 2025. The primary search yielded 771 studies, of which 53 were obtained after application of several filters and then screened by title and abstract. Following full-text analysis of 31 remaining articles, 19 were finally selected based on the inclusion criteria. Birth weight and duration of pregnancy were examined after the mother had received periodontal treatment such as scaling and root planning (SRP), oral hygiene instructions (OHI) and the use of mouthwash.
Results: From the 19 studies included, most showed that periodontal treatment during pregnancy improved oral health markers like bleeding, pocket depth, and attachment loss. However, the effects on birth outcomes such as gestational age and birth weight were mixed. Only a few studies—mostly involving high-risk pregnancies—found a significant benefit in reducing preterm birth or low birth weight. In many others, there was no clear difference between treated and untreated groups.
Conclusion: While periodontal treatment during pregnancy is highly effective for improving oral health, its impact on preventing preterm birth or low birth weight is still uncertain and may depend heavily on individual risk factors. Given its safety and general benefits, periodontal care should be considered a valuable part of prenatal health, especially for women already at elevated risk.
Key words: Periodontal Treatment, Scaling and Root Planning, Pregnancy, Birth Weight, Gestational Age.

List of included studies

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SPECIFIC DETAILS

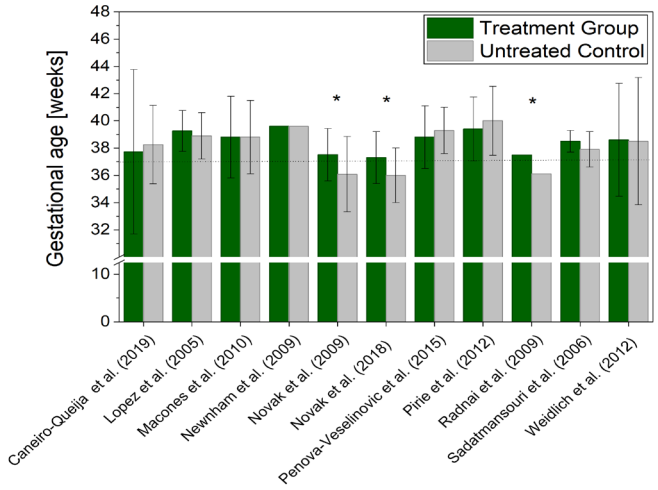

Fig. 3: Gestational age reported in the included studies, presented as mean ± SD (if SD was reported), * denotes the studies with significant difference among both groups, dashed line shows the threshold to pre-term birth.

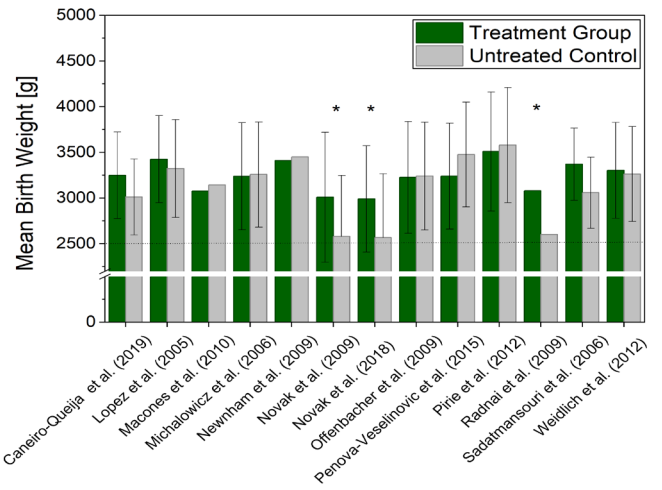

Fig. 4: Infant birth weight reported in the included studies, presented as mean ± SD (if SD was reported), * denotes the studies with significant difference among both groups, dashed line shows the threshold to low birth weight

Table 1 – Relations of observed mean gestational age

Gestational Age in weeks	Classification	No. of studies in Treatment group	No. of studies in Control group
< 37 0/7	Preterm	0	3
37 0/7 - 38 6/7	Early term	9	4
39 0/7 - 40 6/7	Full term	2	4
41 0/7 - 41 6/7	Late term	0	0
> 42 0/7	Postterm	0	0

Table 2 – Relation of observed mean birth weights (BW)

Mean BW in grams	Classification	No. of studies in Treatment group	No. of studies in Control group
< 1000	Extremely low BW	0	0
1000 - 1,499	very low BW	0	0
1,500 - 2,499	low BW	0	0
2,500 - 3,999	normal BW	9	9
> 4000	high BW	0	0

In Fig. 5, a range of potential impact factors is analyzed in relation to the observed changes in adverse pregnancy outcomes. The studies are classified into three categories: those demonstrating a clear benefit of periodontal treatment on pregnancy outcomes, those showing a partial benefit, and those indicating no benefit. Each factor is briefly assessed and categorized, with the corresponding abbreviations explained below the table. An intuitive color code is used to visually represent the expected impact of each factor on the final outcome, according to background knowledge.

