

CLASSIFICATION OF GINGIVAL RECESSION: A NEW APPROACH

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ABSTRACT:

A classification system facilitates the communication and understanding of common standardized identification of the nature of cases, helps in diagnosis, prognosis and finally suitable treatment plan for the condition. Gingival recession, a common condition leading to exposure of root surfaces, is seen in both dentally aware population and those with limited access to dental care. There are several classification systems in literature, with their merits and demerits, to describe recession. None of them ascribes and satisfies its different categories and severity. Hence, to fill this void, a humble attempt is made to present a new classification system for gingival recession.

Key words- cemento-enamel junction, mucogingival junction, radicular gingiva, interdental gingiva, gingival recession classification.

INTRODUCTION:

Classification can be defined as systematic arrangements in groups or categories according to established criteria.^[1] It has been conceived to facilitate the comprehension of the great amount of factors and information involved in complex systems proving its usefulness and indispensable importance in many fields of knowledge.^[2] A classification system facilitates the communication and understanding of common standardized identification of the nature of cases, helps in diagnosis and prognosis and finally suitable treatment plan. In Periodontics, the classification for identification and description of the degree of loss of gingiva should benefit the development of new techniques for recession coverage.

Gingival recession is a term used to characterize the apical shift of the



marginal gingiva from its normal position on the crown of the tooth to the levels on the root surface beyond the cemento-enamel junction.^[3] It is a common and undesirable condition,^[4,5] causes the exposure of the root surface to the oral environment.^[6,7] It usually, creates an esthetic problem, especially when such problem affects the anterior teeth and causes anxiety of tooth loss due to progressing destruction. It may also be associated with dentinal hypersensitivity and/or root caries, abrasion and/or cervical wear, erosion and an increase in the accumulation of dental plaque.^[8,9]

The etiology of gingival recession is multifactorial. Several factors have been stated to play a role in recession development, such as excessive or inadequate tooth brushing,^[10] destructive periodontal disease, tooth malpositioning, alveolar bone dehiscence, thin marginal

tissue covering a non-vascularized root surface, high muscle attachment, frenal pull and occlusal trauma.^[9]

The classification system for gingival recession should have observational and descriptive value, as well as denoting severity; provide a basis for evaluating treatment modalities. However, given the tissue complexities which need to be taken into account when assessing recession, it is perhaps not surprising that no consensus appears to exist in the literature regarding a classification of recession.^[11]

There have been several attempts to classify gingival recession.^[12,13,14,15] Sullivan and Atkins^[12] used the descriptive terms 'narrow', "wide", "shallow", and "deep" to classify recession into 4 groups and concentrated on recession involving mandibular incisor teeth. Mlinek^[13] et al. quantified recession "shallow-narrow" clefts if they were <3 mm in both dimensions, and "deep-wide" defects if they were >3 mm in both dimensions.

P. D. Miller,^[14] in 1985, classified the gingival recession in four classes, based on three factors, 1) degree of involvement of the mucogingival junction (MGJ), 2) the level of the proximal periodontal (bone or soft tissue) loss, and 3) the alignment of tooth. It was stated to be useful in predicting the final amount of root coverage following a free gingival graft procedure. The original classification is as:

Class I- Marginal tissue recession which does not extend to the mucogingival junction. There is no periodontal loss

(bone or soft tissue) in the interdental area, and 100% root coverage can be anticipated.

Class II - Marginal tissue recession which extends to or beyond the mucogingival junction. There is no periodontal loss (bone or soft tissue) in the interdental area, and 100% root coverage can be anticipated.

Class III - Marginal tissue recession which extends to or beyond the mucogingival junction. Bone or soft tissue loss in the interdental area is present or there is malpositioning of the teeth which prevents the attempting of 100% root coverage. Partial root coverage can be anticipated.

Class IV- Marginal tissue recession which extends to or beyond the mucogingival junction. The bone or soft tissue loss in the interdental area and/or malpositioning of teeth is so severe that root coverage cannot be anticipated.

