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The Effects of Combined Periodontal and Orthodontic Treatment in Periodontally Compromised Adult Patients: A Longitudinal Clinical Study

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ABSTRACT

Background: Management of periodontally compromised adult patients often requires a multidisciplinary approach combining periodontal therapy with orthodontic treatment. However, evidence regarding the clinical outcomes of such combined therapy remains limited.

Objective: To evaluate the clinical outcomes of combined periodontal and orthodontic treatment, including controlled orthodontic intrusion, in periodontally compromised adult patients.

Subjects and Methods: This longitudinal clinical study included 30 systemically healthy adult patients presenting with periodontal compromise and pathological tooth migration. All patients received initial periodontal therapy followed by orthodontic treatment using light forces, including selective orthodontic intrusion where indicated. Clinical parameters including probing pocket depth, clinical attachment level, gingival recession, and tooth mobility were recorded at baseline, post-treatment, and during follow-up. Patients were monitored for 18 months to assess treatment stability.

Results: Combined periodontal–orthodontic therapy resulted in significant improvement in periodontal parameters. Reductions in probing pocket depth and tooth mobility were observed, with stabilization of clinical attachment levels during follow-up. Orthodontic intrusion contributed to improved tooth alignment and periodontal stability in selected cases. Most patients demonstrated functional and aesthetic improvement, and outcomes remained stable at the 18-month follow-up period.

Conclusion: Within the limitations of this small longitudinal cohort, combined periodontal and orthodontic treatment, including controlled orthodontic intrusion, showed favorable clinical outcomes in systemically healthy periodontally compromised adult patients. This approach ultimately contributes to the restoration of the patient's functional and aesthetic aspects.

Keywords: Periodontal therapy, orthodontic treatment, gingival recession, pocket depth.

INTRODUCTION

Orthodontic treatment can effectively address many dental issues arising from conditions that affect the supporting structures of teeth. One of the most common conditions is periodontitis, which involves migration and drifting of teeth from their intended positions.[1] Individuals with periodontitis often experience symptoms such as bleeding gums, increased tooth mobility, and development of spacing between teeth. All of

these symptoms can result in incorrect occlusal, or bite relationships that impact both the aesthetic appearance and functionality of individual teeth. Therefore, a comprehensive, multi-stage approach is often needed to restore optimal dental health for those with periodontitis.[2]

Studies have reported favorable outcomes following orthodontic treatment; however, patient satisfaction varies considerably depending on the outcome measured.[3] Satisfaction rates ranging from 34% to 95% have been documented, reflecting differences in aesthetic improvement, functional outcomes, and periodontal health across study populations. This variability may also be influenced by factors such as sex, age, treatment duration, baseline periodontal condition, pain perception, and adherence to oral hygiene practices.

Many individuals requiring correction of malocclusion, or improper alignment of teeth, also exhibit severe inflammation and defects in the tissues supporting their teeth, namely the periodontal ligaments and alveolar bone. This can result in issues such as tooth drifting, rotation, migration, bone loss around teeth, receding gums, and loss of normal contact between teeth, leading to increased spacing between teeth and plaque buildup.[4] Nonetheless, orthodontic intervention offers the potential to correct these issues and preserve the integrity of compromised dentition.

Some key benefits of orthodontic treatment include promoting a functional bite relationship, enhancing dental and facial aesthetics, and improving periodontal health.[2,5] Importantly, orthodontic therapy is no longer contraindicated for patients with advanced periodontal disease when performed carefully. Ensuring long-term stability, preventing relapse, applying gentle continual forces, and effective periodontal therapy can yield further benefits.[5]

Tooth movement often occurs pathologically in periodontal patients.[6,7] Loss of periodontal support can lead to issues such as over-eruption, protrusion, and spacing between the teeth.[8–10] Additionally, "black triangles" between teeth can negatively affect oral health.[11,12] Biological agents have been used to aid in the healing of periodontal wounds by stimulating fibroblasts and osteoblasts.[13] Orthodontic treatment is associated with a reduced risk of developing periodontitis in the Korean population.[14] However, dental realignment is not advised for those with active, uncontrolled periodontal disease due to the risk of exacerbating bone loss and pocket formation.[15,16] Maintaining control of periodontal status throughout treatment with gentle continual forces is crucial.[17] When incisors are intruded, surrounding tissues shift apically in areas with minimal bone loss, and no root resorption occurs.[18] Orthodontic movement can increase interproximal alveolar bone levels if periodontal health is good and forces are light.[19]

The effectiveness of treatment relies on the reaction of periodontal tissues, which is connected to the natural functioning of connective tissues in the alveolar bone.[6,19] In fourteen cases of dental intrusion, the treatment maintained stability, increased bone levels, and transformed defects, thereby enhancing stability.[20] This reduced both bone height and probing depth.[20] Orthodontic therapy is important for remodeling alveolar bone and soft tissues.[15,21] Light forces are necessary when periodontal ligament vascularity is decreased to prevent potential root resorption.[21] In highly motivated patients who respond well to initial periodontal therapy, orthodontic intervention can yield favorable aesthetic and functional long-term outcomes.[22] Orthodontic treatment aimed at achieving healthy, functional, and aesthetic dentition frequently involves dental intrusion to promote remodeling of alveolar bone and soft tissues.[21,22] This clinical study aimed to assess the effects of combining periodontal therapy with orthodontic treatment on patients with specific periodontal and malocclusion issues.

