Universidad Europea

GRADUATION PROJECT

Degree in Dentistry

ORTHODONTIC TREATMENT IN PERIODONTAL PATIENTS: IS IT INDICATED?

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RESUMEN

Introducción: La periodontitis es una enfermedad inflamatoria crónica que provoca la destrucción progresiva de los tejidos de soporte dental. En los últimos años, la demanda de tratamiento ortodóncico en pacientes adultos con antecedentes de enfermedad periodontal ha aumentado considerablemente. Sin embargo, la indicación y seguridad del movimiento dentario ortodóncico en pacientes con soporte periodontal reducido siguen siendo motivo de debate; **Objetivo:** Evaluar si el tratamiento ortodóncico está indicado en pacientes con periodontitis tratada y estabilizada, y analizar sus efectos sobre los parámetros clínicos periodontales; **Materiales y métodos:** Se realizó una revisión sistematizada de la literatura siguiendo una metodología basada en el modelo PICO. Se realizaron búsquedas en las bases de datos PubMed y Cochrane para identificar estudios clínicos que evaluaran el tratamiento ortodóncico en pacientes con periodontitis tratada o estabilizada. Se seleccionaron ocho estudios que cumplían los criterios de inclusión predefinidos. Las variables periodontales analizadas incluyeron el nivel de inserción clínica, la profundidad de sondaje, el nivel óseo radiográfico y la recesión gingival; **Resultados:** Los estudios incluidos comprendieron ensayos clínicos aleatorizados, estudios prospectivos, cohortes retrospectivas y estudios observacionales. La mayoría de las investigaciones reportaron mejoras o mantenimiento estable de los parámetros periodontales tras el tratamiento interdisciplinar periodontal-ortodóncico. Ningún estudio reportó deterioro periodontal progresivo atribuible al movimiento ortodóncico cuando la inflamación periodontal había sido previamente controlada; **Conclusiones:** El tratamiento ortodóncico no está contraindicado en pacientes con periodontitis tratada, siempre que la inflamación periodontal esté controlada y se mantenga una terapia periodontal de soporte durante el tratamiento. La colaboración interdisciplinar entre periodoncistas y ortodoncistas es fundamental para garantizar movimientos dentarios seguros y estabilidad periodontal a largo plazo.

PALABRAS CLAVE

Odontología, Periodontitis, Tratamiento ortodóncico, Nivel de inserción clínica, Profundidad de sondaje.

ABSTRACT

Background: Periodontitis is a chronic inflammatory disease leading to progressive destruction of the dental supporting structures. In recent years, the demand for orthodontic treatment among adult patients with a history of periodontal disease has increased significantly. However, the indication and safety of orthodontic tooth movement in patients with reduced periodontal support remain controversial ; **Objective:** The aim of this study was to evaluate whether orthodontic treatment is indicated in patients with treated and stabilized periodontitis and to analyze its effects on periodontal clinical outcomes ; **Material and Methods:** A systematized literature review was conducted following a PICO-based methodology. Electronic databases PubMed and Cochrane were searched to identify clinical studies evaluating orthodontic treatment in patients with treated or stabilized periodontitis. Eight studies meeting the predefined inclusion criteria were selected. Periodontal outcomes analyzed included clinical attachment level, probing pocket depth, radiographic bone level, and gingival recession ; **Results:** The included studies comprised randomized clinical trials, prospective studies, retrospective cohorts, and observational studies. Most investigations reported improvements or stable maintenance of periodontal parameters following interdisciplinary periodontal-orthodontic treatment. No study reported progressive periodontal deterioration attributable to orthodontic movement when periodontal inflammation had been previously controlled ; **Conclusions:** Orthodontic treatment is not contraindicated in patients with treated periodontitis, provided that periodontal inflammation is controlled and supportive periodontal therapy is maintained throughout treatment. Interdisciplinary collaboration between periodontists and orthodontists is essential to ensure safe tooth movement and long-term periodontal stability**.**

KEYWORDS

Dentistry, Periodontitis, Orthodontic treatment, Clinical attachment level, Probing pocket depth.

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 General background 1

1.2 Relationship between orthodontics and periodontics 2

1.3 Evolution of Concepts and Techniques 3

2 OBJECTIVE 5

2.1 Main Objective 5

2.2 Secondary Objectives 5

3 MATERIALS AND METHODS 5

3.1 Type of study 5

3.2 Research question (PICO) 5

3.3 Search strategy 6

3.4 Eligibility criteria 6
3.4.1 Inclusion criteria 6
3.4.2 Exclusion criteria 7

3.5 Screening and selection process 7

3.6 Data extraction 8
3.6.1 Quality assessment 8

3.7 Ethical considerations 8

4 RESULTS 10

4.1 Study selection 10

4.2 Characteristics of the included studies 10

4.3 Data extraction and summary of included studies 10
4.3.1 Clinical Attachment Level (CAL) 11
4.3.2 Probing Pocket Depth (PPD) 12
4.3.3 Alveolar bone level 14
4.3.4 Gingival recession 15

4.4 Global data extraction table 16

5 DISCUSSION 18

5.1 Interpretation of the main findings and answer to the research question 18

5.2 Comparison with existing literature 18

5.3 Biological explanation of orthodontic tooth movement in a reduced periodontium 19

5.4 Potential benefits of orthodontic treatment in periodontal patients 20

5.5 Clinical considerations for orthodontic treatment in periodontal patients 21

5.6 Limitations of the available evidence 22

5.7 Future research perspectives 22

5.8 Final clinical statement 22

6 CONCLUSIONS 23

7 SUSTAINABILITY 24

8 REFERENCES 25

1 INTRODUCTION

1.1 General background

Periodontal disease is one of the most common chronic inflammatory conditions of the oral cavity. Basically it gradually damages the supporting structures of the teeth, including the periodontal ligament and alveolar bone, which can lead to attachment loss, tooth mobility, and eventually tooth loss if not properly managed (1).

Keeping the periodontium healthy is important to keep chewing function and esthetics throughout life (2). The prevalence of periodontitis have been associated with increased plaque accumulation, age and poor plaque control, and its consequences are not only local. Several studies have shown important links between periodontitis and systemic diseases such as diabetes and cardiovascular disorders. This association reinforces the importance of early diagnosis, prevention and regular maintenance (3).