In 1997, Smith^[16] introduced classification of recession which was described by two digits separated by a dash (for example, F2-4), and the prefixed letter F or L denoting whether the recession was on the facial or lingual aspects of the tooth. The digits describe the horizontal and vertical components of a recession site in that order. The horizontal component is expressed as a whole number value (from the range 0-5) depending on what proportion of the CEJ is exposed on either the facial or lingual aspects of the tooth, between the mesial and distal midpoints (MM-MD

distance). The second digit denotes the vertical extent of recession measured in millimeters (on a range from 0-9). An asterisk (*) is affixed to the second digit when the vertical component extends to the mucogingival junction or beyond it. The absence of an asterisk implies either absence of mucogingival junction at the site or its non-involvement in the soft-tissue defect.

Later on, in 2010, Ajay Mahajan [15] suggested the following modifications in Miller's classification:

1. The emphasis on the extent of gingival recession defect in relation to mucogingival junction should be separated from the criteria of bone /soft tissue loss in interdental areas.
2. Objective criteria should be included to differentiate between the severity of bone/soft tissue loss in class III and class IV, as used in some of the other classifications.
3. Prognosis assessment must include the profile of the gingiva as recent studies have shown that gingival thickness is an important criteria affecting long term prognosis of treated gingival recession defects, (>0.8 mm improves the prognosis) in other words thick gingival profile favors treatment outcome and vice versa.

Ajay Mahajan modified the Miller's classification as following:

Class I: Gingival recession defects not extending to mucogingival junction.

Class II: Gingival recession defects extending to mucogingival junction or beyond it.

Class III: Gingival recession defects with bone or soft-tissue loss in interdental area up to cervical 1/3 of root surfaces and/or malpositioning of the teeth.

Class IV: Gingival recession defects with severe bone or soft tissue loss in interdental area greater than cervical 1/3 rd of root surface and/or severe malpositioning of teeth

Prognosis according to Mahajan's modification:

BEST- Class I and Class II with thick gingival biotype.

GOOD-Class I and Class II with thin gingival biotype.

FAIR- Class III with thick gingival biotype.

POOR-Class III and Class IV with thin gingival biotype.

The relative ease, applicability, reliability, merits and demerits of different systems should be analyzed.

DISCUSSION

To facilitate the diagnosis, prognosis, and treatment plan, a classification is required. Murphy [17] has redefined the some desirable characteristics of a system of classification (taxonomy) which must be considered:

- 1- Usefulness: "Usefulness can be constructed at several different

levels. Not the least is practicality, even crass practicality”.

- 2- Exhaustiveness: “An ideal classification should be exhaustive, i.e. accommodate naturally every member of the group”.
- 3- Disjointness: “No particular case should fall into more than one class”.
- 4- Simplicity: “The most convenient classifications are simple.....for practical applications a large number of sub classes may be inconvenient”.

Pini-Prato, in his elaborated and exhaustive discussion, has stated that, “Miller’s classification appears simple but it is not so easy when it is considered carefully. Many factors are involved such as mucogingival junction (MGJ), soft and hard inter-proximal tissues, gingival margins of the adjacent teeth, tooth malposition and tooth loss; and a simultaneous evaluation of them is difficult and generates confusion. This classification has been demonstrated useful and has been applied by the periodontal community mainly to distinguish recessions related to tooth brushing trauma (Classes I and II) from those caused by periodontal disease with inter-proximal attachment and bone loss (Classes III and IV). But Miller’s classification is not exhaustive because it does not consider all the cases of recession. For example, a marginal tissue recession that does not extend to the MGJ with inter-proximal bone loss is not

classified. In fact, this recession cannot be included in class I because of inter-proximal bone loss and it cannot be categorized in class III because the gingival margin does not extend to the MGJ. Similarly the differences between class III and class IV are based on the severity of the bone or soft tissue loss in the interdental area and tooth malpositioning which are subjective criteria. Another crucial point should be discussed: in fact, tooth malpositioning is considered as an alternative criterion to bone or soft tissue loss without a comprehensive explanation. It is also unclear when it comes to establishing the degree of malposition for including a recession in one or the other class”.[2]

On the other hand, the classification of recession by Smith is more exhaustive and elaborative. But, he included the horizontal and vertical dimensions of radicular recession only without giving any consideration to the involvement of interdental tissues. It is quite difficult to estimate 10%, 25%, or 50% of horizontal dimensions from mid-mesial to mid-distal areas in cases where there is no proximal recession i.e. gingiva is occupying the gingival embrasure. Even with these features it is used in various cross-sectional and longitudinal epidemiologic studies related to the prevalence, incidence, severity and etiology of gingival recession. But in day-to-day practice and clinical assessment this classification could not gain popularity because of its complicated assessments and recording. Hence, Miller's classification, despite its limitations, is still the most widely used

classification for describing gingival recession in clinical practices.

