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Journal of Odontology

Research Article

Prognosis of Periodontitis: Review Article with an Updated Clinical Perspective

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Abstract

Introduction

The prognosis is a prediction of the probable course, duration, and outcome of a disease based on general knowledge of the pathogenesis of the disease and the presence of risk factors for the disease[1]. Although many periodontal prognosis systems have been developed, most of the prognoses are based on tooth mortality (i.e., extractions) [2-6].The decision to retain teeth or extract and restore them is a very important aspect of dental treatment. The literature indicates that high survival and success rates can be achieved with compromised teeth if they supported by appropriate maintenance[4,7,8]. However, the probabilities of successful therapy should be weighed against any benefits that would grow to the adjacent teeth if the tooth under consideration were extracted. The option of tooth extraction was first proposed as a means of improving the overall prognosis of adjacent teeth and/or support the prosthetic treatment alternatives or successful implant insertion [9]. If the teeth are severely compromised and not treated this may allow an area to worsen to the time that insertion of an implant is no longer a realistic option. This means that the dentist should identify teeth that appear to have a more favorable treatment outcome, as opposed to those more severely compromised by disease, and weigh the chance success of periodontal therapy and maintenance versus the extraction and implant insertion when establishing a prognosis to compromised teeth [10].Early diagnosis and proper treatment of periodontal disease are critical to successful treatments therefore, recognizing the prognosis of each tooth and risk factors for disease progression are important during periodontal therapy and supportive periodontal treatment.

Prognosis systems of periodontal disease

The most well-known systems used for determination of prognosis in periodontal disease is **McGuire, 1996** [11] and Kwok, 2007 [12] **McGuire, 1996** [11] gives five categories: Good prognosis: Control of etiologic factors and adequate periodontal support ensure the teeth will be easy to maintain by both the patient and clinician. Fair prognosis: Approximately 25% attachment loss and/or Class I furcation involvement (location and depth allow proper maintenance with good patient compliance). Poor prognosis: 50% attachment loss, Class II furcation involvement (location and depth make maintenance possible but difficult). Questionable prognosis: >50% attachment loss, poor root form, Class II furcation (location and depth make access difficult) or Class III furcation involvements, poor crown-to root ratio; root proximity; >2+ mobility. Hopeless prognosis: Inadequate attachment to maintain comfort, health and function. One of the **McGuire, 1996** system prognosis limitations was that utilization regeneration therapy around teeth was not performed. However, It is well established that regenerative therapy on specific periodontal infra bony defects can lead to bone fill and clinical attachment gain, therefore improve a teeth's prognosis[13]. On the other hand Kwok, 2007 prognosis system [12] have projected criteria based on the possibility of disease progression as related to local and systemic factors and future periodontal stability with therapy. This system is as follows: Favorable prognosis: complete periodontal therapy and follow up will stabilize the status of the teeth. Future loss of periodontal support is unlikely. Questionable prognosis: systemic and/or local factors influencing the periodontal status of the teeth may or may not be controllable. If controlled, the periodontal status can be stabilized with complete periodontal therapy. If not, future periodontal deterioration may occur. Unfavorable prognosis: local and/or systemic factors influencing the periodontal status cannot be controlled. Comprehensive periodontal therapy and follow up are unlikely to prevent future periodontal breakdown. Hopeless prognosis: the teeth need to be extracted. Because periodontal maintenance is assessed on a regular basis using clinical parameters, it may be more useful in making therapy decisions and prognosis predictions than trying to determine the probability that the teeth will be lost. Determining the prognosis at various appointments is also

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Received: January 24, 2020; **Accepted:** August 25, 2021; **Published:** September 06, 2021

Citation: Mohammed Sultan Alakhali (2021) Prognosis of periodontitis: Review article with an updated clinical perspective. J Odontol.Vol 5;(5), 608

essential because periodontal deterioration does not occur in specific time [14]. The periodontal prognostic results rely on patient compliance with motivation and oral hygiene instruction and on the individual's risk factors. With the goal of improved results in a lot of these cases, it may be prudent to establish a provisional prognosis until phase I therapy is completed. The provisional prognosis allows the clinician to start therapy that has a doubtful view in the hope that a positive result may tip the balance and allow teeth to be reserved[15]. The prognosis system of Kwok, 2007 [12] is consistent with prognosis system of **McGuire, 1996** [11]as the following [table 1].

Table 1: shows the congruence in prognoses of periodontal disease between the system of Kwok, Caton [2007] and the system of McGuire, Nunn [1996].

Kwok and Caton 2007(12)	**Favorable prognosis**		**Questionable prognosis**	**Questionable Unfavorable prognosis**	**Hopeless prognosis**
Local / Systemic factor	Controlled		Controlled	Not controlled	Inadequate periodontal support
AL	Adequate periodontal support	25%	50%	>50%	
FI		I	II	II, III	
McGuire 1996(**11**)	Good	Fair	Poor	Questionable prognosis	Hopeless prognosis

AL: Attachment loss, FI: Furcation involvement.

