ISSN: 3049-7361

Review Article

Journal of Clinical Surgery and Anesthesia

An Overview of Periodontitis Staging and Grading: Insights from the 2017 Classification

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Received: October 06, 2025; **Accepted:** October 10, 2025; **Published:** October 18, 2025

ABSTRACT
The classification of periodontal diseases has evolved to address the complexity, variability, and patient-specific nature of periodontitis. The 1999 system, though widely accepted, showed limitations in differentiating chronic from aggressive periodontitis, lacked integration of risk factors, and provided no framework for assessing disease progression or treatment complexity. To resolve these issues, the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions proposed a new staging and grading model. This approach drew inspiration from oncology models to incorporate disease severity, extent, complexity, and progression risk into a unified system. The 2017 classification categorizes periodontitis into four stages (I–IV) based on severity and complexity, and three grades (A-C) reflecting progression rates and risk factors such as smoking and diabetes. It eliminates the distinction between chronic and aggressive periodontitis, integrates systemic and environmental modifiers, and provides a patient centered framework for diagnosis and treatment. The revised classification enhances diagnostic accuracy, supports individualized care, and enables comparability in research. By standardizing assessment and incorporating systemic influences, the 2017 system represents a significant advancement in periodontal disease diagnosis, prognosis, and management

Keywords: Periodontitis, 2017 Classification, Staging, Grading, Periodontal Diagnosis, Periodontal Disease

Introduction

The 2017 world workshop on the classification of periodontal and peri-implant diseases and conditions introduced a modern, patient's cantered system to classify periodontitis. One of the key innovations was the introduction of staging and grading, much like how cancers are classified. This system provides a more accurate framework for diagnosis, prognosis, and treatment planning.

Over the year the classification of periodontitis evolved to better reflect the complexity and individuality of the disease. The most significant change came in 2017, when a new system was proposed by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP), replacing the earlier 1999 classification.

Types of Classification

The establishment of a classification scheme for periodontal and peri-implant diseases and conditions is regarded as essential by clinicians for ensuring accurate diagnosis and effective treatment of patients, and by scientists for facilitating the investigation of etiology, pathogenesis, natural history, and therapeutic approaches to these diseases and conditions [1].

1999 Classification of Periodontitis

Gingival Diseases

Plaque Induced Gingival Diseases

These are caused by bacterial plaque and include conditions like gingivitis. On-plaque-induced gingival lesion These are

Citation: Hemalatha DM, Nanditha Chandran, Vishnusripriya, Shahana Sherin, Shamna Sherin VK. An Overview of Periodontitis Staging and Grading: Insights from the 2017 Classification. J Clin Surg Anesth. 2025. 3(4): 1-6. DOI: doi.org/10.61440/JCSA.2025.v3.40

not directly related to plaque but can be caused by factors like systemic diseases, medications, or injuries.

Periodontitis

Chronic Periodontitis

A common form of periodontitis that develops gradually in adults, often due to plaque and calculus build-up.

Aggressive Periodontitis

Characterized by a rapid progression of tissue destruction and attachment loss, often occurring in younger individuals.

Periodontitis as a Manifestation of Systemic Diseases

Periodontitis that is exacerbated or influenced by underlying systemic conditions.

Necrotizing Periodontal Diseases

Severe and painful infections that involve tissue death and can affect both the gums and surrounding tissues.

Other Periodontal Conditions

Abscesses of the Periodontium

Localized collections of pus that can develop in the gum tissues or supporting bone.

Periodontitis Associated with Endodontic Lesions

Inflammation of the periodontium related to problems with the tooth's pulp or root canal.

Developmental or Acquired Deformities and Conditions

These include factors that can predispose individuals to periodontal disease, such as malocclusion or tooth-related factors.

2017 Classification of Periodontitis

The classification of periodontitis is divided into four stages based on severity, complexity, and extent/distribution [2].

Stage 1: periodontitis is characterized by an interdental clinical attachment loss (CAL) of 1-2 mm. Radiographic bone loss (RBL) is limited to the coronal third of the root and is less than 15%. There is no tooth loss due to periodontitis at this stage. The complexity is local, with a maximum probing depth of s4 mm and mostly horizontal bone loss [3].

Stage 2: periodontitis shows an interdental CAL of 3-4 mm, and RBL remains in the coronal third, ranging from 15% to 33%. No tooth loss due to periodontitis is present. Complexity increases slightly, with a maximum probing depth of s5 mm and mostly horizontal bone loss [4].