SUBJECTS AND METHODS

30 Participants were selected based on the following inclusion criteria: being between 35-50 years old, all patients have noticeable dental spacing and signs of periodontal disease such as bleeding on probing and tooth mobility in the front teeth, and not having any significant medical conditions. All subjects provided informed consent to participate and patient confidentiality was maintained. This study followed the principles of the Helsinki Declaration. The Faculty of Dentistry Research Ethics Committee approved the application (July 2024/ Reference Code: 0215).

Initially, a comprehensive clinical examination was conducted to establish a baseline of each patient's periodontal and orthodontic conditions. Key assessments included measuring gingival recession, probing pocket depth between 3-6 mm, and recording the presence of dental plaque and calculus. Intraoral photographs were also taken to document visible spaces in the dental arches. Additionally, orthopantomograms (OPGs) were obtained to assess periodontal bone levels and identify osseous defects, aiding in treatment planning.

The severity of periodontal disease was classified according to the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions.[23] Each patient was staged based on clinical attachment loss, probing pocket depth, and radiographic bone loss. The majority of patients were classified as Stage III periodontitis, with a minority in Stage II. Bone loss levels were assessed radiographically and ranged from 30–50% of root length. Tooth mobility was graded according to Miller's classification, and individual grades were recorded for each patient (mobility grade were between 1 and 2).

The first treatment phase focused on resolving periodontal issues. Dental calculus was carefully removed using ultrasonic scalers and hand instruments. Scaling and root planing were performed to clean root surfaces and reduce pocket depth. Patients also received oral hygiene instructions including proper brushing, flossing, and interdental cleansing aids to ensure a periodontally healthy baseline prior to orthodontic intervention. After the periodontal care, all patients were fitted with fixed orthodontic appliances, such as conventional braces. Appliances were periodically adjusted as necessary. Periodontal status was closely monitored throughout orthodontic treatment and all patients had supportive periodontal therapy every two months.

Notably, there were no extractions performed as part of the orthodontic treatment plan. It is most likely that the decision not to extract teeth was made based on particular considerations of dental extraction such as crowding, arch length, and proposed treatment objectives.

The particular sequence in which treatment was administered was modified to the unique requirements of each patient. This included:

- Evaluating the severity of periodontal disease in relation to the periodontium.
- Planning the movements of the teeth to minimize stress on the periodontium.
- Monitoring periodontal health throughout the course of treatment.
- Altering the pace and mechanics of orthodontic forces based on the periodontium's response to treatment.

These advanced methods comprised the maintenance of optimal periodontal health alongside precise periodontium–dental tissue maneuvers, resulting in effective orthodontic treatment outcomes without compromising periodontal care throughout the entire therapy.

The sequence of treatment was adapted to individual needs:

Initial Alignment and Leveling:

Bonding/Banding: Bonding of brackets to the teeth or molar bands to the molars.

Initial Archwires: Placement of thin and flexible round nickel-titanium (NiTi) wires. These wires exert light and continuous forces to initiate tooth movements, correct rotations in the occlusion, and begin the leveling of the arch.

Continued Leveling and Alignment:
Progressive Archwires: Change to a slightly larger diameter round or rectangular NiTi wire to continue leveling the arches and aligning the teeth.

Working Phase – Space Closure and Coordination:
Stiffer Archwires: At this stage, rectangular stainless steel or other rigid archwires were introduced to improve control of tooth movement.

Space Closure Mechanics: Use of elastics, power chains, or loops on the archwires to close diastemas.

Arch Coordination: The upper and lower dental arches are coordinated in terms of shape and form for an ideal bite.

Finishing Phase – Detailing and Occlusion:
Finishing Archwires: At this stage, lighter, more flexible rectangular stainless steel or TMA (Titanium-Molybdenum Alloy) archwires are used. These wires allow for minor adjustments in tooth position.