The favorable prognosis in Kwok, 2007 system [12]is consistent with good and fair prognosis of **McGuire, 1996** system [11] because both prognoses are expecting if the etiologic factors are controlled and the periodontal support is adequate or the clinical attachment loss not excessed 25% that ensures the teeth will be easy to maintain [table 1]. When the Local and/or systemic factors can be controlled but the furcation involvement is class II and/or the clinical attachment loss is not excessed 50% of the root surface, that ensure the periodontal status can be stabilized with comprehensive periodontal therapy, then the prognosis will be questionable according to Kwok, 2007 system [12]which is consistent with the poor prognosis of McGuire, 1996 system [11].

But if the Local and/or systemic factors cannot be controlled, the questionable prognosis according to Kwok, 2007 system [12] will be consistent with the questionable prognosis according to McGuire, 1996, where the clinical attachment loss is excessed 50% of the root surface, that hinders the stabilization of periodontal health by comprehensive periodontal therapy[11].

The probability of periodontal condition to be controlled or not in questionable prognosis according to Kwok, 2007 system [12] which rely on ability to control the Local or systemic factors make this level of prognosis more complicated, particularly when the local or systemic factors cannot be controlled where it is difficult to separate between questionable prognosis and unfavorable prognosis in Kwok, 2007 system [12] [table 1], this overlapping in questionable prognosis and unfavorable prognosis within Kwok, 2007 system [12] give McGuire system, 1996, [11] priority in clinical practice which separates between all five levels, good, fair, poor, questionable and hopeless without cleavage or overlapping so it was used in this review to determine the prognosis of periodontal disease according to latest classification of periodontal disease in 2018 [5] [table 2]

Table 2: shows the determination of periodontal prognosis according to the classification of periodontal disease 2018.

Prognosis	**McGuire 1996(11)**	**Good**	**Fair**	**Poor**	**Questionable**	**Hopeless**
	AL	**Adequate periodontal support**	**25%**	**50%**	**>50%** **Mobility >2**	**Inadequate periodontal support**
	FI	**-**	**I**	**II**	**II, III**	**-**
Periodontitis According to New classification 2018(**5**)	Periodontitis	Stage I	Stage II	Stage III	Stage III / stage IV	Stage IV
	BL	<15%	15-33%	50%≥BL>33%	>50% Extending to mid-third of root and beyond	
	AL	1-2mm	34mm	≥5mm		
	FI	-	I	II	III	-
	PD	≤ 4 mm	≤ 5 mm	≥ 6 mm		Uncontrolled systemic factors
	Tooth loss	-	-	≤ 4 teeth		≥ 5 teeth Mobility ≥ 2

AL: Attachment loss, FI : Furcation involvement, BL bone loss, PD: Pocket depth.

When there is inadequate attachment to maintain health, comfort and function, therefore it is expecting to extract the tooth because the prognosis in both prognosis systems [11,12] is hopeless. It should be recognized that favorable [good, fair], and hopeless prognoses in these prognostic systems could be decided with a reasonable degree of precision. However, poor, questionable and unfavorable prognoses were likely to change to

other levels because they rely on a large number of variables that can interrelate in unpredictable ways [6,16,17].

Prognosis of periodontal diseases according to the classification of periodontal disease in 1999

which was supported by the American Academy of Periodontology (AAP) According to this classification; eight categories of periodontal disease were proposed; Gingival Diseases, chronic Periodontitis, aggressive Periodontitis, periodontitis as a Manifestation of Systemic Diseases, necrotizing periodontal Diseases, abscesses of the periodontium, periodontitis associated with Endodontic lesions, developmental or Acquired Deformities and conditions[1]. In cases of chronic Periodontitis in which the clinical attachment loss is not very severe (slight-to-moderate periodontitis), the prognosis is good, provided the inflammation can be controlled through the removal of local plaque-retentive factors and good oral hygiene. In cases with the more advanced disease, as evidenced by increasing tooth mobility and furcation involvement, or in cases that are uncooperative with oral hygiene practices, the prognosis may be reduced to fair or poor. Patients diagnosed with aggressive periodontitis would have a poor prognosis[15].When localized aggressive periodontitis diagnosed early, it can be treated conservatively with oral hygiene instruction and systemic antibiotic therapy, resulting in an excellent prognosis [18]. In contrast cases with generalized aggressive periodontitis usually have a fair, poor, or questionable prognosis [15]. Also Periodontitis as a manifestation of systemic diseases such as neutropenia, hypophosphatasia and Ehlers-Danlos syndrome have a fair to poor prognosis[15].