Based on the distribution of colored patterns in Fig. 5, it becomes evident that women classified as high-risk exhibited the greatest benefit from periodontal treatment with respect to pregnancy outcomes. It should be emphasized that periodontal health improved in all participants and that the treatment was consistently reported as safe. Regarding additional potential impact factors, the timing of the intervention did not appear to influence the outcomes, whereas the inclusion of smokers may represent a confounding variable, as nearly all studies reporting limited benefit included smokers (but no details available).

Impact factor	Studies with consistent benefit				Studies with partial benefit					Studies without benefit								
	Jeffcoat et al. (2011)	Novak et al. (2009)	Novak et al. (2018)	Radnai et al. (2009)	Lopez et al. (2005)	Offenbacher et al. (2006)	Oliverira et al. (2010)	Sadatmansouri et al. (2006)	Tarannum et al. (2007)	Caneiro-Queija et al. (2019)	Macones et al. (2010)	Michalowicz et al. (2006)	Newnham et al. (2009)	Offenbacher et al. (2009)	Penova-Veselinovic et al. (2015)	Pirieet al. (2012)	Reddy et al. (2014)	Weidlichet al. (2012)
Study population	R	HR	HR	HR	R	HR	R	R	R	R	R	R	R	R	R	R	R	R
Smokers included	NR	N	N	N	Y	Y	N	Y	N	N	NR	NR	Y	Y	Y	Y	N	Y
Severity of disease at BL	↓	↑	↑	↑	↑	↓	↓	↑	M	↑	↑	↑	↑	↑	↑	M	M	↑
Improvement of PD due to treatment (Yes/No)	NR	Y	Y	Y	Y	Y	Y	Y	N	M	NR	Y	Y	Y	Y	Y	Y	Y
Time point of treatment: Early or late (< or > 21 w)	E	E	L	L	E&L	L	E	L	L	L	E	E	E	E	E	L	L	L
Severity of observed adverse pregnancy outcomes	↓	↑	M	↓	↑	↓	M	↓	M	↓	↑	↑	M	↑	NR	M	↓	↑

Fig. 5: Correlation between the documented success of periodontal treatment and a series of potential impact factors identified based on the study characteristics.
Abbreviations: E: early, HR: high risk, L: late, M: moderate; N: No, NR: not reported, R: random population, Y: Yes, ↓: low, ↑: high;
Color code: light green: factor status positive -> potentially explaining benefit; light red: unfavorable status or change -> potentially explaining no success of treatment
dark green: status negative for patients -> but potentially explaining the benefit of treatment, dark red: status positive for patients -> but explaining no success of treatment

Topic II - Periodontology & Orthodontics

Growing public awareness of dental appearance has substantially increased the number of adults seeking orthodontic care. At the same time, a significant subset of this population exhibits periodontal conditions, ranging from early gingival inflammation to advanced periodontitis. Consequently, orthodontic practitioners are encountering a rising frequency of adult cases in which tooth movement must be coordinated with the management of compromised periodontal tissues.

This trend highlights two parallel clinical needs: first, periodontal therapy must be incorporated to safeguard periodontal stability throughout orthodontic treatment; second, orthodontic tooth movement itself can serve as an integral component of periodontal rehabilitation, particularly when secondary malocclusions arise from periodontal breakdown. These developments support the growing adoption of a combined periodontal–orthodontic treatment model. In such an approach, orthodontic intervention is introduced after adequate control of periodontal inflammation, with the aim of improving tooth alignment, refining occlusal relationships, enhancing function, facilitating plaque control, and improving dental aesthetics. In this issue, we summarize first the findings of a recent master's thesis that examined orthodontic treatment modalities in patients with periodontitis, with specific attention to differences between removable and fixed appliances.

A clear understanding of how orthodontics can be integrated into periodontal management is becoming increasingly essential for clinicians. On the next page, we therefore provide a brief summary of a consensus statement authored by leading orthodontic experts [Zhong et al.] published only recently.