Intraoral photographs were captured at baseline, during treatment, and post-treatment at 12 and 18 months to document changes in tooth alignment, space closure, and periodontal health over time. Follow-up OPGs assessed the overall oral condition and periodontal structures. Treatment effectiveness was evaluated based on periodontal health improvements such as reduced gingival recession and pocket depths, along with plaque and calculus reductions. Orthodontic outcomes such as proper tooth alignment, space closure, and dental contacts were assessed using photographs and clinical examination. Patient experience and perceived oral health improvements were obtained via patient feedback. Data from examinations, radiographs, and photographs were statistically analyzed using descriptive statistics, paired t-tests, and ANOVA to compare pre-and post-treatment measures of pocket depths, plaque levels, tooth mobility, and alignment/contacts ($p < 0.05$).

RESULTS

The study cohort comprised 30 adult orthodontic patients aged between 35 and 50 years, with a mean age of 47.2 years. At baseline, patients exhibited varying degrees of periodontal disease, characterized by gingival recession and pocket depths ranging from 3 to 6 mm. Dental plaque and calculus were prevalent due to inadequate oral hygiene (Table 1).

Table 1. Initial periodontal measurements.

Parameter	Mean (SD)	Range
Gingival Recession (mm)	2.5 (0.8)	1 - 4
Pocket Depths (mm)	4.5 (1.1)	3 - 6
Plaque Index (PI)	2.8 (0.5)	2 - 3.5
Tooth Mobility (Grade)	1.8 (0.6)	1 - 2

The baseline periodontal examination revealed varying levels of periodontal disease among the participants. On average, gingival recession was 2.5 mm with a standard deviation of 0.8 mm, ranging from 1mm to 4 mm across patients. Probing pocket depths averaged 4.5 mm with a standard deviation of 1.1 mm, falling within the 3 mm to 6 mm range as per the inclusion criteria. Dental plaque accumulation was prevalent, evidenced by a mean plaque index of 2.8 according to standard plaque

scoring. This highlights inadequate oral hygiene practices before treatment instructions. Tooth mobility also varied, averaging a grade of 1.8 on the mobility scale with a standard deviation of 0.6 mm.

Pre-treatment orthopantomograms revealed various osseous defects and generalized bone loss consistent with periodontitis. These findings were crucial in planning the periodontal treatment phase. Following the initial periodontal treatment phase, significant improvements were observed in the periodontal parameters (Table 2).

Table 2. Periodontal status before and after periodontal treatment.

Parameter	Pre-Treatment Mean (SD)	Post-Treatment Mean (SD)	p-valu
Gingival Recession (mm)	2.5 (0.8)	2.0 (0.5)	<0.05
Pocket Depths (mm)	4.5 (1.1)	3.2 (0.7)	<0.01
Plaque Index	2.8 (0.5)	1.5 (0.4)	<0.001
Tooth Mobility (Grade)	1.8 (0.6)	1.2 (0.4)	<0.05

The pre-treatment OPGs demonstrated various osseous defects and generalized bone loss characteristic of periodontitis. Post-periodontal treatment, significant improvements were seen across all clinical parameters, as detailed in Table 2. Gingival recession decreased from a pre-treatment mean of 2.5 mm to 2.0 mm, which was a statistically significant reduction ($p < 0.05$). Similarly, pocket depths improved considerably from an average of 4.5 mm to 3.2 mm ($p < 0.01$). Notably, plaque levels markedly reduced following oral hygiene instruction, declining from 2.8 to 1.5 as per the plaque index scoring ($p < 0.001$). Tooth mobility also diminished, with the grade improving from 1.8 to 1.2 on average ($p < 0.05$).

Fixed orthodontic appliances were applied, and intraoral photographs taken throughout the treatment process showed progressive improvement in tooth alignment and space closure. By the end of 12 months, significant alignment was noted, and by 18 months, all interdental spaces were closed (Table 3).

Table 3. Changes in orthodontic parameters.

Parameter	Pre - Treatment Mean (SD)	12-Month Mean (SD)	18-Month Mean (SD)	p-value
Interdental Space (mm)	1.8 (0.4)	0.8 (0.3)	0.0 (0.0)	<0.001
Alignment Score	4.6 (0.5)	2.3 (0.8)	0.5 (0.2)	<0.001
Contact Points	2.5 (0.7)	1.5 (0.5)	0.0 (0.0)	<0.001

At baseline, the mean interdental space measured 1.8 mm. By 12 months, this was reduced significantly to 0.8 mm on average. Impressively, all spaces were fully closed by 18 months, with a mean of 0 mm. Tooth alignment, as gauged by the alignment scoring index, also improved considerably. The pre-treatment mean of 4.6 mm showed most teeth were misaligned. This improved to 2.3 mm at 12 months, and by 18 months, nearly all teeth exhibited minor alignment at a mean of 0.5 mm. Similarly, contact points between teeth increased substantially with treatment duration. Initially scoring 2.5 mm, indicating intermittent contacts, this declined to 1.5 mm at 12 months and a 0 mm average at completion, suggesting fully restored contacts. The p-values indicate the statistical significance of the improvements observed in the orthodontic parameters over time. Throughout the orthodontic treatment, periodontal health was closely monitored (Table 4).