Severe forms of periodontitis are frequently associated with pathological tooth migration, flaring, drifting and extrusion, which negatively affect both function and esthetics and complicate long-term prognosis. (4)

In the last few years, more adults have been asking for orthodontic treatment. The principal motivation is often esthetic but, many patients also seek to improve chewing efficiency and long-term stability (5)

The growing demand for adult orthodontics has increased the need for interdisciplinary management, especially in patients presenting with reduced periodontal support. (6)

A considerable proportion of these adults have a history of periodontal problems or residual bone loss, which means the treatment plan must be adapted more carefully. In these situations, tooth movement has to stay within the biological limits of a reduced but healthy periodontium (7).

The success really depends on an accurate diagnosis, clear goals, and good communication between the orthodontist and the periodontist (8).

Orthodontic treatment can also provide advantages to patients with a history of periodontitis, on condition that the periodontium is stable before tooth movement begins (1). Better tooth alignment generally reduces areas of plaque retention, which helps and improves the effectiveness of daily oral hygiene, therefore preventing further periodontal deterioration (3). Several reviews have reported that, when inflammation is controlled and maintenance is

adequate, orthodontic therapy does not necessarily worsen periodontal parameters and may even contribute to improved plaque control. (9)

In addition, orthodontic treatment contributes to long-term occlusal stability, which is necessary for keeping periodontal health over time (2).

Clinical evidence suggests that in selected chronic periodontitis patients, adjunctive orthodontic treatment combined with periodontal therapy may lead to additional improvements in probing depth and inflammatory parameters compared with periodontal therapy alone. (10)

Clinical studies have shown that once inflammation is under control and with regular maintenance, tooth movement performed with gentle forces does not represent a risk, even in people with previous periodontal problems (11–13).

Transient increases in probing depth and bleeding on probing may occur during active orthodontic treatment, followed by a partial normalization after appliance removal, which underlines the importance of continuous periodontal supervision throughout therapy. (14)

However, fixed orthodontic appliances can temporarily increase plaque accumulation and gingival inflammation if oral hygiene is insufficient, although these changes are often reversible after appliance removal. (15)

1.2 Relationship between orthodontics and periodontics

During orthodontic treatment, it is the response of the periodontal tissues that influences tooth movement (16). The biological basis of orthodontic tooth movement relies on a controlled inflammatory cascade within the periodontal ligament. When an orthodontic force is applied to a tooth, mechanical stress is transmitted through the periodontal ligament fibers to the surrounding alveolar bone. On the compression side, increased pressure stimulates the differentiation of osteoclasts, which resorb the alveolar bone and allow the tooth to move. On the tension side, the stretching of periodontal ligament fibers activates osteoblasts, which deposit new bone and consolidate the new tooth position. This coupled resorption-apposition process is the fundamental mechanism underlying all orthodontic tooth movement. (16)

In patients with a reduced periodontium, this biological process is not abolished but is altered by the reduced volume of supporting tissues. The remaining periodontal ligament retains its capacity for bone remodeling provided that it is free of active inflammation. However, the reduced height of the alveolar bone shifts the center of resistance of the tooth apically. This displacement has important biomechanical consequences: forces that would produce controlled tipping or bodily movement in a healthy periodontium may generate uncontrolled movements, excessive tipping, or root torque in a patient with significant bone loss. For this reason, lighter

and more precisely controlled forces are recommended when treating periodontally compromised patients. (16,17)

Furthermore, the quality of the periodontal tissues, including gingival phenotype, remaining bone architecture, and the presence or absence of infrabony defects, influences both the response to orthodontic forces and the risk of iatrogenic damage such as dehiscences, fenestrations, or gingival recession. These considerations underline the importance of a thorough periodontal assessment before initiating any orthodontic treatment in patients with a history of periodontitis. (17,18)

When these tissues are healthy and free of inflammation, the application of light and well-controlled forces can stimulate bone remodeling without compromising the remaining support (1). Even in patients who have already experienced attachment loss, tooth movement is still possible if the inflammation is controlled (3).

Evidence from clinical studies indicates that a reduced but inflammation-free periodontium can tolerate orthodontic movement without significant additional attachment loss. (4)

However, starting orthodontic treatment while inflammation persists, or applying excessive forces, can accelerate tissue breakdown and lead to attachment or bone loss, and sometimes root resorption (1,12,18). It is therefore essential to first control inflammation using periodontal treatment, then to follow up to ensure stable long-term results (1).

Both simultaneous and delayed orthodontic approaches following cause-related periodontal therapy have been associated with improvements in clinical attachment levels and reductions in periodontal pocket depth when adequate infection control and supportive care are maintained. (19)

The literature consistently emphasizes that orthodontic therapy should only be initiated after adequate periodontal stabilization and under strict supportive periodontal care. (9)

The best results are seen when orthodontists and periodontists work together to adapt the biomechanics and treatment goals to each individual case. This collaboration means focusing more on periodontal access and stability than on purely esthetic alignment (5).

Interdisciplinary planning allows clinicians to adapt force magnitude, treatment duration and retention protocols to the periodontal prognosis of each patient. (6)

1.3 Evolution of Concepts and Techniques

Over the last decades, orthodontics and periodontology have evolved a lot. Early approaches relied on strong, continuous forces, which were later found to be harmful to patients with reduced periodontal support (13,20,21). Modern treatment concepts use lighter, intermittent

forces and segmented mechanisms, which allow for safer and more predictable movement, even with a reduced periodontium (1,8).

The integration of periodontal variables such as gingival phenotype, residual bone support and attachment levels into orthodontic biomechanics has been emphasized as essential to minimize iatrogenic effects and to optimize long-term periodontal stability. (17)

Recent systematic evaluations suggest that orthodontic correction of pathologically migrated teeth may be associated with small improvements in clinical attachment level and marginal bone level, although the overall quality of evidence remains limited. (4)

The arrival of temporary anchorage devices (TADs) has also expanded treatment options by offering more anchorage control with fewer side effects (22).

Imaging techniques and regenerative procedures have improved diagnosis and outcomes as well (23).

