

Application of 2017 New Classification of Periodontal Diseases and Conditions to Localized Aggressive Periodontitis: Case Series

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Introduction: This case series illustrates the use of the new classification system of periodontal diseases and conditions. This case series highlights how the assessment of the rate of progression of periodontal disease, that is, grading, allows for the identification of individual patients, who are more likely to require active periodontal treatment intervention to prevent onset of disease, need long-term disease control, or referral to a periodontist.

Case Presentation: A 17-year-old female presents with slight gingival inflammation. However, exploration into indirect evidence of disease progression, that is, family history of periodontal disease, leads to the discovery of advanced disease in the mother. The patient was diagnosed with generalized Stage I Grade C periodontitis. The patient was managed with initial periodontal therapy, consisting of scaling and root planing with systemic antibiotic therapy. Special consideration was taken to mitigate the potential for rapid disease progression because of indirect evidence of familial history of aggressive periodontitis and indicated the need for early intervention. The case resulted in remission of the progression of periodontal disease.

Conclusions: Applying the staging and grading system leads to an understanding of the need for periodontal referral and early periodontal treatment intervention. Wide adoption of staging and grading could increase early referral leading to early periodontal treatment intervention, decreased tooth loss, and have a potential effect on overall health improvement and wellness. *Clin Adv Periodontics* 2019;9:185–191.

Key Words: Aggressive periodontitis; diagnosis; risk factor(s); genetic(s).

Background

At the 2017 World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions, the previous acceptance of the life-long nature and close follow-up of a periodontitis patient, even following successful therapy, was affirmed.¹ Under the 1999 Classifications of Periodontal Diseases, grading of periodontitis has been subtly incorporated into diagnosis as chronic periodontitis versus aggressive periodontitis based on age of onset and rate of progression earlier in life.² With the new 2017 classification system,³ grading estimates

the aggressiveness of the disease by focusing on the factors contributing to progression rather than previously focusing on the identification of a form of periodontitis. Staging relies on the severity and extent of periodontitis at presentation but also introduces the practical and individualized dimension of case complexity³ (Table 1). Specific clinical patterns suggestive of rapid progression and/or early onset disease, for example, % bone loss/age, molar/incisor pattern, lack of expected response to standard bacterial control therapies due to potential family history and genetic components influencing periodontal disease progression,^{4–7} prompted us to diagnose a 17-year-old female with generalized Stage I Grade C periodontitis (Table 2).

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Clinical Presentation

A 17-year-old female patient presented on August 3, 1993, at a general dental practice in Sakata, Japan based on the recommendation of her mother. When the patient presented, the patient had no understanding of having periodontal disease at an early age. She was seen by a

TABLE 1 Periodontitis Stage. Reproduction of original table³

Periodontitis stage		Stage I	Stage II	Stage III	Stage IV
Severity	Interdental CAL at site of greatest loss	1 to 2 mm	3 to 4 mm	≥5 mm	≥5 mm
	Radiographic bone loss	Coronal third (<15%)	Coronal third (15% to 33%)	Extending to mid-third of root and beyond	Extending to mid-third of root and beyond
	Tooth loss	No tooth loss due to periodontitis		Tooth loss due to periodontitis of ≤4 teeth	Tooth loss due to periodontitis of ≥5 teeth
Complexity	Local	Maximum probing depth ≤4 mm	Maximum probing depth ≤5 mm	In addition to stage II complexity: Probing depth ≥6 mm	In addition to stage III complexity: Need for complex rehabilitation due to:
		Mostly horizontal bone loss	Mostly horizontal bone loss	Vertical bone loss ≥3 mm Furcation involvement Class II or III Moderate ridge defect	Masticatory dysfunction Secondary occlusal trauma (tooth mobility degree ≥2) Severe ridge defect 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 pattern			

The initial stage should be determined using CAL; if not available then RBL should be used. Information on tooth loss that can be attributed primarily to periodontitis, if available, may modify stage definition. This is the case even in the absence of complexity factors. Complexity factors may shift the stage to a higher level, for example furcation II or III would shift to either stage III or IV irrespective of CAL. The distinction between stage III and stage IV is primarily based on complexity factors. For example, a high level of tooth mobility and/or posterior bite collapse would indicate a stage IV diagnosis. For any given case only some, not all, complexity factors may be present; however, in general it only takes one complexity factor to shift the diagnosis to a higher stage. It should be emphasized that these case definitions are guidelines that should be applied using sound clinical judgment to arrive at the most appropriate clinical diagnosis.