To overcome the limitations of Miller's classification, Mahajan modified it by separating the facial gingival recession from interdental bone/soft tissue recession. He, further, suggested that in class III and class IV, the subjective criteria should be eliminated by more objective evaluation of bone or soft-tissue loss in interdental area by gingival recession defect up to cervical 1/3rd of root surfaces or greater than cervical 1/3rd of root surface; and/or malpositioning of the teeth and severe malpositioning of teeth. But still this assessment of proportion of exposed versus unexposed root surface area (1/3rd) is very difficult, practically impossible. It needs the help of advanced imaging techniques, without which it becomes a subjective criterion. Further, similar to Miller's classification, measuring criterion for degree/severity of malpositioning is not explained. Additionally, it does not explain the malpositioning is either a cause of recession or result of gingival defect (recession), so this criterion is also misleading for the classifications.

In different classification systems malpositioning is used as a criterion for differentiation of different classes. But malpositioning causes prominence of root which may lead to change into thin gingival biotype, predisposing to recession in association with periodontal disease or any trauma. So this may be associated with any class of gingival recession and remains a constant factor, irrespective of

the severity of gingival recession. In clinical practice it is seen that there are so many different situations in which there are malpositioning of teeth but no associated recession. On the other hand, malalignment is also associated with class I and class II recession but is not considered as a criterion in these situations. So, this should be considered as a co-existing and complicating factor affecting the result of root coverage procedures. Hence, this should not be considered as a criterion in any classification. This requires more exhaustive study and a separate indexing system. Tooth malpositioning can be assessed with the help of malalignment index (MI) given by Nympha Pandit et al.^[18]

Different classification systems have been suggested to predict the prognosis of root coverage procedures. Nevertheless, the role of possible etiological and prognostic factors in the onset of gingival recession and in determining the outcome of treatment is still unknown.^[19]

So, many factors are responsible for prognosis of root coverage procedures. Clinically, healthy gingival margin around a tooth is dependent on the underlying topography of bone, which itself is dependent on the position, proclination or retroclination and rotation of the tooth.^[20] Consequently, the outcome of various recession coverage procedures depends primarily on the position of the tooth and the topography of underlying bone along with several other factors including anatomic factors, diagnosis of

periodontal conditions, age, plaque level, smoking status,^[21] severity of attachment loss, control of etiologic factors, occlusal loading, and genetic and systemic makeup. However, anatomic factors that may predispose the periodontium to recession and, therefore, affect the prognosis include biotype of overlying gingiva,^[22] proclination or rotation of the teeth in the arch,^[23] presence of fenestration, or dehiscence on underlying bone.^[24] Besides the above mentioned patient related factors, the surgical and technical skills of the operator also influence the prognosis.

In teeth with labial version, the margins of labial bone are located farther apically than on a tooth in proper alignment. The bone margins are thinned to knife-edged and present an accentuated arc in the direction of the apex. Labial protrusions of root combined with thin bony plate are predisposing factors for fenestration and dehiscence, which can also complicate the outcome of recession coverage therapy.^[20] Adequate vascular supply is essential to achieve complete root coverage. This may be obtained from the bone, periosteum, and periodontal ligament underlying the graft and from flap tissue overlying the graft. So, if bone is present apically and is thin, then a lesser amount of blood supply will be available to nourish the overlying flap as well as graft.^[25]

The first classification of recession by Sullivan and Atkins had a morphologic basis, but it had no predictive value regarding treatment outcome. A landmark

classification of recession was given by Miller who enhanced the predictability of root coverage by pre-surgical examination and its correlation with the recession, although this classification did not include the thickness of overlying gingiva, and alveolar bone. Mahajan added gingival biotype as a deciding factor for prognosis but did not explain the method to measure the gingival thickness and other factors modifying it.