Contemporary interdisciplinary protocols combine periodontal therapy, possible regenerative procedures, and controlled orthodontic forces to optimize both functional and periodontal outcomes. (10)

The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases introduced a complete staging and grading system to assess disease severity and progression risk. This system is particularly useful for orthodontists, because it helps adapt mechanics to each periodontal profile (23).

For exemple, patients with stabilized Stage I or II periodontitis can be treated with standard precautions, whereas those classified as Stage IV require a more conservative approach and strict follow-up (22). In certain cases, regenerative periodontal therapy may be recommended before or during orthodontic treatment, if infection control is achieved (12).

In patients with severe periodontitis and pathological tooth migration, combined periodontal–orthodontic treatment appears to offer functional and esthetic benefits without considerable adverse periodontal effects when inflammation is controlled. (4)

So overall, orthodontic treatment is not contraindicated in patients with treated periodontitis, but it requires good case selection and strict biological control (1).

Despite the increasing demand for orthodontic treatment in periodontally compromised patients, the indication and safety of such treatment remain debated. Current evidence is heterogeneous and sometimes contradictory, particularly regarding periodontal outcomes after orthodontic movement. Therefore, there is a need to critically analyse and synthesise the

available clinical evidence to better define the indications and limitations of orthodontic treatment in these patients.

2 OBJECTIVE

2.1 Main Objective

To review and summarize current scientific evidence about the indication and safety of orthodontic treatment in patients with a history of periodontitis.

2.2 Secondary Objectives

• To analyze periodontal outcomes obtained through controlled orthodontic tooth movement in reduced but healthy periodontium.

• To identify clinical recommendations for managing orthodontic treatment in patients with different stages of periodontal stability.

3 MATERIALS AND METHODS

3.1 Type of study

This work is a documentary research project structured as a systematized review of the literature, following the methodological guidelines of the Universidad Europea de Madrid for non-empirical research. No experimental procedures were performed.

3.2 Research question (PICO)

To structure the research question, the following PICO model was applied:

P :(Population): Adults with treated or stabilized periodontitis

I :(Intervention): Orthodontic tooth movement

C :(Comparison): No orthodontic treatment or delayed treatment

O :(Outcome): Periodontal stability, attachment level, bone level, and clinical safety

In patients with treated and stable periodontal disease, is orthodontic treatment indicated and beneficial compared with no orthodontic treatment in terms of periodontal outcomes ?

3.3 Search strategy

A structured research was conducted between October and December 2025 using the databases PubMed and Cochrane.

A combination of MeSH terms and free-text keywords was used :

Example of the main search string:

("orthodontal"[All Fields] OR "orthodontic"[All Fields] OR "orthodontical"[All Fields] OR "orthodontically"[All Fields] OR "orthodontics"[MeSH Terms] OR "orthodontics"[All Fields]) AND ("therapeutics"[MeSH Terms] OR "therapeutics"[All Fields] OR "treatments"[All Fields] OR "therapy"[MeSH Subheading] OR "therapy"[All Fields] OR "treatment"[All Fields] OR "treatment s"[All Fields]) AND ("periodontal"[All Fields] OR "periodontally"[All Fields] OR "periodontically"[All Fields] OR "periodontics"[MeSH Terms] OR "periodontics"[All Fields] OR "periodontic"[All Fields] OR "periodontitis"[MeSH Terms] OR "periodontitis"[All Fields] OR "periodontitides"[All Fields]) AND ("patient s"[All Fields] OR "patients"[MeSH Terms] OR "patients"[All Fields] OR "patient"[All Fields] OR "patients s"[All Fields])

Additional studies were identified through manual backward and forward citation screening of the selected articles.

During the identification phase, more than 4000 articles were collected across databases and reference lists.

3.4 Eligibility criteria

3.4.1 Inclusion criteria

To ensure methodological rigor and clinical relevance, the following criteria were applied:

- Adults with treated or stable periodontitis.
- Studies evaluating orthodontic treatment or orthodontic tooth movement in periodontally compromised patients.
- Studies analysing the interaction between orthodontics and periodontal status.
- Clinical or radiographic outcomes: CAL, PPD, bone levels, gingival,recession, periodontal stability.
- Primary evidence only:
    - Randomized clinical trials
    - Prospective cohort studies

    - Retrospective cohort studies
    - Observational studies
    - Cross-sectional clinical studies
- Articles published in English.
- Research involving human subjects.

3.4.2 Exclusion criteria

- Systematic reviews, meta-analyses, narrative reviews
- Clinical guidelines or expert consensus documents
- In vitro or animal studies
- Studies lacking orthodontic intervention
- Studies without periodontal data
- Studies focused exclusively on children
- Articles with insufficient methodological information or unavailable in full text.

3.5 Screening and selection process

The initial search using the predefined Boolean equation generated 4406 records. After applying filters for English language and free full-text availability, 1601 records remained. Additional filtering by study type (Randomized Controlled Trial, Clinical Trial, Clinical Study, Comparative Study, Controlled Clinical Trial, Evaluation Study, Observational Study, Case Reports) reduced the number to 493. Limiting the search to studies conducted in humans and involving adult participants resulted in 171 records.

These 171 titles were screened according to the eligibility criteria. Studies were excluded if they did not involve treated or stable periodontitis (n = 76), did not present a clear relationship between orthodontic tooth movement and periodontal outcomes (n = 31), lacked periodontal clinical outcome measures such as CAL, PPD, bone level, gingival recession, periodontal stability (n = 29), or did not align with the PICO question (n = 17). Studies were excluded due to insufficient methodological clarity or subjective evaluation methods (n = 3).

Following title screening, 15 studies were selected. After abstract evaluation, 8 studies met all inclusion criteria and were selected for full review and final inclusion in this systematized literature review. (Figure 1. PRISMA flow diagram of study selection.)

3.6 Data extraction

The following variables were extracted from each study:

- authors and year of publication
- study design
- sample characteristics and periodontal diagnosis
- description of orthodontic intervention and timing of tooth movement
- periodontal clinical outcomes reported (CAL, PPD, bone level, gingival recession, periodontal stability)
- radiographic or microbiological parameters when available
- duration of follow-up
- main findings and reported limitations

3.6.1 Quality assessment

The methodological quality of the included studies was evaluated based on four criteria. First, the clarity and confirmation of periodontal diagnosis and stability prior to orthodontic treatment was assessed, as this represents a fundamental prerequisite for safe orthodontic intervention in periodontally compromised patients. Second, the adequacy of the description of orthodontic mechanics and loading protocols was evaluated, since the type and magnitude of forces applied directly influence periodontal outcomes. Third, the appropriateness of the clinical outcome measures was considered, focusing on whether validated and reproducible parameters such as CAL, PPD, radiographic bone level, and gingival recession were used. Fourth, the duration and completeness of follow-up were assessed, as short follow-up periods may not capture late periodontal changes associated with orthodontic treatment.