Table 4. Periodontal parameters at various stages of orthodontic treatment.

Parameter	Pre-Ortho Mean (SD)	12-Month Mean (SD)	18-Month Mean (SD)	p-value
Gingival Recession (mm)	2.0 (0.5)	2.0 (0.5)	2.0 (0.4)	>0.05
Pocket Depths (mm)	3.2 (0.7)	3.0 (0.5)	3.0 (0.4)	>0.05
Plaque Index	1.5(0.4)	1.2 (0.2)	1.1 (0.2)	<0.05
Tooth Mobility (Grade)	1.2 (0.4)	1.0 (0.2)	0.8 (0.2)	<0.05

Gingival recession and pocket depths remained stable throughout treatment, with no statistically significant differences between measurement periods ($p > 0.05$). A gradual yet statistically significant reduction in plaque index and tooth mobility was observed over time ($p < 0.05$). The plaque index declined from 1.5 at baseline to 1.1 by 18 months. Similarly, the mean tooth mobility grade decreased from 1.2 to 0.8.

At the end of the 18-month treatment period, patients were surveyed regarding their experience and satisfaction with the treatment. The feedback was overwhelmingly positive, highlighting significant improvements in oral health and psychosocial confidence (Table 5).

Table 5. Patients' feedback.

Feedback Parameter	Mean Score (SD) (1-5 scale)
Satisfaction with Treatment	4.8 (0.4)
Improvement in Oral Health	4.7 (0.5)
Improvement in Appearance	4.9 (0.3)
Psychosocial Confidence	4.6 (0.6)

A paired t-test showed a statistically significant reduction in pocket depths from pre-treatment (mean =4.5 mm, SD =1.1) to

post-periodontal treatment (mean =3.2 mm, SD =0.7), with p <0.01. The plaque index significantly decreased from pre-treatment (mean =2.8, SD =0.5) to post-periodontal treatment (mean =1.5, SD =0.4), with p <0.001. There was a significant reduction in tooth mobility from pre-treatment (mean grade =1.8, SD =0.6) to post-periodontal treatment (mean grade =1.2, SD =0.4), with p <0.05.

The reduction in interdental space from pre-treatment (mean =1.8 mm, SD =0.4) to 18 months post-treatment (mean =0.0 mm, SD =0.0) was statistically significant with p <0.001. Similarly, the improvement in alignment score from pre-treatment (mean =4.6, SD =1.2) to 18 months post-treatment (mean =0.5, SD =0.2) was significant with p <0.001. ANOVA showed no significant changes in gingival recession or pocket depths during the orthodontic treatment, indicating stable periodontal health. However, there was a significant improvement in the plaque index (p <0.05) and tooth mobility (p <0.05) over the treatment period.

Intraoral photographs taken at various stages of treatment visually corroborated the quantitative findings. Pre-treatment photographs showed noticeable spaces and periodontal issues. Mid-treatment photographs evidenced progressive alignment and space closure, while post-treatment photographs highlighted complete closure of spaces, improved dental contacts, and healthier periodontal conditions. OPGs taken at various stages confirmed the clinical improvements. Pre-treatment radiographs showed bone loss and osseous defects, while follow-up radiographs demonstrated stabilized or improved bone levels, supporting the clinical outcomes.

DISCUSSION

In recent years, the utilization of orthodontic treatments has increased considerably, particularly among adults presenting with periodontal compromise.[1,5,9] This trend reflects growing recognition that orthodontic therapy, when performed within physiological limits and preceded by adequate periodontal control, can contribute to improved oral function and aesthetics. Periodontal interventions such as scaling, surgical reduction of pocket depth, and correction of pathologic tooth migration reduce inflammation and improve plaque and calculus indices.[8,24] Given that bacterial biofilm is a primary factor in the onset and recurrence of periodontal inflammation, maintaining excellent oral hygiene and minimizing biofilm accumulation is crucial.[24] The improvements observed in the present study support this concept, as the initial periodontal phase resulted in reductions in pocket depths, plaque index, and tooth mobility, providing a biologically stable environment for orthodontic tooth movement. This approach is consistent with previous findings reporting an association between orthodontic therapy and reduced occurrence of periodontitis when inflammation is controlled.[14]