Gingival biotype alone is not responsible for the amount of root coverage because the biotype itself is dependent on so many factors e.g. alignment, rotation, protrusion, supra eruption etc. For better prognosis/root coverage, all the factors responsible for thin biotype should be eliminated. Then the suitable root coverage procedures should be used for correction of gingival recession defect. Even in the most favorable condition, the maximum amount of expected root coverage will be at the level of adjacent interdental bone.

Since the prognosis of recession is dependent on so many factors, the amount of root coverage achieved, cannot be predicted only on the basis of class of recession. It is important to point out that the inclusion of a given recession in one class cannot be absolutely considered the unique prognostic factor that can predict the amount of final root coverage. Thus a class I gingival recession may have a poor prognosis in situation where anatomical and etiological factors are not controlled and/or the operator's skill is questionable. On the contrary, a class IV recession gives

an unexpected result in a well-managed situation. So, the prognosis cannot be included in any classification system of gingival recession so affirmatively.

Analyzing these classification systems, their merits, demerits and limitations, a new classification system is proposed to include and differentiate different gingival recession conditions making an attempt to minimize the variations and subjective as well as objective bias.

NEW CLASSIFICATION FOR GINGIVAL RECESSION

This classification is based on the gingival recession on radicular surface and interdental area in relation to mucogingival junction and mid facial/lingual extent of the cemento-enamel junction. This classification system utilizes three identifiable anatomical landmarks (Figure1-A and B) –

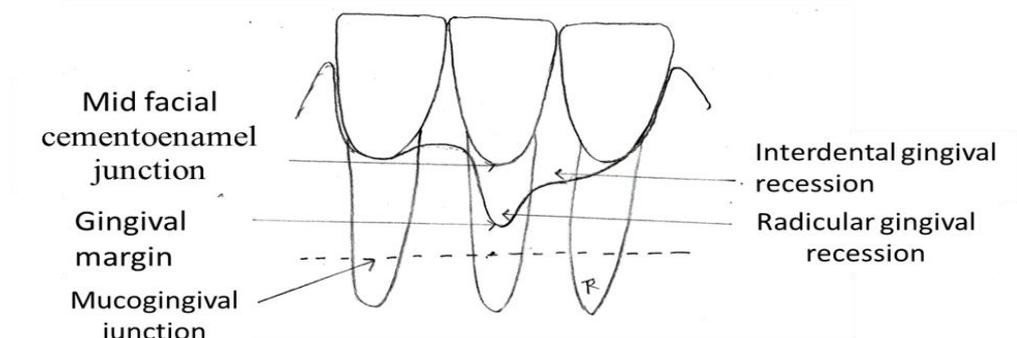


Figure 1 - A

Figure 1-A- Diagrammatic illustration of different landmarks applied in classification.

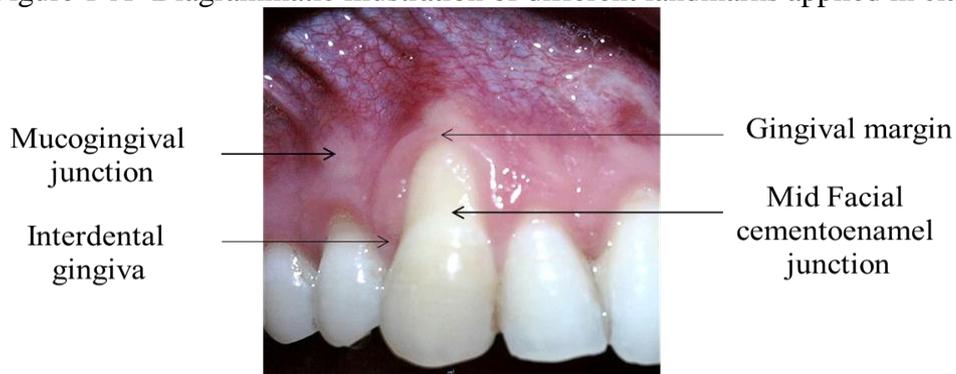


Figure 1- B

Figure 1-B – Clinical presentation of different landmarks

1. Gingival Margin,
2. Mid facial extent of the cemento-enamel junction (CEJ),
3. Mucogingival junction (MGJ)

Terms used to measure recession:

- Recession on the root surface - Radicular gingival recession (RGR),

- Recession in the adjacent interdental area- Interdental gingival recession (IDGR).