These criteria were applied consistently across all eight included studies. No formal scoring system or risk of bias tool was used, as the heterogeneity of study designs among the included studies made standardized quality scoring difficult to apply. This represents a recognized limitation of systematized reviews compared with formal systematic reviews.

3.7 Ethical considerations

As this project is based exclusively on previously published literature and involved no human or animal experimentation, ethical approval was not required.

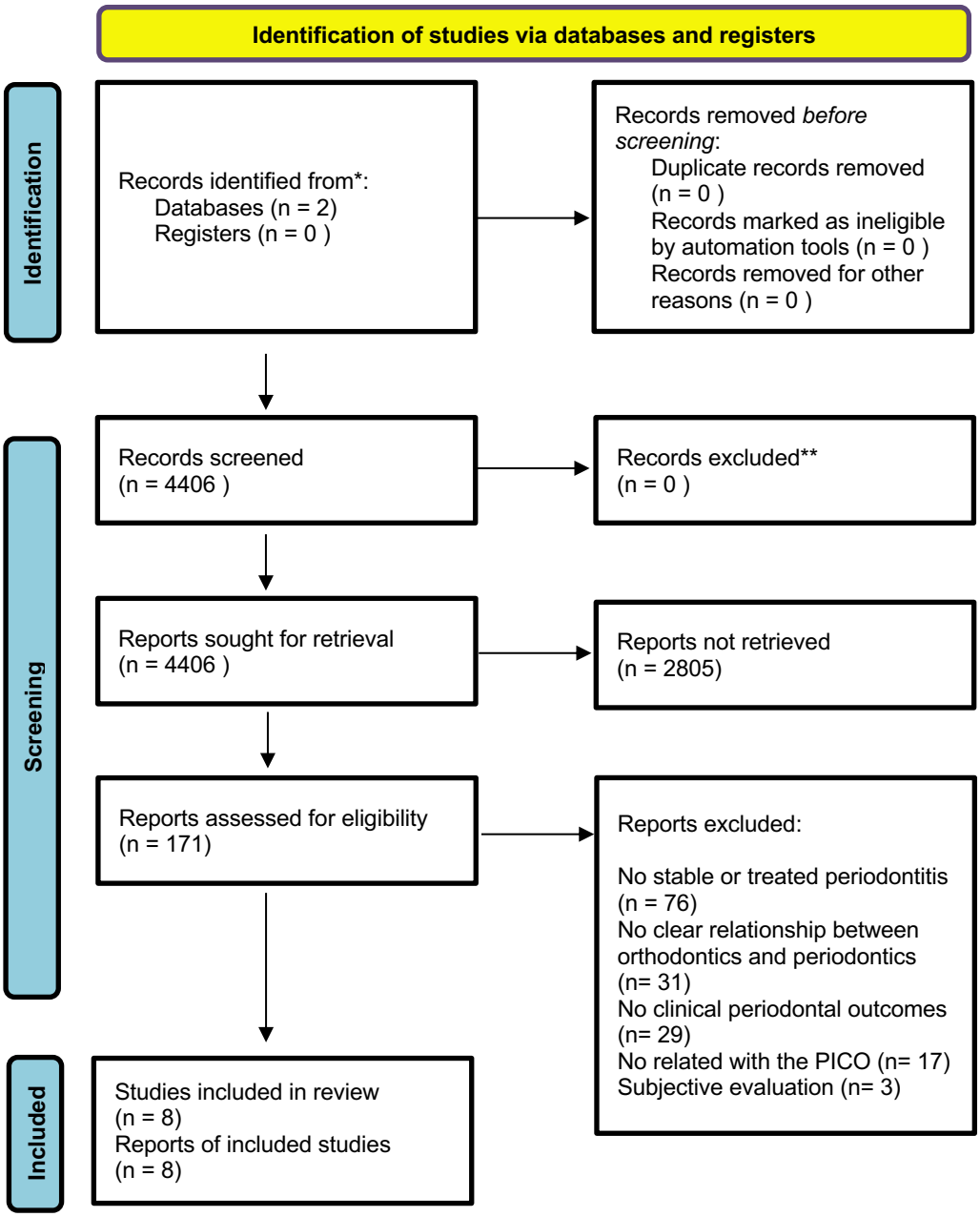


Figure 1. PRISMA flow diagram of study selection.

Source : *Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71*

4 RESULTS

4.1 Study selection

The literature search and study selection process led to the inclusion of eight clinical studies that fulfilled the predefined eligibility criteria. These studies evaluated the effects of orthodontic treatment (OT) in adults with treated or stable periodontitis and reported on periodontal clinical outcomes. The selection process is summarised in the PRISMA diagram (Figure 1).

4.2 Characteristics of the included studies

The eight included studies presented considerable diversity in terms of study design, sample size, clinical setting, and follow-up duration. Two studies were multicenter randomized clinical trials conducted in specialized periodontal and orthodontic centers in Europe, providing the highest level of primary evidence among the included studies. (19,24)

Two studies were retrospective cohort studies performed in a single private practice setting, evaluating outcomes over periods of up to ten years. (25,26) One study was a long-term retrospective investigation with a follow-up ranging between ten and fifteen years. (27) One study was a prospective clinical study reporting outcomes after twelve months of follow-up. (28) One study was a prospective longitudinal investigation evaluating periodontal parameters during and after fixed orthodontic appliance therapy. (14) Finally, one study was a cross-sectional investigation assessing the prevalence of gingival recession in patients with previous orthodontic treatment. (11)

Orthodontic appliances used across the studies included fixed multibracket systems, segmented arch mechanics, and intrusion arches. Periodontal treatment preceding orthodontic intervention included cause-related therapy, regenerative periodontal surgery with bone grafts or enamel matrix derivatives, and supportive periodontal maintenance.