Master thesis II

Effects of Orthodontic Therapy in Periodontitis and Non-periodontitis Patients

Tzu-Hsuan Lin

Master of Science in Specialized Orthodontics - 2024

Objectives: This study aims to investigate the differential effects of tooth movement and underlying biological mechanisms between normal teeth and those affected by periodontitis. It will compare orthodontic treatment modalities, specifically aligners nd conventional fixed appliances, to identify optimal treatment strategies for individuals with periodontitis.

Material & methods: An electronic and manual search was conducted from March 2012 to March 2024 via PubMed, Embase, and manual searches, yielding 734 titles and 283 additional studies. After reviewing full-text articles, 19 publications were included in the qualitative synthesis. Periodontal parameters with different orthodontic appliances, such as conventional fixed appliances and aligners, were assessed.

Results: Periodontal pocket depth, clinical attachment level, and bone level all improved with both conventional fixed appliances and aligners. During orthodontic treatment, bleeding on probing and plaque index scores were lower in the aligner group.

However, post-treatment, the values between different appliances showed no significant differences.

Conclusion: Patients with severe periodontitis and malocclusion face greater periodontal challenges during orthodontic treatment compared to healthy patients, requiring stringent oral hygiene. They should wait 1 to 6 months post-periodontal treatment before starting orthodontics for optimal outcomes. Fixed appliances obstruct effective hygiene, increasing plaque and inflammation, whereas clear aligners facilitate better hygiene, resulting in lower plaque index (PI) and bleeding on probing (BOP) scores. Clear aligners are generally better for maintaining periodontal health. However, fixed appliances may still be necessary for certain treatment goals. Further high-quality studies are needed to confirm the long-term effects of orthodontic appliances on periodontal health.

Key words: Orthodontic treatment, Orthodontic appliances, Pathologic tooth migration, Periodontal disease, Periodontitis.

List of included studies

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Zasčiurinskienė, E. et al. (2023). Malocclusions, pathologic tooth migration, and the need for orthodontic treatment in subjects with stage III–IV periodontitis. A cross-sectional study. European Journal of Orthodontics, 45(4), 418-429.

The shortened version of the expert consensus presented here reviews current clinical guidance for orthodontic intervention in individuals with periodontal disease focusing exclusively on the treatment sequences and omitting all other parts. For more detailed information, please check the original article as well as the respective S3 guideline of the European Federation of Periodontology (EFP) for stage IV periodontitis assembled by Herrera et al., which aside from general periodontal treatment includes also sections on patients in need for a orthodontic therapy. Specifically the S3-level guideline recommends a staged approach to periodontal therapy. The **first step** focuses on improving oral hygiene and modifying risk factors through plaque removal, supragingival scaling, and behavioral support (e.g., smoking cessation, diabetes control). The **second step** aims to reduce subgingival biofilm and calculus via subgingival instrumentation, sometimes supported by short-term antimicrobials. The **third step** is reserved for sites not responding adequately (pockets ≥5 mm with bleeding or ≥6 mm), and may involve surgical procedures—either non-regenerative to improve access or regenerative to restore tissues.

Periodontal Treatment

Initial Joint Evaluation:

- Interdisciplinary consultation between periodontist and orthodontist after initial examination.
- Assessment of tooth prognosis (hopeless, questionable, safe).
- Compromised teeth may be useful for anchorage or bone augmentation.
- Address risk factors (smoking, diabetes) through patient education and behavioral counseling.

Non-Surgical Periodontal Therapy:

- Reduction of supra- and subgingival plaque/calculus.
- Oral hygiene instructions and risk-factor management.
- Aim to improve patient compliance and inflammation control.

Re-evaluation I:

- Assess healing response after non-surgical therapy.
- If treatment endpoints reached → joint planning of orthodontics.
- Persistent deep pockets or complex anatomy → surgery required.
- Poor oral hygiene compliance contraindicates surgery.

Non-Regenerative Periodontal Surgery:

- Includes flap surgery or resective surgery to improve access for cleaning.
- Recommended for deep residual pockets (≥6 mm).
- Consider risk of gingival recession.

Re-evaluation II

- If endpoints attained after surgery, orthodontics may proceed.
- Intrabony defects or furcation involvement → need for regenerative surgery.