Stage 3: periodontitis has a CAL of 25 mm and RBL extending to the middle third of the root and beyond. Tooth loss due to periodontitis is limited to s4 teeth. In addition to stage 2 characteristics, complexity includes probing depths of 26 mm, vertical bone loss of 23 mm, furcation involvement of Class II or III, and moderate ridge defects [5].

Stage 4: periodontitis is also defined by a CAL of ≥5 mm and RBL extending to the middle third of the root and beyond. However, tooth loss due to periodontitis is 25 teeth. The complexity is more severe and includes all stage 3 features along with additional needs such as complex rehabilitation due to masticatory dysfunction, secondary occlusal trauma (tooth mobility of grade ≥2), severe ridge defects, bite collapse, tooth drifting or flaring, and having fewer than 20 remaining teeth (fewer than 10 opposing pairs) [6].

The extent and distribution of periodontitis in each stage can be described using descriptors such as "localized" (less than 30% of teeth involved), "generalized," or specific to certain teeth, such as *molar/incisor pattern."

	Periodontitis	Stage 1	Stage 2	Stage 3	Stage 4
Severity	Interdental CAL (at site of greatest loss)	1 - 2 mm	3 - 4 mm	≥5 mm	≥5 mm
	RBL	Coronal third (<15 %)	Coronal third (15%- 33%)	Extending to middle third of root and beyond	Extending to middle third of root and beyond
	Tooth loss (due to periodontitis)	No tooth loss		≤ 4 teeth	≥ 5 teeth
Complexity	Local	• Max probing depth ≤4 mm • Mostly horizontal bone loss	• Max probing depth ≤5mm • Most horizontal bone loss	In addition to stage 2 complexity: • Probing depths≥6mm • Vertical bone loss≥3mm • Furcation involvement class2 or 3 • Moderate ridge defects	In addition to stage3 complexity: • Need for Complex rehabilitation due to: • Masticatory dysfunction • Secondary occlusal trauma (tooth mobility degree ≥2) • Severe ridge defects • Bite collapse, drifting, flaring • <20 remaining teeth (10 opposing pairs)

Extent and distribution	Add to stage as descriptor	For each stage describe extent as: • Localized (<30% of teeth involved) • Generalized; or • Molar/incisor			

Limitations of Earlier Classification
The 1999 classification of periodontitis has several limitations. It struggled to clearly distinguish between chronic and aggressive periodontitis due to overlapping clinical features. It also lacked a standardised method to assessed disease progression and did not account for important risk factors like smoking and diabetes. Additionally, it provided little guidance on the complexity of treatment. Importantly it does not include peri-implant disease [7].

Here are the Main Limitations
Lack of Distinction Between Severity and Complexity
The 1999 classification grouped periodontitis mainly by disease type (chronic vs. aggressive), but it did not adequately address disease severity or treatment difficulty.

Unclear Distinction Between Chronic and Aggressive Periodontitis
Many clinical features overlapped, making it difficult to differentiate between the two, especially in advanced stages.

Did Not Account for Individual Risk Factors
Systemic factors (e.g., diabetes, smoking) were not integrated into disease classification, despite their major impact on disease progression.

Inadequate Recognition of Disease Progression
The classification was static and did not consider the rate of progression over time.

No Staging or Grading System
There was no framework to categorize periodontitis by severity (staging) or by risk/progression rate (grading), which is important for prognosis and treatment planning.

Limited Usefulness in Clinical Practice
Due to its complexity and overlap between disease types, the classification was often difficult to apply effectively in everyday clinical settings.

These limitations prompted the creation of the 2017 classification, which introduced a more comprehensive system using staging and grading, and removed the distinction between chronic and aggressive periodontitis.

Advantages of 2017 Classification
The 2017 classification of periodontitis brought significant improvements over the 1999 system. Here are the main advantages of the 2017 classification

Introduction of Staging and Grading
Staging reflects the severity of the disease and the extent of tissue loss.

Grading estimates the rate of disease progression, risk of future progression, and the impact of systemic factors like smoking or diabetes.

Elimination of Chronic and Aggressive Periodontitis Categories
These two categories often overlapped and were hard to distinguish.

The 2017 classification combines them into one entity: "Periodontitis", with differences addressed through staging and grading instead [8].

Personalized Treatment Planning
By considering complexity factors (such as bone loss pattern, tooth mobility, and bite issues), clinicians can create better, individualized treatment plans.