4.3 Data extraction and summary of included studies

The data extracted from the eight included studies focused on the periodontal outcomes associated with orthodontic tooth movement in patients with treated or stabilized periodontitis. The variables analyzed were selected according to the predefined outcomes of the PICO framework and included clinical attachment level (CAL), probing pocket depth (PPD), alveolar bone level, and gingival recession.

Across the selected studies, orthodontic treatment was performed only after periodontal stabilization had been achieved through cause-related therapy or regenerative procedures.

The studies differed in terms of study design, orthodontic mechanics, and follow-up duration, which ranged from short-term evaluation after orthodontic appliance removal to long-term follow-up extending up to ten years.

Overall, the reported outcomes primarily focused on periodontal stability rather than periodontal regeneration alone. Several studies reported improvements in periodontal clinical parameters following interdisciplinary periodontal-orthodontic treatment, while others reported maintenance of previously achieved periodontal stability over time. Importantly, none of the included studies reported progressive periodontal deterioration directly attributed to orthodontic tooth movement when periodontal inflammation was previously controlled. The results are therefore presented according to the main periodontal clinical variables reported in the literature.

4.3.1 Clinical Attachment Level (CAL)

CAL was measured in 4 studies.

Study	Timing of measurement	Comparison	Main CAL result
Corrente et al., 2003(28)	12 months	Pre- vs post- OT	Mean CAL gain 5.50 mm
Zasčiurinskienė et al., 2010(19)	21-25 months	Early vs delayed OT	CAL gain 0.44 mm (test) / 0.38 mm (control)
Jepsen et al., 2021(24)	12 months	4 weeks vs 6 months OT	CAL gain (early OT) : 5.4mm (late OT) : 4.45mm
Dung et al., 2025 (27)	10-15 years	Pre- vs post-OT	CAL gain : 3.47mm

Table 1. Summary of CAL outcomes

Clinical attachment level (CAL) represents one of the most relevant indicators of periodontal stability and treatment success. Among the eight included studies, four evaluated changes in CAL associated with orthodontic treatment (OT) performed after periodontal stabilization.

The prospective clinical study (28) reported the greatest attachment improvement among the included studies. In this investigation, orthodontic intrusion of maxillary incisors into infrabony defects following periodontal therapy resulted in a mean CAL gain of approximately 5.50 mm after 12 months of treatment.

Similarly, the randomized clinical trial (24) assessed the effect of the timing of orthodontic therapy after regenerative periodontal surgery in patients with stage IV periodontitis. Both the

early orthodontic treatment group and the delayed orthodontic treatment group demonstrated substantial attachment gain after 12 months, with mean CAL improvements of approximately 5.4 mm and 4.45 mm respectively. No statistically significant difference between the two treatment timings was reported.

In contrast, the randomized clinical trial conducted (19) reported a more modest improvement in attachment levels. In this study, orthodontic treatment initiated either simultaneously with or after periodontal cause-related therapy resulted in small but measurable CAL gains of approximately 0.44 mm in the test group and 0.38 mm in the control group during the follow-up period of 21–25 months.

Long-term data were provided by the retrospective study (27), which evaluated immediate orthodontic treatment following regenerative therapy of periodontal intrabony defects. After a follow-up period ranging between 10 and 15 years, the study reported a mean CAL gain of approximately 3.47 mm, indicating stable attachment levels over extended observation.

Taken together, the studies evaluating clinical attachment level generally reported either measurable attachment gain or long-term maintenance of attachment levels following interdisciplinary periodontal-orthodontic treatment.

4.3.2 Probing Pocket Depth (PPD)

PPD was assessed in the eight included studies.

Study	Timing	Comparison	Main PPD result
Zasčiurinskienė et al., 2010(19)	21-25 months	Early vs delayed OT	~30% PD reduction, control showed greater healing of 4–6 mm pockets (30.4% vs 20.5%)
Jepsen et al., 2021(24)	12 months	Early vs late	PPD reduction of 4,2mm in early group, and 3,9mm in late group
Tietmann et al., 2021(25)	Up to 4 years	Post-regenerative OT	Mean PPD reduction of 2.9mm
Tietmann et al., 2023(26)	10 years	Combined therapy	Mean PPD reduction 2.91mm
Dung et al., 2025(27)	10-15 years	Immediate OT	PPD reduction : 3.94mm

Van Gastel et al., 2011(14)	Baseline, removal, 3 months post-OT	During vs after fixed appliances	PPD increased of ~1.7 mm during treatment and decreased of ~1 mm, 3 months after debonding
Corrente et al., 2003(28)	12 months	Surgical + OT	Mean PPD reduction 4.35 mm
Gül et al., 2025(11)	6 months post-treatment	Patient with gingival recession vs no recession	PPD : 1.80mm vs 1.79mm

Table 2. Summary of PPD outcomes

Probing pocket depth (PPD) was the most frequently reported periodontal parameter, being assessed in the eight included studies. This variable provides important information regarding periodontal inflammation and disease activity.

Several studies reported a reduction in probing pocket depth after orthodontic treatment in previously stabilized periodontal patients. The clinical study (28) demonstrated a mean PPD reduction of approximately 4.35 mm after 12 months of orthodontic intrusion into infrabony defects.

Comparable reductions were observed in the randomized clinical trial (24), where probing pocket depth decreased by approximately 4.2 mm in the early orthodontic treatment group and 3.9 mm in the delayed treatment group after 12 months.

Long-term retrospective cohort studies (25) further supported these findings. In the 4-year follow-up study, mean probing pocket depth reduction was approximately 2.9 mm following regenerative periodontal therapy combined with orthodontic treatment. Similar results were reported in the subsequent long-term analysis with a 10-year follow-up, where mean PPD reduction remained stable at approximately 2.91 mm.

The retrospective investigation (27) also demonstrated substantial improvement in periodontal pocket depth. Immediate orthodontic treatment after regenerative therapy resulted in a mean PPD reduction of approximately 3.94 mm during long-term follow-up.

However, not all studies reported improvements in PPD associated with orthodontic treatment. The prospective longitudinal study (14) evaluated periodontal parameters during active orthodontic treatment in patients with stable periodontal tissues. In this study, probing pocket depth increased during the period of fixed orthodontic appliance therapy but decreased after appliance removal. Nevertheless, the final values remained slightly higher than baseline measurements.