Orthodontic tooth movement in periodontally compromised patients differs biologically from movement in a healthy periodontium. In reduced but inflammation-free periodontal tissues, the application of light continuous forces promotes controlled bone remodeling while minimizing the risk of additional attachment loss. In such cases, the primary objective is stabilization rather than regeneration of periodontal structures.[22,25] This biological principle may explain why some periodontal parameters in the present study remained stable rather than showing further improvement during orthodontic treatment. The maintenance of gingival recession and pocket depth values suggests that orthodontic forces did not exacerbate pre-existing periodontal defects, whereas gradual reductions in plaque index and tooth mobility likely reflect improved oral hygiene and supportive periodontal care.[14,25] These findings indicate that periodontal stability, rather than substantial improvement, should be considered a successful therapeutic outcome in compromised dentitions. The integration of orthodontic treatment with periodontal therapy also contributes to reduction of traumatic occlusal forces and improved tooth positioning, facilitating plaque control and functional stability.[25] In the present study, improvements in alignment and space closure were accompanied by maintenance of periodontal health throughout treatment. These results highlight the importance of multidisciplinary management, where orthodontic movement is performed only after achieving periodontal stability. The gradual reduction in plaque index and mobility observed over time may also be attributed to frequent supportive periodontal maintenance and reinforcement of oral hygiene instructions, which ensured adherence to home care and minimized the risk of inflammation during active orthodontic therapy.

Previous reports have demonstrated successful outcomes of combined periodontal and orthodontic treatment in cases with severe bone loss and pathologic tooth migration, with long-term stability reported even after extended follow-up periods.[17] Although our findings demonstrated similar improvements over an 18-month period, long-term relapse remains a potential concern, particularly in patients with reduced periodontal support. Periodontally compromised teeth are more susceptible to relapse due to altered periodontal ligament and reduced bone support; therefore, prolonged retention and maintenance are essential. The relatively short follow-up period in this study limits conclusions regarding long-term stability.

Orthodontic treatment with fixed appliances may increase plaque retention and food accumulation, thereby increasing the risk of caries and gingival inflammation, particularly in patients with inadequate oral hygiene.[26] This highlights the importance

of patient motivation and continuous oral hygiene reinforcement. In the present study, structured oral hygiene education and regular periodontal monitoring were integral components of the treatment protocol and likely contributed to the maintenance of periodontal health throughout the study period.

Previous studies involving patients with pathological tooth movement treated with guided tissue regeneration followed by orthodontic therapy reported improvements in pocket depth and bone support.[15] Similarly, the current study employed a staged treatment approach beginning with periodontal stabilization, followed by orthodontic alignment, which resulted in improved dental positioning without deterioration of periodontal parameters. These findings support the concept that orthodontic treatment should be initiated only after adequate periodontal control.

Orthodontic treatment also influences patient quality of life (QoL) and psychosocial well-being. A cross-sectional study involving 898 patients reported improved quality of life following orthodontic treatment, with younger patients demonstrating greater improvement.[27]

Although the present study included patients aged 35 to 50 years, positive changes in appearance and psychosocial confidence were observed, suggesting that meaningful benefits can also be achieved in older adults. However, these subjective outcomes should be interpreted cautiously. Patient satisfaction scores may be influenced by expectations, treatment experience, and social desirability bias. Furthermore, validated psychological assessment tools were not utilized in this study, which represents a limitation. Future studies incorporating standardized QoL instruments would provide more reliable assessment of patient-reported outcomes.

The present findings should also be interpreted in the context of systemic health factors. The study population consisted of systemically healthy individuals; therefore, the results cannot be generalized to patients with systemic conditions such as diabetes mellitus, which is known to affect bone metabolism, periodontal healing, and orthodontic tooth movement.[2,23] Systemic diseases may alter tissue response and increase the risk of periodontal breakdown during orthodontic therapy.[1,7,10] Future investigations should evaluate outcomes in medically compromised populations to provide broader clinical guidance.

Although improvements in alignment, space closure, and periodontal stability were observed, some periodontal parameters remained unchanged rather than improving further. This outcome likely reflects the biological limitation of regenerative potential in compromised periodontal tissues. Once inflammation is controlled, orthodontic movement primarily redistributes forces and improves plaque control but does not necessarily restore lost attachment. Therefore, stability of periodontal parameters should be considered a positive therapeutic outcome.

Overall, the findings suggest that combined periodontal and orthodontic therapy may be effective for managing adult patients with spacing and reduced periodontal support when strict periodontal control is maintained. These results should be interpreted cautiously, and further well-designed studies are needed to clarify the long-term stability and broader applicability of this interdisciplinary approach.

CONCLUSION

Combined periodontal and orthodontic treatment demonstrated favorable improvements in periodontal parameters and tooth alignment in this small cohort of systemically healthy, periodontally compromised adult patients. Outcomes remained stable during the 18-month follow-up period. However, the absence of a control group, limited sample size, and relatively short follow-up duration restrict the generalizability of these findings. Further well-designed controlled studies with larger and more diverse populations are required to confirm long-term effectiveness and stability.