Acknowledges Systemic and Risk Factors
Systemic conditions (like diabetes) and lifestyle factors (like smoking) are integrated into grading, improving the understanding of how these factors influence the disease.

Improved Prognosis and Communication
The staging and grading system gives a clearer picture of current disease status and potential progression, which helps in:
Communicating with patients
Setting realistic treatment goals
Coordinating care with other health professionals

Better Research and Data Comparability
Standardized definitions improve the quality and comparability of clinical studies, leading to better evidence-based treatments. Overall, the 2017 classification is more clinically relevant, flexible, and scientifically grounded, helping dentists provide better care for patients with periodontitis.

Periodontits
Periodontitis is a chronic inflammatory disease of the supporting structures of the teeth, primarily caused by bacterial infection resulting in the progressive destruction of the periodontal ligament and alveolar bone, which may ultimately lead to tooth mobility and loss. It typically follows gingivitis, a reversible condition, and represents the more advanced, irreversible phase of periodontal disease.

Etiology
Primary Etiological Factor
Dental plaque biofilm a complex microbial community adhering to tooth surfaces.

Contributing Factors
Host response (genetic susceptibility, immune response)
Systemic conditions (e.g., diabetes mellitus, HIV)
Environmental factors (e.g., smoking, stress)
Local factors (e.g., poor restorations, crowding)

Pathogenesis
Initiated by the accumulation of plaque bacteria.
Bacterial products (toxins, enzymes) trigger a host immune-inflammatory response.
This response leads to the release of inflammatory mediators such as prostaglandins, interleukins, and matrix metalloproteinases. These mediators result in the breakdown of collagen fibers in the periodontal ligament and resorption of alveolar bone.

Clinical Features
Gingival inflammation
Periodontal pocket formation
Clinical attachment loss (CAL)
Bleeding on probing (BOP)
Tooth mobility
Alveolar bone loss (visible radiographically)
Possible tooth migration or pathologic tooth loss

Staging and Grading
Staging of periodontitis
staging of periodontitis aims to classify the severity and extent of a patient's disease based on measurable amounts of destroyed or damaged tissue caused by periodontitis, and to assess factors contributing to the complexity of long-term case management. The initial stage should be determined using clinical attachment loss (CAL); if CAL is unavailable, radiographic bone loss (RBL) should be used. Tooth loss due to periodontitis can modify the stage definition, and one or more complexity factors may also shift the stage to a higher level.

Stage I: periodontitis is characterized by an interdental CAL of 1–2 mm and radiographic bone loss in the coronal third of the root (<15%), with no tooth loss. The complexity is minimal, with a maximum probing depth of 4 mm and mostly horizontal bone loss.

Stage II: periodontitis shows an interdental CAL of 3–4 mm with RBL in the coronal third (15%–33%), still without tooth loss. The complexity factors include a maximum probing depth of 5 mm and mostly horizontal bone loss.

Stage III: periodontitis has an interdental CAL of ≥5 mm, with RBL extending to the middle third of the root and beyond, and tooth loss of up to 4 teeth due to periodontitis. Additional complexity includes probing depths of ≥6 mm, vertical bone loss of ≥3 mm, furcation involvement classified as Class II or III, and moderate ridge defects.

Stage IV: periodontitis also has an interdental CAL of ≥5 mm with RBL extending to the middle third of the root and beyond but involves the loss of 5 or more teeth due to periodontitis. Its complexity factors are more severe, including the need for complex rehabilitation because of masticatory dysfunction, secondary occlusal trauma (with tooth mobility degree ≥2), severe ridge defects, bite collapse, drifting, flaring, or having fewer than 20 remaining teeth (10 opposing pairs).

For each stage, the extent and distribution of periodontitis should be described with a descriptor indicating whether it is localized (affecting less than 30% of teeth involved), generalized, or presents a molar/incisor pattern.