Maximum interdental gingival recession will be considered. The mucogingival junction will be assessed by rolling the mobile mucosa with the help of a periodontal probe. The facial and lingual recessions are to be assessed separately.

The gingival recession is classified as following (Box 1):

Class I: Radicular gingival recession not extending up to mucogingival junction and no interdental gingival recession (Figure 2-A and 2-B).



Figure 2-A
Figure 2-A- Diagrammatic representation of Class I gingival recession
Figure 2-B- Clinical picture of Class I gingival recession in all the three incisors

Class II: Radicular gingival recession extending up to or beyond mucogingival junction but no interdental gingival recession (Figure 3-A and 3-B).



Figure 3-A
Figure 3-B

Figure 3-A- Diagrammatic presentation of Class II gingival recession

Figure 3-B- Clinical picture of Class II gingival recession

Class III: This class can be stated to be the extension of class I gingival recession with proximal interdental gingival recession. The proximal interdental gingival position guides the selection of corrective technique and predicts the outcome. So the relative position of the interdental tissue is an important determining factor. Based on its position, this class is sub-classified in to three types-

Type A- Radicular gingival recession not extending up to mucogingival junction and interdental gingival recession not extending beyond the level of mid facial cemento-enamel junction (Figure 4-A and 4-B).

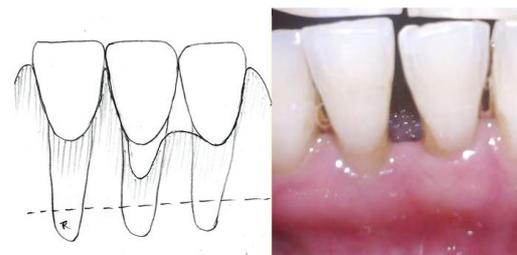


Figure 4-A
Figure 4-B
Figure 4-A- Diagrammatic presentation of Class III Type A - RGR not extending to MGJ and IDGR not extending beyond mid facial CEJ.

Figure 4-B- Clinical picture of Class III Type A - RGR not extending to MGJ and IDGR not extending beyond mid facial CEJ in teeth # 31 and 41.

Type B- Radicular gingival recession not extending up to mucogingival junction and interdental gingival recession extending beyond mid facial cemento-enamel junction but not up to mucogingival junction (Figure 5-A and 5-B).

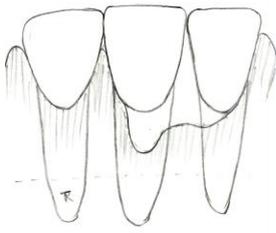


Figure 5-A

Figure 5-B

Figure 5-A- Clinical picture of Class III Type A - RGR not extending to MGJ and IDGR not extending beyond mid facial CEJ in teeth # 31 and 41.

Figure 5-B- Clinical picture of Class III Type B - RGR not extending to MGJ and IDGR extending beyond mid facial CEJ but not up to MGJ.

Type C- Radicular gingival recession not extending up to mucogingival junction and interdental gingival recession extending up to or beyond mucogingival junction (Figure 6-A and 6-B).

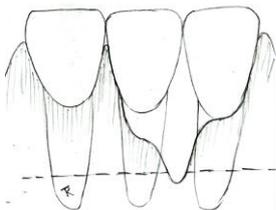


Figure 6-A

Figure 6-B

Figure 6-A- Diagrammatic presentation of Class III Type C - RGR not extending to MGJ and IDGR extending up to/beyond MGJ.

Figure 6-B- Clinical picture of Class III Type C - RGR not extending to MGJ and IDGR extending up to/beyond MGJ in tooth # 41; (Class IV Type C in # 31).