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AUTHOR CONTRIBUTIONS

AAA: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources and Writing - original draft. MAA: Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources and Writing. MSE: Software; Supervision; Validation; Visualization; Formal analysis and Writing the final manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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The authors received no funding from any organization for the submitted work.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available upon request from the corresponding author.

ETHICAL APPROVAL

This study followed the principles of the Helsinki Declaration. The Faculty of Dentistry/University of Benghazi's Research Ethics Committee approved the application (July 2024/ Reference Code: 0215).

CONSENT TO PARTICIPATE

Informed consent was obtained from all individual participants included in the study.

REFERENCES

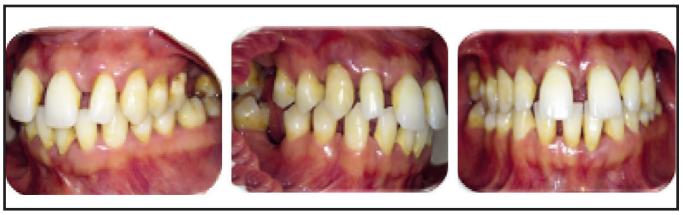
1. Oruba Z, Gibas-Stanek M, Pihut M, Cześnikiewicz-Guzik M, Stós W. Orthodontic treatment in patients with periodontitis - a narrative literature review. Aust Dent J. 2023;68(4):238-46. doi:10.1111/adj.12974.
2. Papapanou PN, Sanz M, Buduneli N, Dietrich T, Feres M, Fine DH, et al. Periodontitis: consensus report of workgroup 2 of the 2017 World Workshop on the classification of periodontal and peri-implant diseases and conditions. J Clin Periodontol. 2018;45(Suppl 20):S162–S170. doi:10.1002/JPER.17-0721.
3. Feldmann I. Satisfaction with orthodontic treatment outcome. Angle Orthod. 2014;84(4):581-7. doi:10.2319/093013-710.1.
4. Ristoska S, Dzipunova B, Stefanovska E, Rendzova V, Radojkova-Nikolovska V, Evrosimovska B. Orthodontic treatment of a periodontally affected adult patient (case report). Open Access Maced J Med Sci. 2019;7(14):2343-9. doi:10.3889/oamjms.2019.629.
5. Zhong W, Zhou C, Yin Y, Feng G, Zhao Z, Pan Y, et al. Expert consensus on orthodontic treatment of patients with periodontal disease. Int J Oral Sci. 2025;17:27. doi:10.1038/s41368-025-00356-w
6. Cao T, Xu L, Shi J, Zhou Y. Combined orthodontic-periodontal treatment in periodontal patients with anteriorly displaced incisors. Am J Orthod Dentofacial Orthop. 2015;148(5):805-13. doi:10.1016/j.ajodo.2015.05.026.
7. Rath-Deschner B, Nogueira AVB, Beisel-Memmert S, Nokhbehsaim M, Eick S, Cirelli JA, et al. Interaction of periodontitis and orthodontic tooth movement—an in vitro and in vivo study. Clin Oral Investig. 2022;26:171-81. doi:10.1007/s00784-021-03988-4.
8. Papageorgiou SN, Antonoglou GN, Michelogiannakis D, Kakali L, Eliades T, Madianos P. Effect of periodontal-orthodontic treatment of teeth with pathological tooth flaring, drifting, and elongation in patients with severe periodontitis: a systematic review with meta-analysis. J Clin Periodontol. 2022;49(S24):102-20. doi:10.1111/jcpe.13529.
9. Erbe C, Heger S, Kasaj A, Berres M, Wehrbein H. Orthodontic treatment in periodontally compromised patients: a systematic review. Clin Oral Investig. 2023;27(1):79-89. doi:10.1007/s00784-022-04822-1.
10. Fleming P, Andrews J. Periodontitis: orthodontic implications and management. Br Dent J. 2024;237:334-40. doi:10.1038/s41415-024-7789-6.
11. Mahasneh S, Goodwin M, Pretty I, Cunliffe J. The use of radiographs to assess the impact of the distance between the contact area and the crest of the bone to predict the presence or absence of interdental papilla: an in vivo study. Br Dent J. 2023;235:597-602. doi:10.1038/s41415-023-6184-z.
12. Ikbal A, Siddiqui ZR, Fatima T. Black triangle and vitiated esthetic vis-à-vis management: a review. The Traumaxilla. 2022;4(1-3):26-31. doi:10.1177/26323273221089285.
13. Valente NA, Pileri C, Floris L, Carrus N, Natto ZS, Clementini M. Clinical outcomes of periodontal regeneration using biologic agents alone or in combination with graft materials for intrabony defects: a systematic review and meta-analysis. J Dent. 2025;162:106080. doi:10.1016/j.jdent.2025.106080.
14. Sim HY, Kim HS, Jung DU, Lee H, Lee JW, Han K, et al. Association between orthodontic treatment and periodontal diseases: Results from a national survey. Angle Orthod. 2017;87(5):651-7. doi:10.2319/030317-162.1.
15. Ghezzi C, Masiero S, Silvestri M, Zanotti G, Rasperini G. Orthodontic treatment of periodontally involved teeth after tissue regeneration. Int J Periodont Resto Dent. 2008;28(6):559-67.
16. Kalina E, Grzebyta A, Zadurska M. Bone remodeling during orthodontic movement of lower incisors: narrative review. Int J Environ Res Public Health. 2022;19(22):15002. doi:10.3390/ijerph192215002.
17. Alfayez SS, Aldarrab RA, Alhazmi N, Alhazmi N, Alzahrani E, Abdelwahab N, et al. Long-term stability and periodontal health outcomes following orthodontic treatment in adult patients with pre-existing periodontal conditions: a systematic review and meta-analysis. Rev Diabet Stud. 2025;21(S6):835-49. doi:10.70082/mvamza40.
18. Cardaropoli D, Re S, Corrente G, Abundo R. Intrusion of migrated incisors with infrabony defects in adult