	Periodontitis	Stage 1	Stage 2	Stage 3	Stage 4
Severity	Interdental CAL (at site of greatest loss)	1 - 2 mm	3 - 4 mm	≥5 mm	≥5 mm
	RBL	Coronal third (<15 %)	Coronal third (15%- 33%)	Extending to middle third of root and beyond	Extending to middle third of root and beyond
	Tooth loss (due to periodontitis)	No tooth loss		≤ 4 teeth	≥ 5 teeth
Complexity	Local	• Max probing depth ≤4 mm • Mostly horizontal bone loss	• Max probing depth ≤5mm • Most horizontal bone loss	In addition to stage 2 complexity: • Probing depths≥6mm • Vertical bone loss≥3mm • Furcation involvement class 2 or 3 • Moderate ridge defects	In addition to stage3 complexity: • Need for Complex rehabilitation due to: • Masticatory dysfunction • Secondary occlusal trauma (tooth mobility degree ≥2) • Severe ridge defects • Bite collapse, drifting, flaring • <20 remaining teeth (10 opposing pairs)

Extent and distribution	Add to stage as descriptor	For each stage describe extent as: • Localized (<30% of teeth involved) • Generalized; or • Molar/incisor			

Grading of Periodontitis

The grading of periodontitis is designed to indicate the rate of disease progression, the patient's responsiveness to standard therapy, and the potential impact on systemic health. Clinicians are advised to initially assume Grade B disease and then look for specific evidence to reclassify to Grade A or C if appropriate.

Grade A: represents a slow rate of progression, with radiographic bone loss or clinical attachment loss showing no progression over five years. The percentage of bone loss relative to the patient's age is less than 0.25. Clinically, these patients typically present with heavy biofilm deposits but only minimal tissue destruction. As for grade modifiers, these patients are non-smokers and either normoglycemic or without a diagnosis of diabetes.

Grade B: represents a moderate rate of progression, with radiographic bone loss or clinical attachment loss of less than 2 mm over five years. The bone loss-to-age ratio falls between 0.25 and 1.0.(14). The disease destruction is proportionate to the amount of biofilm present. Grade B patients typically smoke fewer than 10 cigarettes per day and have HbA1c levels of less than 7% if diabetic.

Grade C: represents a rapid rate of progression, characterized by radiographic bone loss or clinical attachment loss of 2 mm or more over five years. The percentage of bone loss relative to age exceeds 1.0. In these cases, destruction surpasses what would be expected given the amount of biofilm, and specific clinical patterns point to periods of rapid disease progression and/or early-onset periodontitis. Grade C patients may smoke 10 or more cigarettes per day, and if diabetic, their HbA1c is 7% or higher.

Conclusion

The 2017 classification of periodontitis represents a major advancement in the diagnostic

	Progression		**Grade A: Slow rate**	**Grade B: Moderate rate**	**Grade C: Rapid rate**
Primary Criteria	Direct evidence of progression	Radiographic bone loss or CAL	No loss over 5 years	< 2 mm over 5 years	≥2 mm over 5 years
Whenever available, Direct evidence should be used	Indirect evidence of progression	% bone loss / age	< 0.25	0.25 to 1	< 1.0
		Case phenotype	Heavy biofilm deposits with low level of destruction	Destruction commensurate with biofilm deposits	Destruction exceeds expectations given biofilm deposits; specific clinical patterns suggestive of periods of rapid progression and/or early onset disease
Grade modifiers	Risk factors	Smoking	Non smoker	<10 cigarettes/day	≥ 10 cigarettes/day
		Diabetes	Normoglycemic/no diagnosis of diabetes	HbA1c <7.0% in patients with diabetes	HbA1c z7.0% in patients with diabetes

framework for periodontal diseases, particularly through its detailed and comprehensive staging system. The staging of periodontitis ranging from Stage I (initial periodontitis) to Stage IV (advanced periodontitis with extensive tooth loss and potential loss of dentition) enables clinicians to assess the full scope of the disease, not only in terms of severity but also complexity and extent of damage.

Each stage is defined by clear clinical parameters such as clinical attachment loss (CAL), radiographic bone loss, tooth loss due to periodontitis, and other complexity factors like pocket depth, bone loss patterns, tooth mobility, and occlusal issues. This

multidimensional approach ensures a more individualized evaluation of each case, promoting better clinical decision-making.

Moreover, the inclusion of complexity factors allows for a deeper understanding of how challenging the case may be to treat and maintain. For instance, while Stage II may indicate moderate periodontitis, the presence of complicating factors like deep intrabony defects or furcation involvement in Stage III or IV necessitates more advanced treatment modalities.

In conclusion, the 2017 staging system of periodontitis emphasizes a holistic, evidence-based, and patient centered approach to periodontal care. By standardizing diagnosis and incorporating both current disease status and anticipated treatment challenges, it aids in improving treatment outcomes, enhancing communication among dental professionals, and facilitating long-term disease control and maintenance [9-25].

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