Diagnosis and Evidence-Based Treatment of Stage IV Periodontitis: Contemporary Clinical Treatment Guideline from the Framework of Updated Disease Classification

Evre IV Periodontitisin Tanısı ve Kanıta Dayalı Tedavisi: Yenilenen Periodontal Hastalık Sınıflandırması Çerçevesinden Güncel Klinik Tedavi Rehberi

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ABSTRACT

Periodontal diseases are chronic, non-communicable inflammatory diseases that occur due to interactions between microbial dental plaque and host response. In the field of periodontology, efforts have been made for many years to classify periodontal diseases and determine treatment approaches for these conditions. In particular, in the management of Stage IV periodontitis, where confounding factors prevail, data obtained from treatment guidelines are of great importance in determining the sequencing and timing of treatments that clinicians will apply. The aim of this review is to present scientific evidence and findings through clinical guidelines prepared for the treatment of periodontitis, especially for the treatment approach of Stage IV periodontitis patients, in the light of current literature.

Keywords: *Periodontal disease, periodontitis, diagnosis, treatment*

ÖZ

Periodontal hastalıklar mikrobiyal dental plak ve konak yanıtı arasındaki etkileşimlere bağlı olarak oluşan kronik ve bulaşıcı olmayan enflamatuvar hastalıklardır. Periodontoloji alanında uzun yıllardır periodontal hastalıkların sınıflandırılması ve bu periodontal hastalıkların tedavi yaklaşımını belirlemeye yönelik rehberler geliştirilmekte ve güncellenmektedir. Özellikle karıştırıcı faktörlerin hakim olduğu evre IV periodontitisin yönetiminde klinisyenlerin uygulayacakları tedavilerin sıralama ve zamanlaması konusunda tedavi rehberlerinden elde edilen veriler büyük önem arz etmektedir. Bu derlemenin amacı; güncel literatür ışığında periodontitisin tedavisi ve özellikle evre IV periodontitis hastalarının tedavi yaklaşımı için hazırlanan klinik rehberler üzerinden, bilimsel kanıt ve bulguların aktarılmasıdır.

Anahtar Kelimeler: *Periodontal hastalık, periodontitis, tanı, tedavi*

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INTRODUCTION

Periodontitis is recognized as one of the most prevalent chronic inflammatory non-communicable diseases in the population, characterized by the dysregulation of the host immune-inflammatory response due to the accumulation and dysbiosis of the microbial dental plaque biofilm at the gingival margin.[1–3] Beyond inducing inflammation and destruction in the periodontal tissues, periodontal diseases have the potential to exert detrimental effects on distant organs and tissues. To date, periodontal diseases have been associated with more than 50 systemic conditions,[4] including diabetes,[5] atherosclerotic cardiovascular disease,[6] and adverse pregnancy outcomes such as low birth weight and preterm birth.[7] Consequently, the treatment of existing periodontal disease has been proposed as an adjunctive therapeutic strategy in the management of certain systemic conditions.[8]

In the 2017 workshop, periodontal diseases were reclassified in accordance with the latest literature, replacing the previously used terms such as "Chronic Periodontitis" and "Aggressive Periodontitis"[9] with a staging and grading system for periodontitis.[10] This classification system remains in use in contemporary clinical practice. According to the classification, the presence of radiographically detectable marginal bone loss is a prerequisite for a preliminary diagnosis of periodontitis. Additionally, the clinical level of attachment loss is assessed. Patients exhibiting interdental attachment loss in at least two non-adjacent teeth, or buccal or oral attachment loss of ≥3 mm with probing pocket depths of ≥3 mm in at least two teeth, are given a preliminary diagnosis of periodontitis. Subsequently, for individuals with a preliminary diagnosis of periodontitis, it is necessary to investigate whether the observed clinical attachment loss is attributable to alternative etiologies, including traumatic gingival recession, endo-periodontal lesions, vertical root fractures, caries, restorations, or local factors associated with impacted third molars. If a patient with a preliminary diagnosis of periodontitis exhibits probing pocket depths of ≥4 mm in at least one site during periodontal examination, a definitive diagnosis of periodontitis is established. The staging and grading of periodontitis are determined based on comprehensive oral radiographic evaluation, periodontal records, and the history of tooth loss.[11]