Finally, the cross-sectional study (11) reported mean probing depths of approximately 1.80 mm in patients presenting gingival recession and 1.79 mm in patients without recession, with no statistically significant difference between the groups.

Overall, the studies evaluating probing pocket depth demonstrated that orthodontic treatment performed after periodontal stabilization is generally associated with either reduction or maintenance of periodontal pocket depth values over time.

4.3.3 Alveolar bone level

Radiographic bone level was evaluated in four studies.

Study	Timing	Assessment method	Result
Corrente et al., 2003(28)	12 months	Radiographic vertical/ horizontal defect	Bone gain 1.35 ± 0.75 mm/ 1.40 ± 0.88 mm
Tietmann et al., 2021(25)	Up to 4 years	Radiographic bone level	Mean bone fill 4.7mm
Tietmann et al., 2023(26)	10 years	Radiographic follow-up	Mean bone gain : 4.48mm
Dung et al., 2025(27)	10-15 years	Radiographic	Bone gain : 3.89mm

Table 3. Summary of bone level outcomes

Radiographic assessment of alveolar bone levels was reported in four of the included studies. These studies focused primarily on patients presenting advanced periodontal destruction and infrabony defects treated through regenerative periodontal procedures prior to orthodontic intervention.

The clinical study (28) reported radiographic bone fill within infrabony defects following orthodontic intrusion. Radiographic analysis demonstrated a mean bone fill of approximately 1.35 ± 0.75 mm in the vertical defect dimension and 1.40 ± 0.88 mm in the horizontal dimension after 12 months.

The retrospective cohort study (25) reported more substantial radiographic bone improvements after regenerative therapy followed by orthodontic tooth movement. In the 4-year follow-up analysis, a mean bone fill of approximately 4.7 mm was observed.

Long-term evaluation in the subsequent 10-year follow-up study (26) showed that these radiographic improvements remained stable over time, with a mean bone gain of approximately 4.48 mm.

The long-term retrospective study (27) also reported radiographic bone regeneration following regenerative periodontal surgery and immediate orthodontic treatment. Mean radiographic bone gain of approximately 3.89 mm was observed after a follow-up period ranging between 10 and 15 years.

Across these studies, no radiographic evidence of additional bone loss attributable to orthodontic tooth movement was reported when orthodontic therapy was initiated after periodontal stabilization.

4.3.4 Gingival recession

Gingival recession was specifically evaluated in the cross-sectional study assessing periodontal health and orthodontic treatment.

Study	Timing	Outcome
Gül et al., 2025(11)	6 months post-treatment	37.5% patients with gingival recession mainly due to thin gingival phenotype, high bleeding on probing, and age

Table 4. Summary of gingival recession findings

Gingival recession was specifically investigated in one of the included studies. The cross-sectional study (11) evaluated the prevalence and potential determinants of gingival recession in patients who had previously undergone orthodontic treatment.

In this study, gingival recession was defined as exposure of the root surface greater than 1 mm measured from the cemento-enamel junction to the gingival margin. The authors reported that 37.5% of the patients presented at least one site with gingival recession during the post-orthodontic follow-up examination.

Statistical analysis indicated that gingival recession was significantly associated with a thin gingival phenotype, higher bleeding on probing values, and increasing age. In contrast, orthodontic treatment variables did not demonstrate a statistically significant association with gingival recession in this patient population.

Although this study does not provide longitudinal data on recession progression, its results suggest that gingival recession observed after orthodontic treatment may be more closely related to individual periodontal characteristics than to orthodontic tooth movement itself.

4.4 Global data extraction table

Reference	Study design	Sample	Periodontal status	Orthodontic intervention	Outcomes assessed	Follow-up	Main findings
Corrente et al., 2003(28)	Prospective clinical	N=10	Advanced periodontitis	Intrusion of maxillary incisors into infrabony defects	CAL, PPD, bone level	12 months	Significant CAL gain and PPD reduction, moderate radiographic bone gain
Zasčiurinskienė et al., 2010(19)	RCT	N=50	Plaque-induced Periodontitis	Periodontal therapy before or during OT	CAL, PPD, BOP	21-25 months	Little CAL gain, no intergroup difference, PPD reduction.
Jepsen et al., 2021(24)	Multicenter RCT	N=43	Stage IV periodontitis	Early vs late OT after regenerative surgery	CAL, PPD	12 months	Significant CAL gain and PPD reduction in both groups, no significant difference between early vs delayed timing
Tietmann et al., 2021(25)	Retrospective cohort	N=48	Stage IV periodontitis	OT 3 months post-surgery	PPD, bone level	4 years	Significant bone gain and PPD reduction with stable long-term outcomes
Tietmann et al., 2023(26)	Retrospective long-term	N=27	Stage IV	OT after regeneration	PPD, bone	10 years	Significant radiographic bone gain and PPD reduction with stable outcomes after 10 years
Dung et al., 2025(27)	Retrospective	N=9	Stage IV Grade III periodontitis	Immediate OT after regeneration of periodontal intrabony defects	CAL, PPD, bone	10-15 years	Significant CAL gain, PPD reduction, and radiographic bone fill with stable outcomes after long-term follow-up
Van Gastel et al., 2011(14)	Prospective longitudinal	N=24	Stable periodontium	Fixed appliances	PPD, BOP	3 months	Significant increase in PPD, BOP and microbial pathogenicity then reduced significantly but

							remained significantly higher than at the beginning
Gül et al., 2025(11)	Cross-sectional	N=96	Variable	Previous OT	Gingival recession, PD	6 months post treatment	Gingival recession associated with gingival phenotype, age and BOP; orthodontic variables showed no significant effect

Table 5 . Data extraction

5 DISCUSSION

5.1 Interpretation of the main findings and answer to the research question

The objective of this review was to evaluate whether orthodontic treatment is indicated and safe in patients with a history of periodontitis, provided that periodontal inflammation has been controlled prior to the initiation of tooth movement. The analysis of the eight included clinical studies provides evidence suggesting that orthodontic treatment can be performed safely in periodontally compromised patients when periodontal stability is achieved and maintained.