periodontal patients. Am J Orthod Dentofacial Orthop. 2001;120(6):671-5. doi:10.1067/mod.2001.119385.

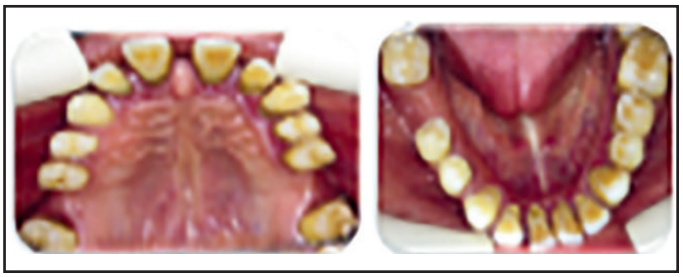
19. Mester A, Armencea G, Tent A, Sabau D, Onisor FG, Bran S. Gingival recession after combined orthodontic-orthognathic treatment: a systematic review of clinical studies with emphasis on mandibular incisors and adjunctive periodontal therapies. J Clin Med. 2026;15(5):1793. doi:10.3390/jcm15051793.
20. Melsen B, Agerbaek N, Eriksen J, Terp S. New attachment through periodontal treatment and orthodontic intrusion. Am J Orthod Dentofacial Orthop. 1988;94(2):104-16. doi: 10.1016/0889-5406(88)90358-7.
21. Saga AY, Maruo H, Argenta MA, Maruo IT, Tanaka OM. Orthodontic intrusion of maxillary incisors: a 3D finite element method study. Dent Press J Orthod. 2016;21(1):75-82. doi:10.1590/2177-6709.21.1.075-082.oar.
22. Li Y, Zhan Q, Bao M, Yi J, Li Y, et al. Biomechanical and biological responses of periodontium in orthodontic tooth movement: update in a new decade. Int J Oral Sci. 2021;13:20. doi:10.1038/s41368-021-00125-5.
23. Tonetti MS, Greenwell H, Kornman KS. Staging and grading of periodontitis: Framework and proposal of a new classification and case definition. J Clin Periodontol. 2018;89(S1):159-72. doi:10.1002/JPER.18-0006.
24. Sanz M, Herrera D, Kebschull M, Chapple ILC, Jepsen S, Berglundh T, et al. EFP Workshop Participants and Methodological Consultants. Treatment of stage I–III periodontitis—The EFP S3 level clinical practice guideline. J Clin Periodontol. 2020;47(Suppl 22):4–60. doi:10.1111/jcpe.13290.
25. Tu KW, Kuo CH, Hung CC, Yan DY, Mau JLP. Strategic sequencing of orthodontic treatment and periodontal regenerative surgery: a literature review. J Dent Sci. 2025;20(3):1391-7. doi:10.1016/j.jds.2025.03.010.
26. Dipalma G, Inchingolo AD, Fiore A, Balestriere L, Nardelli P, Casamassima L, et al. The differential impact of clear aligners and fixed orthodontic appliances on periodontal health: a systematic review. Children (Basel). 2025;12(2):138. doi:10.3390/children12020138.
27. Paes Da Silva S, Pitchika V, Baumert U, Wehrbein H, Schwestka-Polly R, Drescher D, et al. Oral health-related quality of life in orthodontics: a cross-sectional multicentre study on patients in orthodontic treatment. Eur J Orthod. 2020;42(3):270-80. doi:10.1093/ejo/cjz064.