For post-treatment patients, CAL and RBL are still the primary stage determinants. If a stage-shifting complexity factor(s) is eliminated by treatment, the stage should not regress to a lower stage since the original stage complexity factor should always be considered in maintenance phase management.

CAL = clinical attachment loss; RBL = radiographic bone loss.

general dentist (TK) and initial periodontal examination revealed generalized periodontal inflammation (Figs. 1 and 2). No contributory medical history was reported by patient's mother. Periodontal probing depths ranged from 3 to 4 mm except the interproximal of teeth #19, #20, #29, and #30 (localized probing depths ranging from 5 to 6 mm) (Fig. 3). Bleeding on probing was 45.5% at the initial visit. Generalized incipient bone loss and a localized moderate angular bony defect on the mesial surface of tooth #30 were observed with 10% to 15% bone loss in that area (Figs. 4 through 6). Clinical observations of severe gingival inflammation with slight purulent discharge on the lingual of tooth #30 were made (Fig. 6). No mobility was noted in all dentitions. No history of restorative dental treatment were noted. The patient provided verbal informed consent for treatment.

The mother's chief concern was the patient's multiple visits to other dental offices in the past, in which her previous dentists would extract teeth "one by one," and she is worried that she has periodontal disease. The mother recognized that she has had generalized bleeding while brushing and flossing since she was 30 years old. Sometimes, the mother felt like her gums were not "settled." However, when the mother was young, she never experi-

enced dental caries and was reportedly very confident in the health of her dentition and periodontium.

Initial periodontal examination was rendered for the 43-year-old mother. Probing depths ranged from 7 to 8 mm. Teeth #2, 3, 4, 5, 13, 14, 15, 17, 18, 19, 20, 28, 29, and 30 were lost because of a history of periodontal disease (Figs. 7 and 8). Class I mobility was noted on teeth #6 through #11. Generalized severe horizontal bone loss was also noted (Fig. 7). Bleeding on probing was 63.3%.

For the mother, the periodontal diagnosis of generalized Stage IV Grade C periodontitis was given (Fig. 9). The overall periodontal prognosis was assigned as hopeless.

Case Management

Initial periodontal therapy, which consisted of scaling and root planing, along with systemic antibiotic therapy, was rendered for this patient. The regiment of systemic antibiotics therapy used in this case was 500/250 mg of amoxicillin and metronidazole combination, three times daily for 7 days. Although the patient is only 17 years old, the pattern of the periodontal inflammation, as well as the presentation of localized vertical bone loss on the mesial of tooth #30, demonstrates that this patient has

TABLE 2 Periodontitis Grade. Reproduction of original table³

Periodontitis grade			Grade A: Slow rate of progression	Grade B: Moderate rate of progression	Grade C: Rapid rate of progression
Primary criteria	Direct evidence of progression	Longitudinal data (radiographic bone loss or CAL)	Evidence of no loss over 5 years	<2 mm over 5 years	≥2 mm over 5 years
	Indirect evidence of progression	% bone loss/age	<0.25	0.25 to 1.0	>1.0
		Case phenotype	Heavy biofilm deposits with low levels 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 (e.g., molar/incisor pattern; lack of expected response to standard bacterial control therapies)
Grade modifiers	Risk factors	Smoking	Non-smoker	Smoker <10 cigarettes/day	Smoker ≥10 cigarettes/day
		Diabetes	Normoglycemic/no diagnosis of diabetes	HbA1c <7.0% in patients with diabetes	HbA1c ≥7.0% in patients with diabetes
Risk of systemic impact of periodontitis*	Inflammatory burden	High-sensitivity CRP (hsCRP)	<1 mg/L	1 to 3 mg/L	>3 mg/L
Biomarkers	Indicators of CAL/bone loss	Saliva, gingival crevicular fluid, serum	?	?	?