Regenerative Periodontal Surgery:

- Use of membranes, enamel matrix derivative, and/or grafts for intrabony defects (≥3 mm).
- Thin gingival phenotype or <2 mm keratinized tissue → soft/hard tissue augmentation before orthodontics.
- Prevents recession during tooth movement.

Orthodontic Treatment Phase

Perio-Ortho Joint Evaluation/ Treatment Planning:

- Identify periodontal considerations before active orthodontics.
- Possible use of supracrestal fiberotomy prior to intrusion in elongated teeth.

Active Orthodontic Treatment:

Specific design principles and precuautionsfor patients with periodontal disease shoud be regarded (for details check Zhong et al.).

Orthodontic Treatment Towards Completion:

- May involve implants or restorations near completion for stable occlusion.

Some steps may overlap (e.g., implants placed early if anchorage compromised & Tooth movement direction can influence timing of regeneration procedures).

Orthodontic Retention & SPC

Perio-Ortho Final Evaluation:

- Final evaluation by both specialists (CAL, PPD, BOP, RBL, alignment, occlusion).

Orthodontic Retention and Periodontal Maintenance

- Long-term retention required to maintain occlusal stability.
- Regular periodontal maintenance prevents relapse.
- Retainers, recall intervals, and SPC frequency should be individualized.

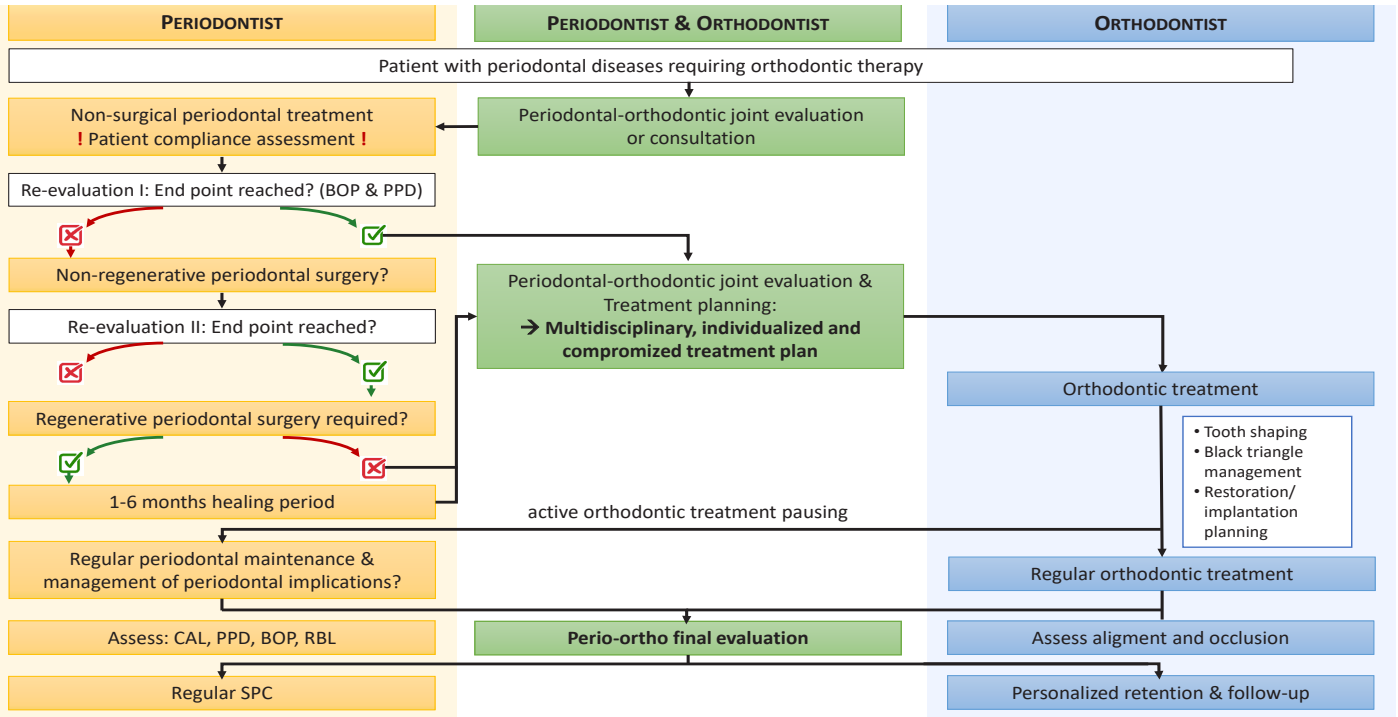

Fig. 6: Flowchart illustrating the integration of orthodontic treatment into periodontal management for patients with periodontal disease (modified from Zhong et al.)
Abbreviations: BOP: bleeding on probing, CAL: clinical attachment loss, PPD: probing pocket depth, RBL: radiographic bone loss, SPC: supportive periodontal care