The grading system provides insight into the biological characteristics of periodontitis, including its progression rate, anticipated response to treatment, and systemic health implications, while staging reflects the severity, complexity, and extent of the disease. The staging framework is broadly outlined as follows:

- Stage I: Patients with clinical attachment loss of 1–2 mm, bone loss confined to the coronal third of the root in at least one of two adjacent teeth, probing pocket depth of ≤4 mm, and no tooth loss due to periodontitis.
- Stage II: Patients with clinical attachment loss of 3–4 mm, bone loss extending to the coronal third of the root in at least one of two adjacent teeth, probing pocket depths of 4–5 mm, and no periodontitis-related tooth loss.
- Stage III: Patients with clinical attachment loss of ≥5 mm, bone loss extending to the middle third or beyond in more than two adjacent teeth, or periodontitis-related tooth loss of ≤4 teeth. Additionally, criteria from Stage II must be met, with probing pocket depths of ≥6 mm, vertical bone loss of ≥3 mm, or the presence of Class II or Class III furcation defects.

The distinction between Stage IV periodontitis and Stage III lies in the following criteria:

1. A reduction in the number of occluding teeth to fewer than 20 due to periodontitis-related tooth loss.
2. Presence of masticatory dysfunction.
3. Class II or more severe tooth mobility.
4. Severe alveolar bone defects characterized by bone loss extending beyond the middle third of the root (Figure 1).
5. Occlusal irregularities.[10,11]



Figure 1: Panoramic radiographic view of a patient diagnosed with stage IV periodontitis.

These distinguishing features inherent to Stage IV periodontitis contribute to the increased complexity of treatment, often necessitating a multidisciplinary approach. In 2020, the European Federation of Periodontology published a clinical practice guideline outlining treatment strategies for Stage I-III periodontitis.[12] Subsequently, in 2022, a clinical treatment guideline was introduced specifically for Stage IV periodontitis. This guideline aimed to provide guidance on multidisciplinary treatment approaches, enhance the overall quality of periodontal therapy, reduce periodontitis-related tooth loss, and consequently improve systemic health and quality of life.[13]

- *Clinical diagnosis of Stage IV periodontitis*

The differential diagnosis between Stage IV and Stage III periodontitis is primarily based on radiographic evidence of bone loss extending beyond the middle third of the root. The complexity of Stage IV periodontitis treatment arises from the presence of one or more of the following factors: tooth hypermobility associated with reduced periodontal attachment, secondary occlusal trauma, tooth migration and diastema formation due to severe attachment loss, periodontal-related loss of five or more teeth, posterior support loss, and "fan-shaped" (i.e., flared anterior teeth due to loss of periodontal support) anterior dentition divergence (Figure 2). These features collectively contribute to the loss of masticatory function and necessitate complex rehabilitative treatment.



Figure 2: Intraoral photographs of a patient diagnosed with Stage IV periodontitis prior to treatment.

Notably, some of these clinical manifestations such as malocclusion or dental caries can also be observed in patients with Stage I or II periodontitis, making an accurate differential diagnosis of Stage IV periodontitis of critical clinical importance.[13]

- *Definition of Clinical Case Types in Stage IV Periodontitis and the Importance of Individualized Approaches*

The concept of personalized medicine has gained significant importance in modern medicine and dentistry.[14] Personalized periodontology is an innovative approach that considers genetic predispositions, environmental influences, lifestyle factors, and individual behavioral differences. Thus, personalized periodontology can be defined as the integration of clinical decision-making and treatment strategies with the stratification of patients into distinct subgroups.[15] The influence of this patient-centered approach is also evident in contemporary classifications and treatment guidelines for periodontal diseases.

Within this framework, the clinical treatment guidelines for Stage IV periodontitis categorize patients into four distinct clinical case types:

- **Case type 1**: Patients presenting with tooth mobility due to secondary occlusal trauma, which can be managed without the need for tooth extraction.
- **Case type 2**: Patients exhibiting pathological tooth migration characterized by extrusion, tipping, and diastema formation, who are suitable candidates for orthodontic correction.
- **Case type 3**: Partially edentulous patients who can undergo prosthetic rehabilitation without requiring full-arch bridge restoration.
- **Case type 4**: Partially edentulous patients requiring full-arch bridge rehabilitation, who necessitate either tooth-supported or implant-supported treatment.