Grade should be used as an indicator of the rate of periodontitis progression. The primary criteria are either direct or indirect evidence of progression. Whenever available, direct evidence is used; in its absence indirect estimation is made using bone loss as a function of age at the most affected tooth or case presentation (radiographic bone loss expressed as percentage of root length divided by the age of the subject, RBL/age). Clinicians should initially assume Grade B disease and seek specific evidence to shift towards Grade A or C, if available. Once grade is established based on evidence of progression, it can be modified based on the presence of risk factors.

*Refers to increased risk that periodontitis may be an inflammatory comorbidity for the specific patient. CRP values represent a summation of the patient's overall systemic inflammation, which may be in part influenced by periodontitis, but otherwise is an "unexplained" inflammatory burden that is valuable to assess in collaboration with the patient's physicians. The grey color of the table cells refers to the need to substantiate with specific evidence. This element is placed in the table to draw attention to this dimension of the biology of periodontitis. It is envisaged that in the future it will be possible to integrate the information into periodontitis grade to highlight the potential of systemic impact of the disease in the specific case. Question marks in the last row indicate that specific biomarkers and their thresholds may be incorporated in the table as evidence will become available.

HbA1c, glycated hemoglobin; hsCRP, high sensitivity C-reactive protein; CAL, clinical attachment loss.



FIGURE 1 Clinical photograph (frontal) taken August 3, 1993.

a strong predisposition of rapid rate of progression and a periodontal diagnosis of generalized Stage I Grade C periodontitis (Fig. 10). The evidence that we chose to assign Grade C periodontal disease was the family history and pattern of bone loss, generalized inflammation, and purulent discharge in the area of tooth #30. Although the most extensive bone loss was noted as up to 15%, resulting in a % bone loss/age ratio of 0.88, this would indicate a strict mathematical grading of B. This is theoretically correct however, Tonetti et al.³ demonstrated that known emerging risk factors such as family history or genetics⁴⁻⁷ may be appropriately used as grade modifiers, although not specifically listed in the grading table (Table 2). Thus, a prevention-minded clinician would more likely consider a grade of C on assessing the predictive probability of biologic response



FIGURE 2 Clinical photographs (lingual) taken August 3, 1993.

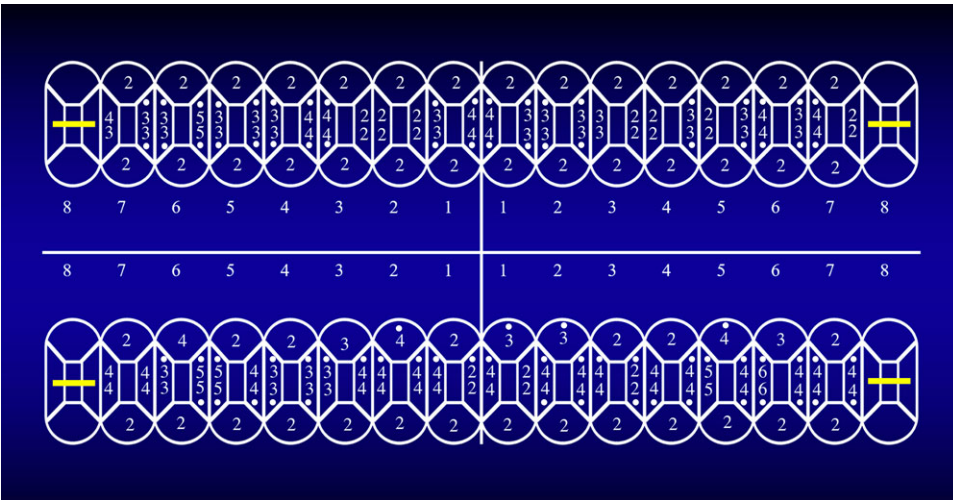


FIGURE 3 Full-mouth periodontal charting from initial periodontal examination for 17-year-old patient completed August 16, 1993.