APPENDICES

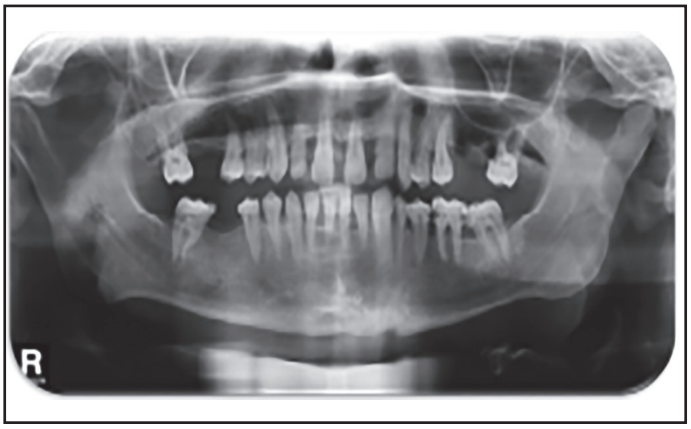
Case history: A. 47-year-old man presented with chief complaints of noticeable spaces between his teeth, gum bleeding, and tooth mobility particularly in the frontal area. His medical history did not reveal any significant past illnesses or conditions [Refer to Figures A through G].



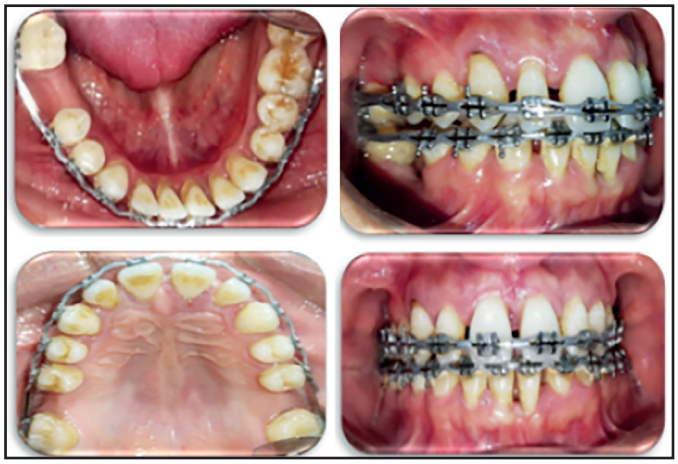
B. Pre-treatment intraoral photographs, spaces in upper and lower teeth. The periodontal condition was found to be characterized by gingival recession and pocket depths ranging from 3 to 6 mm in different regions. There was a widespread presence of dental plaque and calculus, attributed to inadequate oral hygiene practices.



C. Pre-treatment, an orthopantomogram was taken to assess the periodontal status and identify any osseous defects, marking the commencement of periodontal treatment.

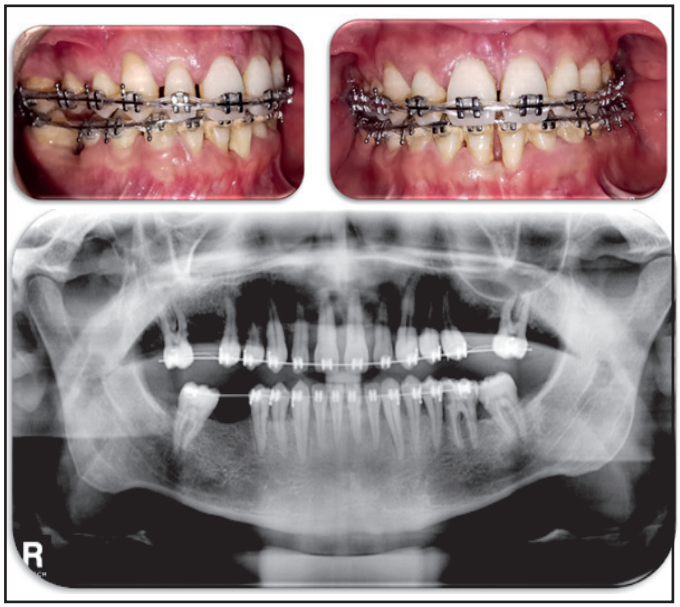


D. Throughout the treatment process, intraoral photographs were taken to monitor progress. Periodontal treatment involved the removal of dental calculus, scaling, and root planing. Fixed orthodontic appliances were applied to both the upper and lower teeth, exerting gentle forces to gradually align and level them while closely monitoring the periodontal status.



E. During treatment, intraoral photographs were taken to monitor the dental status. By the end of 12 months of orthodontic therapy, there was a significant improvement in the overall oral situation. The patient received instructions on maintaining proper oral hygiene practices at home.

F. During treatment orthopantomogram; improvement of the overall oral condition.



G. During the treatment, intraoral photographs were taken, revealing closure of spaces, establishment of good contacts, and improvement in periodontal health after 18 months. This led to enhanced psychosocial confidence.

CITATION

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