These case type classifications can coexist within the same patient. For instance, while the maxilla may correspond to Case type 4, the mandible of the same patient may align with Case type 2. Therefore, the treatment guidelines recommend that, prior to formulating a treatment plan for patients with Stage IV periodontitis, a comprehensive assessment should be conducted for each individual tooth. This evaluation should consider the number and distribution of remaining natural teeth, the residual alveolar bone support, periodontal sustainability, and the restorability of the dentition.[13]

- *Sequencing of Periodontitis Treatment*

In the treatment guidelines for Stage I-III periodontitis, periodontal therapy is structured into sequential stages.[4] These stages are outlined as follows:

- *Step 1:* Control of supragingival dental biofilm, oral hygiene education, and patient motivation, implementation of adjunctive therapies to reduce gingival inflammation, professional plaque removal, including supragingival plaque and calculus debridement, and management of risk factors (e.g., metabolic control of diabetes, smoking cessation).
- *Step 2:* Subgingival instrumentation, use of adjunctive physical or chemical agents, application of host modulation therapies (local or systemic), administration

of local subgingival antimicrobials, and systemic antimicrobial therapy when indicated. Following the second stage, a reassessment of the periodontal tissues is recommended to evaluate individual treatment response (periodontal re-evaluation). If the clinical treatment objectives—defined as the absence of periodontal pockets deeper than 4 mm with bleeding on probing or the absence of deep periodontal pockets ≥6 mm—are not achieved, progression to the third stage of treatment is advised. If the treatment objectives are met, patients should be transitioned into what was historically referred to as "periodontal maintenance therapy",[16,17] now termed "supportive periodontal therapy",[18] ensuring continued monitoring and care.

- *Step 3:* In cases where treatment objectives are not achieved, additional therapeutic interventions, either alone or in combination, are recommended. These may include re-instrumentation (repeat mechanical debridement), periodontal flap surgery, and either resective or regenerative surgical approaches.
- *Supportive Periodontal Therapy:* A personalized follow-up program should be established based on the patient's periodontal condition to maintain periodontal stability. The guidelines emphasize the necessity of appropriate diagnostic and treatment planning based on the patient's needs identified during follow-up visits. Additionally, oral hygiene maintenance and patient motivation should be reassessed as integral components of this phase.[12] Supportive periodontal therapy represents a key aspect of the contemporary patient-centered treatment philosophy, requiring lifelong, personalized strategies for periodontitis patients. In Stage IV periodontitis, this phase is even more pronounced, evolving from merely the final phase of therapy into a fundamental component of periodontal disease management.[12,13]

Periodontal health was redefined during the 2017 workshop. It is possible to achieve and maintain periodontal health not only in an intact periodontium but also in a reduced periodontium. While the clinical goal in gingivitis patients is to establish health in an intact periodontium, the primary objective of non-surgical periodontal therapy in periodontitis patients is to achieve health in a reduced periodontium, as the attachment loss observed in periodontitis is irreversible (Figure 3).[19] Individuals diagnosed with periodontitis remain classified as periodontitis patients for life, with an increased risk of disease recurrence. At this point, the importance of supportive periodontal therapy in maintaining periodontal stability becomes evident.[20,21] Researchers advocate for a lifelong, personalized approach to supportive periodontal therapy. Additionally, numerous clinical studies have demonstrated that supportive periodontal therapy sessions conducted at 3- to 6-month intervals significantly reduce periodontitis-related tooth loss.[22]



Figure 3: Intraoral view of a patient diagnosed with Stage IV periodontitis at the 6-month follow-up after non-surgical periodontal treatment.

Beyond the structured treatment stages outlined in contemporary guidelines, adjunctive therapeutic approaches, such as local and systemic drug applications, have been extensively investigated. Among these, local

or systemic antimicrobial agents and host modulation therapies are the most commonly employed interventions.[23–25] While antimicrobial therapy primarily targets periodontal pathogens within the periodontal pockets, specific approaches—such as sub-antimicrobial dose doxycycline—have been reported to modulate the host response effectively.[26] The clinical practice guideline for Stage I-III periodontitis restricts the use of systemic antimicrobials to young patients diagnosed with generalized Stage III periodontitis and reports low levels of evidence for local antimicrobial applications.[12]

Host modulation therapy has emerged as a strategy aimed at controlling the host response that drives periodontal destruction.[27] Although no definitive recommendations for host modulation therapy are provided in the Stage I-III treatment guidelines, recent systematic reviews have reported promising outcomes regarding the use of omega-3 fatty acids, low-dose aspirin, and probiotics.[28,29] However, further studies are required before these approaches can be routinely integrated into clinical practice.