Class IV: It is extension of class II gingival recession with associated interdental gingival recession. Depending upon the level of interdental gingiva, this class is sub-classified in to three types as-

Type A- Radicular gingival recession extending up to or beyond mucogingival junction with interdental gingival

recession not extending beyond mid facial cemento-enamel junction (Figure 7-A and 7-B).

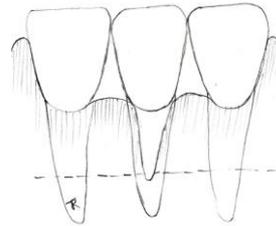


Figure 7-A

Figure 7-B

Figure 7-A- Diagrammatic presentation of Class IV Type A - RGR extending to/beyond MGJ with IDGR not extending beyond mid facial CEJ.

Figure 7-B- Clinical picture of Class IV Type A - RGR extending to/beyond MGJ with IDGR not extending beyond mid facial CEJ in tooth # 31; (Class III Type A in # 32 and 42).

Type B- Radicular gingival recession extending up to or beyond mucogingival junction with interdental gingival recession extending beyond mid facial cemento-enamel junction but not up to mucogingival junction (Figure 8-A and 8-B).

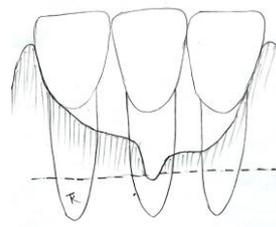


Figure 8-A

Figure 8-B

Figure 8-A- Diagrammatic presentation of Class IV Type B - RGR extending to/beyond MGJ with IDGR extending beyond mid facial CEJ but not up to MGJ.

Figure 8-B- Clinical picture of Class IV Type B - RGR extending to/beyond MGJ with IDGR extending beyond mid facial CEJ but not up to MGJ in tooth # 42; (Class III Type B in # 41 and 31).

Type C- Both Radicular and interdental gingival recession extending up to or beyond mucogingival junction (Figure 9-A and 9-B).

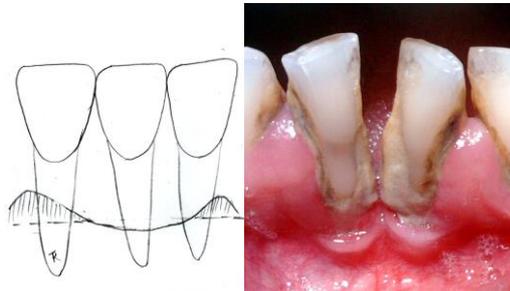


Figure 9-A

Figure 9-B

Figure 9-A- Diagrammatic presentation of Class IV Type C - Both RGR and IDGR extending up to/beyond MGJ.

Figure 9-B- Clinical picture of Class IV Type C - Both RGR and IDGR extending beyond MGJ in teeth # 31 and 41.

For recession on palatal surface, having no mucogingival junction, a separate grading can be applied as following:

- Mild palatal recession- gingival recession up to 3 mm,
- Moderate palatal recession- gingival recession more than 3 mm but less than 6 mm,

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- Severe palatal recession- gingival recession more than 6 mm.

CONCLUSION

This classification system is designed to include all the possible cases of gingival recession. It eliminates subjective criteria and bias because of objective criteria. The different possible positions of radicular gingiva are described in relation with cemento-enamel junction and mucogingival junction. The criteria are simple to judge and record. There are minimum chances of intra- and inter examiner variability, hence, suited for clinical and research studies.

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TABLE:

TABLE 1- Classification criteria for gingival recession:

Class I		RGR not extending up to MGJ and no IDGR.
Class II		RGR extending up to/beyond MGJ but no IDGR.
Class III	Type A	RGR not extending up to MGJ and IDGR not extending beyond mid facial CEJ.
	Type B	RGR not extending to MGJ and IDGR extending beyond mid facial CEJ but not up to MGJ.
	Type C	RGR not extending up to MGJ and IDGR extending up to/beyond MGJ.
Class IV	Type A	RGR extending up to/beyond MGJ with IDGR not extending beyond facial CEJ.
	Type B	RGR extending up to/beyond MGJ with IDGR extending beyond facial CEJ but not up to MGJ
	Type C	Both RGR and IDGR extending up to/beyond MGJ.