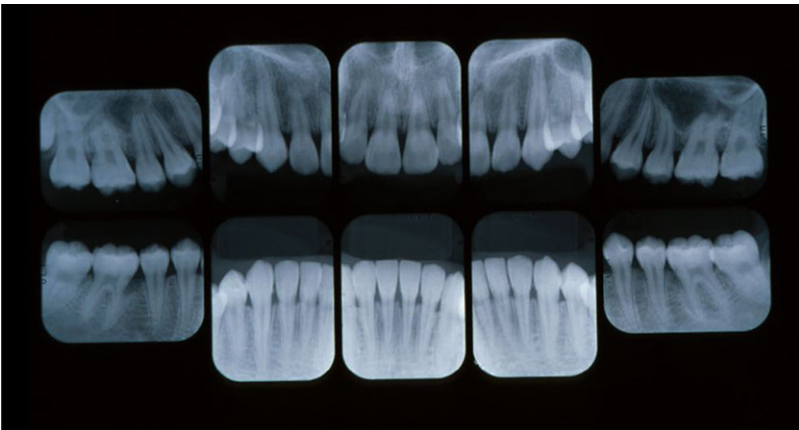


FIGURE 4 Full-mouth radiographs taken August 3, 1993.



FIGURE 5 Periapical radiograph tooth #30 taken August 3, 1993.



FIGURE 6 Clinical photograph tooth #30 taken August 3, 1993.

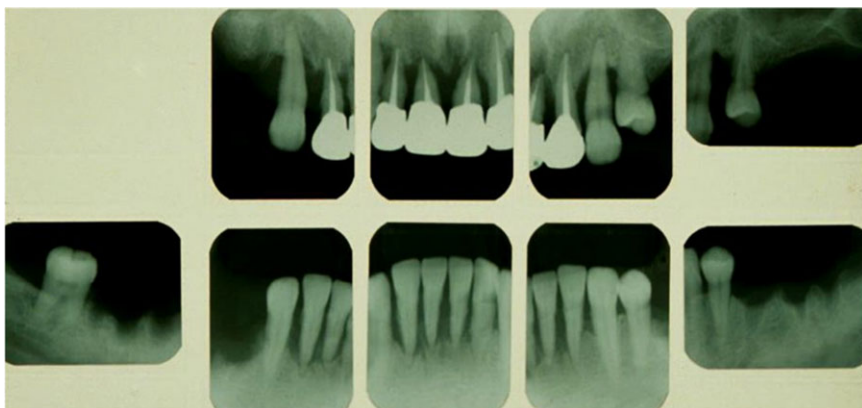


FIGURE 7 Full-mouth radiographs of patient's mother taken October 15, 1991.

of the patient, as grading is intended to do. This case indicates that the staging and grading of periodontal disease has a strong component to differentiate diagnosis from the 1999 previous periodontal diagnosis guidelines.

Clinical Outcomes

The clinical photographs and radiograph indicate the date as November 9, 1995, when the patient was 18 years old (Figs. 11 through 13). Bleeding on probing was 0%



FIGURE 8 Clinical photograph (frontal) of patient's mother taken October 15, 1991.

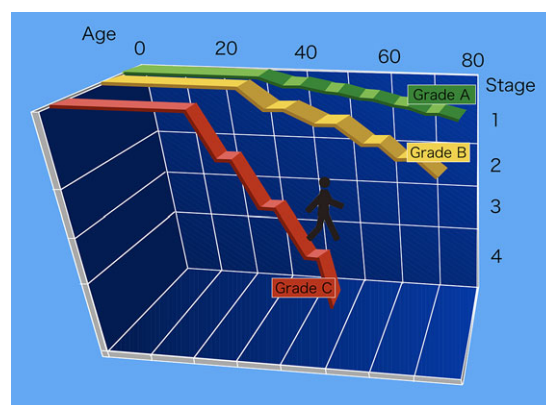


FIGURE 9 Schematic illustrating a red-carpet diagram analogy illustrating mother's placement in Grade C category (rapid rate of disease progression) as a function of age (x-axis) and disease severity (y-axis).

and probing depths ranged from 1 to 3 mm. No purulent discharge was observed. Slight bone regeneration on the mesial of tooth #30 was also observed in the radiograph (Fig. 13).

Discussion

Periodontal diagnosis based on proper periodontal disease staging determines extent and severity. Proper grading estimates environmental and genetic risk interactions for future risk, as in this case, in which the patient has the potential to progress at a similar rate as the mother. A step-by-step approach to grading and staging needs to be rendered when a patient presents with a significant family history of periodontal disease in which the staging of periodontal disease is advanced, and genetic risk factors are assessed.