New products on the market

Porphyromonas gingivalis, a gram-negative anaerobe, is considered a key pathogen in periodontitis due to its ability to modulate the oral microbiome and dysregulate host immunity. Through virulence factors such as gingipains, *P. gingivalis* suppresses immune responses and promotes tissue destruction, driving a shift from eubiosis to dysbiosis and sustaining a self-perpetuating cycle of inflammation and periodontal breakdown.

According to current S3 guideline, standard periodontitis therapy relies on mechanical biofilm removal supplemented, when necessary, by local or systemic antimicrobials. These interventions can be painful, require ongoing supportive periodontal therapy (SPT), and systemic antibiotic use carries risks of adverse effects and antimicrobial resistance. Moreover, such treatments often reset the oral microbiome, allowing recolonization by pathogenic species and perpetuating disease activity [Brookes et al.].

Fig. 6: Innovative approach to periodontitis: Specific inhibition of *P. gingivalis'* virulence without destroying the overall microbiome (generated with sora.chatgpt.com)

A novel strategy aims to prevent dysbiosis by selectively inhibiting virulence rather than eliminating bacteria. PerioTrap Pharmaceuticals (a spin-off of Fraunhofer IZI-MWT, Halle) has developed a technology that blocks the maturation of key virulence factors of *P. gingivalis* without killing the organism, thereby minimizing the risk of resistance development [Taudte et al.]. Experimental studies demonstrate that this approach prevents bacterial invasion of keratinocytes and erythrocyte binding, while reducing virulence in complex biofilms. Importantly, the overall bacterial load, including *P. gingivalis*, remains unchanged, indicating that the pathogen itself is not killed.

This virulence-targeting microbiome modulator enables commensal species to dominate ecological niches, thereby lowering susceptibility to future dysbiosis-driven infections. Such an approach may represent a paradigm shift in periodontitis prevention by maintaining microbial homeostasis while suppressing pathogenic processes relevant to both caries and periodontal disease.

The active ingredient is incorporated into two new formulations: orazen dental care gel for professional application following dental cleaning and orazen microbiome toothpaste for daily oral care, both combining the modulator with fluoride and supportive ingredients to provide comprehensive protection against periodontitis and caries. Further information is available at www.periotrap.com and www.orazen.de.

Fig. 7: Microbiome toothpaste developed by PerioTrap

Fig. 8: Antimicrobial gel developed by Geistlich Biomatierials

Another innovative product already on the market offers a valuable advancement in periodontal therapy: Pocket-X® Gel by Geistlich. Designed for routine periodontal care and as an adjunct after subgingival instrumentation, Pocket-X Gel supports gingival healing and helps prevent bacterial recolonization. This thermogelling formulation is applied as a liquid and solidifies at body temperature, forming a temporary protective barrier within the periodontal pocket. It is simple to use—ready from the syringe, without mixing—and can be efficiently applied by trained personnel, making it a practical and time-saving addition to any periodontal treatment protocol.

Save the date

International & national congresses:

- 30th **AEEDC Conference**: January 19-21, 2026 | Dubai: AEEDC Dubai has grown from a local gathering into the world's premier annual dental conference and exhibition, attracting leading experts, academics, and industry professionals. Renowned for its focus on knowledge exchange and innovation, it brings top dental minds together at the Dubai World Trade Center. Take the opportunity to visit our **booth SM05**!
- 101st Congress of the European Orthodontic Society **(EOS)**: 7-11 June 2026 | Dublin: The EOS brings together orthodontists from all over the world, held annuary in different European countries
- **FDI World Dental Congress 2026:** 4-7 September, 2026 | Prague: the leading global voice of the dental profession, representing over one million dentists worldwide, unites approx. 200 national dental associations and specialist groups across more than 130 countries.
- October 3, 2026 | Hamburg: From anatomy to extraction to reconstruction – over 100 years of maxillofacial surgery in Dresden (part 1: Implantology & bone substitutes)
- October 31, 2026 | Dresden: From anatomy to extraction to reconstruction – over 100 years of maxillofacial surgery in Dresden (part 2: Maxillofacial surgery in Dresden)

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