- *Stage IV Periodontitis Treatment and Critical Timing*

In the treatment of Stage IV periodontitis, the therapeutic stages applied in Stage I-III cases serve as the foundation, with surgical and non-surgical periodontal interventions tailored to the specific needs of each case. While the overall treatment approach does not fundamentally differ from that of Stage I-III periodontitis, it is more complex due to the necessity of restoring masticatory function through the replacement of missing teeth and ensuring adequate stabilization for highly mobile teeth subjected to traumatic occlusal forces.[13]

The comprehensive management of these cases, following the elimination of the periodontal inflammatory process through non-surgical and/or surgical approaches, often requires orthodontic treatment to correct pathological tooth migration, as well as the rehabilitation of lost teeth using removable prostheses, tooth-supported fixed prostheses, and/or dental implants.[30] In summary, a significant aspect of Stage IV periodontitis treatment involves addressing masticatory dysfunction, which is more frequently observed in these patients compared to those with other stages of periodontitis.[31]

In patients with Stage IV periodontitis, the initial step includes establishing a comprehensive diagnosis and clinical evaluation, clearly informing the patient about their periodontal condition, and formulating an individualized treatment strategy. It is critical to emphasize to the patient that there is a significant risk of tooth loss if timely treatment is not initiated. Additional orthodontic, restorative, and prosthetic interventions tailored to the severity of Stage IV periodontitis and the patient's specific needs should be integrated into the treatment plan, either during active periodontal therapy or in subsequent phases.[13]

According to the Stage IV periodontitis treatment guidelines published in 2022, additional treatment options for these cases include:

- Temporary control of occlusal trauma
- Orthodontic treatment
- Rehabilitation of edentulous spaces
- Rehabilitation of unilateral or bilateral free-end edentulous areas
- Tooth-supported full-arch fixed prosthetic restorations
- Tooth-supported full-arch removable prosthetic restorations
- Implant-supported full-arch fixed prosthetic restorations
- Implant-supported full-arch removable prosthetic restorations[13]

Beyond functional impairments, Stage IV periodontitis also negatively impacts dental aesthetics.[32,33] The current clinical treatment guidelines for Stage IV periodontitis emphasize the significance of a multidisciplinary approach. Successful rehabilitation of both function and aesthetics is achievable through a comprehensive strategy incorporating periodontal therapy, orthodontics, and prosthetic dentistry.[34,35] For instance, when evaluating a tooth intended to serve as a fixed prosthetic abutment, it is necessary to assess not only the condition of the residual periodontium but also the mechanical strength of the tooth as a prosthetic abutment. However, this does not imply that teeth with reduced periodontal support cannot function as prosthetic abutments. Literature reports confirm the feasibility of using such teeth for prosthetic support, with their suitability being significantly influenced by the design of the prosthesis (fixed vs. removable).[31]

Additionally, orthodontic tooth movement following periodontal therapy may yield clinical benefits such as reduced probing pocket depth and gains in clinical attachment levels,[32] thereby enhancing the potential for periodontally affected teeth to serve as prosthetic abutments. Achieving long-term success necessitates meticulous treatment planning and a thorough evaluation of biomechanical factors.[34] In these complex cases, the management of occlusal discrepancies and tooth loss through fixed or removable prosthetic rehabilitation plays a crucial role.[35] In conclusion, prosthetic planning should be carried out with a careful evaluation of both periodontal and prosthetic factors, ensuring that the patient's expectations and preferences are taken into account.

CONCLUSION

Periodontal diseases represent a significant public health concern and impose a substantial economic

burden. In the treatment of periodontal diseases, patient-centered approaches are gaining increasing prominence. Current literature provides robust scientific evidence highlighting the interconnection between oral and systemic health and underscores the critical role of oral health in overall well-being. Although clinical expertise remains central in individualized patient assessments, treatment guidelines serve as essential resources that provide a structured framework for clinicians. In the management of Stage IV periodontitis, interdisciplinary collaboration and a multidisciplinary approach play a pivotal role in achieving clinical success.

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