Across the included studies, orthodontic treatment did not result in significant deterioration of periodontal parameters such as clinical attachment level (CAL), probing pocket depth (PPD), or radiographic bone levels when periodontal therapy had been completed before orthodontic intervention. These findings suggest that orthodontic treatment itself does not constitute a risk factor for additional periodontal destruction when appropriate periodontal control is ensured.

These results are consistent with the randomized clinical trial evaluating orthodontic treatment initiated simultaneously or after periodontal therapy, which reported stable periodontal outcomes regardless of whether orthodontic treatment was started early or after a delayed healing period. (19) Similarly, clinical investigations evaluating orthodontic movement into infrabony defects demonstrated that orthodontic tooth movement can be performed without worsening periodontal conditions when appropriate periodontal therapy is provided beforehand (28).

Therefore, the results of this review support the concept that orthodontic treatment is not contraindicated in patients with treated and stabilized periodontitis. However, the indication for orthodontic treatment in periodontal patients should remain conditional and individualized, as the safety of orthodontic movement appears to depend primarily on the stability of the periodontal condition rather than the absence of previous periodontal destruction.

5.2 Comparison with existing literature

The findings of this review are consistent with previous systematic reviews and meta-analyses investigating the interaction between orthodontic treatment and periodontal health. A systematic review with meta-analysis concluded that orthodontic therapy does not significantly worsen periodontal clinical parameters in patients with treated periodontitis when appropriate periodontal care is maintained. (12)

Similarly, another systematic review evaluating orthodontic treatment in periodontally compromised patients reported that orthodontic therapy performed after periodontal

stabilization does not lead to significant attachment loss or periodontal deterioration. (21) These conclusions align with the results observed in the present review, where none of the included studies reported consistent evidence of progressive periodontal breakdown associated with orthodontic tooth movement.

Narrative reviews focusing on the interdisciplinary management of periodontal and orthodontic patients also emphasize that orthodontic treatment can be safely performed in patients with reduced periodontal support, provided that inflammation and infection are controlled. (3) In addition, interdisciplinary reviews highlight the importance of coordinated management between periodontists and orthodontists in order to ensure optimal treatment outcomes. (6)

Moreover, systematic reviews evaluating the correction of pathological tooth migration in patients with severe periodontitis suggest that combined periodontal and orthodontic treatment can improve both functional and esthetic outcomes without negatively affecting periodontal stability. (4) These findings further support the concept that orthodontic treatment may play a beneficial role in the rehabilitation of patients with advanced periodontal disease.

Overall, the consistency between the findings of the present review and the existing literature reinforces the conclusion that orthodontic treatment may be considered a safe and valuable component of interdisciplinary treatment in selected periodontal patients.

5.3 Biological explanation of orthodontic tooth movement in a reduced periodontium

The biological compatibility between orthodontic tooth movement and a reduced but stable periodontium can be explained by the mechanisms underlying orthodontic bone remodeling. Orthodontic tooth movement is mediated by a controlled inflammatory response within the periodontal ligament, which stimulates bone resorption on the compression side and bone formation on the tension side.

When periodontal tissues are free of active inflammation, this remodeling process remains physiologically regulated and does not lead to additional attachment loss. However, when orthodontic forces are applied in the presence of active periodontal inflammation, the inflammatory environment may be amplified, potentially increasing the risk of periodontal breakdown.

Experimental and clinical studies have demonstrated that orthodontic movement of teeth with reduced periodontal support can occur without additional tissue destruction if plaque control and periodontal stability are maintained. (3) In contrast, orthodontic movement in the presence of active infection may lead to worsening periodontal damage due to the interaction between mechanical stress and inflammatory mediators.

In addition, reduced periodontal support alters the biomechanics of tooth movement. Loss of alveolar bone shifts the center of resistance apically, increasing the risk of uncontrolled tipping if excessive orthodontic forces are applied. Consequently, light and carefully controlled forces are generally recommended when treating periodontally compromised patients. (16)

These biological and biomechanical considerations support the clinical observations reported in the included studies, where orthodontic treatment performed under controlled conditions did not result in significant periodontal deterioration.

The displacement of the center of resistance has direct clinical implications for treatment planning. In a tooth with normal bone support, the center of resistance is located approximately at one third of the root length from the alveolar crest. In a patient with significant horizontal bone loss, this point shifts apically, meaning that the same force applied at the bracket level will generate a greater tipping moment than in a patient with intact periodontal support. To compensate for this effect, clinicians must apply reduced force magnitudes, modify torque prescription, and use segmented mechanics or temporary anchorage devices to achieve controlled bodily movement. Failure to adapt the biomechanics to the periodontal status of the patient may result in uncontrolled tooth displacement, dehiscence of the buccal cortical plate, or worsening of pre-existing infrabony defects. (16,22,23)

5.4 Potential benefits of orthodontic treatment in periodontal patients

Although orthodontic treatment is primarily evaluated in terms of safety in periodontal patients, several studies suggest that it may also provide functional and esthetic benefits. One of the most common consequences of advanced periodontitis is pathological tooth migration, which may result in spacing, flaring, extrusion, and occlusal instability.

Orthodontic treatment can help correct these alterations, improving occlusal function and dental alignment. Systematic reviews investigating the correction of pathological tooth migration have reported improvements in periodontal parameters and esthetic outcomes following combined periodontal and orthodontic therapy. (4)

Furthermore, realignment of teeth may facilitate oral hygiene by reducing plaque-retentive areas and improving accessibility for periodontal maintenance. Clinical studies also suggest that orthodontic intrusion of teeth affected by infrabony defects may contribute to improvements in probing depth and attachment levels when performed in combination with periodontal therapy. (28)

However, it is important to emphasize that orthodontic treatment should not be considered a primary therapy for periodontitis. The improvements observed in periodontal parameters are

primarily related to periodontal therapy and infection control rather than orthodontic tooth movement itself.

5.5 Clinical considerations for orthodontic treatment in periodontal patients

Successful orthodontic treatment in periodontal patients requires careful case selection and interdisciplinary collaboration. Several clinical principles emerge from the studies analyzed and from the existing literature.

First, periodontal stability must be achieved before initiating orthodontic treatment. Active periodontal inflammation represents a contraindication to orthodontic tooth movement due to the increased risk of further attachment loss.