Latest classification of periodontal disease in 2018

The latest classification of periodontal diseases which was summarized in a workshop was supported by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP) and included expert researchers from all over the world. The workshop, which was held in Chicago on November 9 to 11, 2017 [5]. In reviewing the classification, the workshop established a classification for periodontitis in which gathered what was known by aggressive and chronic periodontitis in one category and called it periodontitis which was classified based on a multidimensional staging and grading system that could be modified over time as new evidence emerges [19]. Staging is mostly rely on the severity of periodontitis as well as on the complexity of treatment, while grading provides additional data about biological characteristics of the disease, including a history of disease progression[20]. Staging involves four stages [stages 1 through 4] and is determined after considering several measurements including the percentage of radiographic bone loss, clinical attachment loss, probing depth level, the extent of infra bony defects and furcation involvement, tooth loss and tooth mobility. Grading comprises three grades [grade A , grade B, grade C], it is included, in addition to progression of periodontitis, systemic health, and other variables such as level of metabolic control in diabetes or smoking [19].

Prognosis of periodontal diseases according to the classification of periodontal disease in 2018

It is possible to determine the prognosis of each stage of periodontitis according to the prognosis system of McGuire, 1996 [11] . After considering several measurements including the percentage of bone loss, attachment loss, probing depth, the extent of intra bony defects and furcation involvement, tooth loss and tooth mobility [table 2]. So Stage I periodontitis according to McGuire, 1996 system [11] has a good prognosis, stage II has a fair prognosis, stage III has poor or questionable prognosis and Stage IV has questionable or hopeless prognosis [table 2].

In stage I periodontitis the interdental attachment loss is 1-2mm, the maximum probing depth ≤4 mm and the radiographic bone loss is <15% which is mostly horizontally Table 2, therefore the surrounding bone is adequate which consistent with good prognosis according to McGuire, 1996 system (**11**). In stage II periodontitis the interdental attachment loss is 3-4mm, the maximum probing depth ≤4 mm and the radiographic bone loss (15% to 33%) Table 2, which is consistent with fair prognosis according to McGuire, 1996 system[11], where the attachment loss approximately is 25% and/or Class I furcation involvement [location and depth allow proper maintenance with good patient compliance].

The bone loss and attachment loss in Stage I and stage II periodontitis have affected only the coronal third of the tooth [19] so the prognosis is favourable [12] [good and fair according to McGuire, 1996 system] [11].In stage III periodontitis, the interdental attachment loss is ≥5 mm, the probing depth ≥6 mm and bone loss extending to mid-third of root and beyond so the prognosis according to McGuire, 1996 system [11] may be poor or questionable; the poor prognosis when the radiographic bone loss (33% to 50%) and/or the furcation involvement is class II, but the prognosis in stage III maybe become questionable when the bone loss exceeds 50% and the furcation involvement is class III (McGuire, 1996 system) [11] In stage IV if Mobility ≥ grade 2 and/or the bone loss exceed 50% (inadequate bone support) and/or the systemic factors uncontrolled, the prognosis will be hopeless according to McGuire, 1996 system [11]. In some cases the prognosis of stage IV might be questionable if there is a furcation involvement class III without advance bone destruction and/or mobility according to McGuire, 1996 system [11].Periodontitis Grade A has a good prognosis because the patient is healthy systemically and nonsmoker and the level of destruction are low although the level of deposits is heavy. Periodontitis Grade C has a questionable to hopeless diagnosis because of the uncontrolled systemic condition [HbA1c ≥7%] in diabetic patients and/or heavy Smoker ≥ 10 cigarettes /day, destruction exceeds expectation given biofilm deposits; and lack of expected response to standard bacterial control therapies [20].Periodontitis Grade B has fair to good prognosis according to McGuire 1996 system [11] because the patient usually smokes but < 10 cigarettes /day, destruction commensurate with biofilm deposits and the patients with glucose diabetes has good controlled level of HbA1c <7.0%. As is evident from these classifications, the periodontal prognosis is a dynamic process because local and systemic factors are not permanent situations.

For example, smoking might worsen the periodontal condition during the periodontal maintenance phase. It should correlate between the parameters and risk factors in the level of grades and stages to establish the correct prognosis of periodontitis [19] After determining the diagnosis of periodontitis, if the level of grades and stages are not close so it is suggested to expect the worst prognosis. For example, if the grade of periodontitis is B and the stage is IV so the expecting prognosis will be questionable to hopeless depend on the tooth mobility and number of tooth loss. If the number of teeth lost ≥5 and/or the tooth mobility is ≥2 so the prognosis is hopeless, similarly if the stage of periodontitis is II (bone loss not excessed coronal third) and the grade is C (uncontrolled systemic condition [HbA1c ≥7%] in patients with diabetes and/or heavy Smoker ≥ 10 cigarettes /day) so the prognosis expects to be hopeless.

CONCLUSION

Stage I and stage II periodontitis have good, fair prognosis respectively. In stage III periodontitis the prognosis might be poor prognosis when the radiographic bone loss [33% to 50%] and/or the furcation involvement is class II, but the prognosis in stage III maybe become questionable when the bone loss exceeds 50% and the furcation involvement is class III. In stage IV if Mobility ≥ grade 2 and/or the bone loss exceed 50% and/or the systemic factors uncontrolled, the prognosis will be hopeless.

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