In this case series, the grade was modified to C because of family history. Taking family history of periodontal disease in close relatives when reviewing dental history with the patient is significant in the new classification

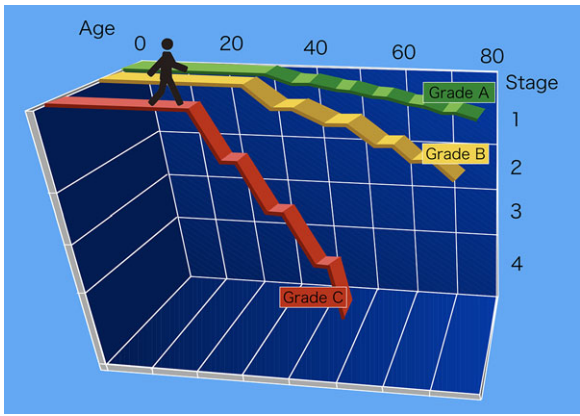


FIGURE 10 Schematic illustrating a red-carpet diagram analogy illustrating 17-year-old daughter’s placement in Grade C category (rapid rate of disease progression) as a function of age (x-axis) and disease severity (y-axis). The patient is placed on the same red-carpet and “road to periodontal destruction” as her mother in Fig. 9.



FIGURE 11 Clinical photograph (frontal) taken November 9, 1995.



FIGURE 12 Clinical photographs (lingual) taken November 9, 1995.

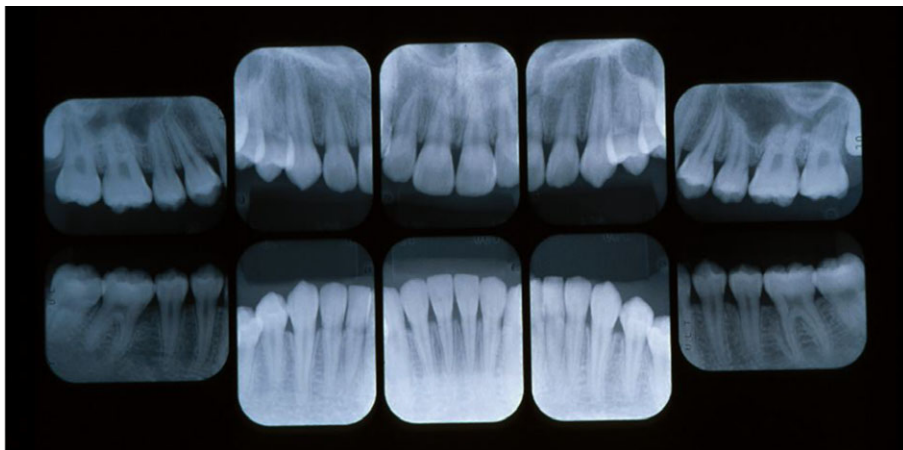


FIGURE 13 Full-mouth radiographs taken November 9, 1995.

system. This case series was reported because of the teaching value presented by the long-term follow-up and the nuanced application of the staging and grading system that could be missed and not result in referral to a periodontist. Cases with a grade of C should be referred to periodontists for early periodontal treatment intervention. Understanding the grading of periodontal disease has a significant impact on the prognosis of dentition.

Moreover, grading is critical for planning prevention of periodontal disease and indicates the need for meticulous periodontal maintenance. Teaching of the new classification and wide adoption of staging and grading could increase early referral, early periodontal treatment intervention leading to decreased tooth loss, and have a potential effect on overall health improvement and wellness. ■

Summary

Why is this case new information?	<ul style="list-style-type: none"> ■ Application of the new classification system on a historic case illustrating pattern recognition with progression risk assessment.
What are the keys to successful management of this case?	<ul style="list-style-type: none"> ■ Risk assessment and referral, followed with regeneration and careful follow-up. ■ Recognition of a greater disease grade (C) diagnosis drawing further attention to a seemingly less severe disease stage (I) without great complexity, indicating more intensive monitoring and/or treatment.
What are the primary limitations to success in this case?	<ul style="list-style-type: none"> ■ Widespread adoption of both staging and grading and including indirect evidence (family history) to lead to appropriate treatment.

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