Second, orthodontic forces should be light and carefully controlled in order to minimize stress on the reduced periodontal support. Modified biomechanics, including segmented mechanics and appropriate torque control, may be necessary to prevent excessive loading of compromised teeth. (23)

Third, regular periodontal maintenance is essential throughout orthodontic treatment. Frequent professional cleaning and monitoring help maintain periodontal stability and prevent disease recurrence. (5)

Finally, long-term retention and periodontal follow-up are crucial for maintaining the stability of orthodontic results in patients with reduced periodontal support.

From a practical standpoint, several specific recommendations emerge from the literature regarding the clinical management of orthodontic treatment in periodontal patients. Periodontal maintenance appointments should be scheduled every two to three months during active orthodontic treatment, rather than the standard six-month interval recommended for healthy patients. This increased frequency allows early detection of inflammation recurrence and prevents the accumulation of subgingival plaque around fixed appliances. (5,8) Force levels should generally be kept below 25 to 30 grams for tipping movements and below 50 to 60 grams for bodily movement in patients with moderate to severe bone loss, although precise thresholds remain to be established by future research. (16) Following appliance removal, long-term fixed retention is strongly recommended in periodontally compromised patients, as the reduced periodontal support increases the risk of relapse and pathological tooth migration if retention is discontinued.(13,22)

5.6 Limitations of the available evidence

Despite the encouraging results observed in the included studies, several limitations must be acknowledged. First, the number of studies available on this topic remains relatively limited. Only eight studies met the inclusion criteria of this review, reflecting the scarcity of high-quality clinical research specifically addressing orthodontic treatment in stabilized periodontal patients. Second, significant heterogeneity exists among the included studies in terms of study design, sample size, periodontal severity, orthodontic mechanics, and follow-up duration. These differences make direct comparisons between studies difficult and may limit the generalizability of the findings.

Furthermore, many studies involve relatively small patient populations and are conducted in specialized clinical settings, which may not fully reflect routine clinical practice. Long-term randomized clinical trials evaluating orthodontic treatment in periodontal patients remain scarce.

5.7 Future research perspectives

Future research should aim to provide stronger evidence regarding the long-term safety and effectiveness of orthodontic treatment in periodontal patients. Larger randomized clinical trials with standardized orthodontic protocols and extended follow-up periods are needed to better evaluate periodontal stability over time.

Additionally, further investigation into the biological mechanisms underlying orthodontic movement in reduced periodontium may contribute to optimizing orthodontic biomechanics for periodontal patients.

5.8 Final clinical statement

Within the limitations of the available evidence, orthodontic treatment may be considered safe in patients with treated and stabilized periodontitis when appropriate periodontal therapy and maintenance are provided. Orthodontic treatment may therefore be indicated in selected periodontal patients, particularly for the correction of pathological tooth migration and the restoration of functional occlusion.

However, orthodontic treatment in periodontal patients should always be performed within an interdisciplinary framework involving both orthodontic and periodontal management in order to ensure long-term periodontal stability.

6 CONCLUSIONS

The aim of this systematized literature review was to evaluate whether orthodontic treatment is indicated and safe in patients with a history of periodontitis. Based on the analysis of the eight clinical studies included in this review, the following conclusions can be drawn:

1. Orthodontic treatment is not contraindicated in patients with treated and stabilized periodontitis. The available evidence demonstrates that orthodontic tooth movement can be performed safely in periodontally compromised patients without causing significant deterioration of clinical attachment level, probing pocket depth, or radiographic bone levels, provided that periodontal inflammation has been successfully controlled prior to initiating tooth movement.
2. Orthodontic treatment performed after periodontal stabilization is associated with either maintenance or improvement of periodontal clinical outcomes in patients with a reduced but healthy periodontium. Several included studies reported measurable gains in clinical attachment level ranging from approximately 0.4 mm to more than 5 mm, reductions in probing pocket depth ranging from approximately 2.9 mm to 4.35 mm, and radiographic bone fill in patients presenting infrabony defects treated with regenerative periodontal surgery prior to orthodontic intervention. Long-term follow-up data of up to fifteen years confirmed the stability of these outcomes over time.
3. Successful orthodontic treatment in periodontally compromised patients requires strict adherence to specific clinical recommendations adapted to the periodontal status of each patient. Periodontal stability must be confirmed before initiating tooth movement, light and carefully controlled forces must be applied throughout treatment, regular periodontal maintenance must be maintained at increased frequency during active orthodontic therapy, and long-term retention is essential following appliance removal to prevent relapse and pathological tooth migration.

7 SUSTAINABILITY

This study contributes to sustainability by addressing the social, economic, and environmental dimensions of healthcare in the context of orthodontic treatment in periodontal patients.

From a social perspective, periodontal disease is a highly prevalent chronic condition that can significantly affect quality of life, including oral function, aesthetics, and psychological well-being. The interdisciplinary management combining periodontal and orthodontic treatment may improve long-term oral health outcomes, reduce tooth loss, and enhance patient confidence and social integration. This approach aligns with Sustainable Development Goal 3 (Good Health and Well-being), which aims to ensure healthy lives and promote well-being for all at all ages.

From an economic perspective, early and well-planned orthodontic intervention in periodontally treated patients may reduce the need for more complex and costly treatments in the future, such as prosthetic rehabilitation or implant therapy. Preventing disease progression and maintaining natural dentition can decrease long-term healthcare costs for both patients and healthcare systems, contributing to more efficient and sustainable resource allocation.

From an environmental perspective, although orthodontic treatment itself has a limited direct environmental impact, clinical practice involves the use of materials, instruments, and energy. Promoting preventive and conservative approaches, such as maintaining periodontal stability and minimizing unnecessary treatments, can reduce material consumption and clinical waste. In addition, the integration of digital orthodontics and optimized treatment planning may contribute to reducing environmental impact in dental practice.

Finally, this study highlights the importance of sustainable clinical strategies, including:

prioritizing prevention and maintenance of periodontal health before orthodontic treatment,

ensuring interdisciplinary collaboration to optimize treatment outcomes,

promoting minimally invasive and biologically respectful approaches,

and encouraging patient education to support long-term oral health.

Overall, the findings of this review support a more sustainable model of dental care, focused on prevention, long-term stability, and efficient use of healthcare resources.

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