

Gingival Recession: Short Literature Review on Etiology, Classifications and Various Treatment Options.

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Abstract

Gingival recession is the term that designates the oral exposure of the root surface due to a displacement of the gingival margin apical to the cement-enamel junction. It is the most common and undesirable condition of the gingiva. The etiology is multifactorial and includes excessive or inadequate teeth brushing, destructive periodontal disease, tooth malposition, alveolar bone dehiscence, high muscle attachment, aberrant frenal pull, occlusal trauma, iatrogenic factors and smoking. It is ideally recommended to have an adequate mucogingival complex so that the MG tissues can sustain their bio-morphological integrity and maintain an enduring attachment to the teeth and the underlying soft tissues. Complete information on marginal tissue recession is essential for diagnosis, prognosis, treatment planning, and for communication between clinicians. However, most of the classifications are unable to convey all the relevant information related to marginal tissue recession. Hence, this review broadly discusses the possible causative factors, classifications including the various treatment options for GR.

Keywords: Gingival Recession, classification, treatment options.

INTRODUCTION:

Gingival recession (GR) is the term that designates the oral exposure of the root surface due to a displacement of the gingival margin apical to the cement-enamel junction (CEJ).^[1,2] It is the most common and undesirable condition of the gingiva and its prevalence commonly increases with age.^[3,4] GR either localized or generalized, is one of the clinical features of periodontal disease and is frequently associated with clinical problems such as root surface hypersensitivity, root caries, cervical root abrasions, erosions, plaque retention and aesthetic dis-satisfaction.^[5,6]

The etiology is multifactorial and includes excessive or inadequate teeth brushing, destructive periodontal disease, tooth malposition, alveolar bone dehiscence, high muscle attachment, aberrant frenal pull, occlusal trauma, iatrogenic factors (such as orthodontic, or prosthetic treatment) and smoking.^[7]

It is ideally recommended to have an adequate mucogingival (MG) complex so that the MG tissues can sustain their bio-morphological integrity and maintain an enduring attachment to the teeth and the underlying soft tissues. The MG problems can present either as close disruption resulting in pocket formation or as open disruption resulting in gingival clefts and GR.^[5]

Complete information on marginal tissue recession is essential for diagnosis, prognosis, treatment planning, and for communication between clinicians. However, most of the classifications are unable to convey all the relevant information related to marginal tissue recession. Hence, this review broadly discusses the possible causative factors, classifications including the various treatment options for GR.

Etiology of GR

The common etiologic factors are (1) local factors, (2) periodontal disease, (3) mechanical forces, (4) iatrogenic factors, and (5) anatomical factors.

Local factors: Plaque and calculus have been associated with inflammation in the connective tissue (CT) adjacent to the junctional epithelium resulting in development of GR.^[8,9]

Periodontal disease: The interaction between bacteria present in the plaque and immune response of the host results in matrix degradation, bone resorption, and down-growth of the epithelium, resulting in periodontal pockets, GR, or a combination of both.^[10]

Mechanical forces: Faulty tooth brushing is a common cause of GR. Aggressive tooth brushing gradually abrades the gingival tissue. The gingiva appears free of inflammation however the apical shift of the marginal gingiva exposes the root surfaces.^[11-13] Friction from the soft tissues i.e. gingival ablation has been implicated in GR. Occlusal traumatism is also an etiologic factor leading to MG problems^[14,15] but its mechanism of action has never been demonstrated.

Iatrogenic factors: Orthodontic tooth movement can alter the marginal and the papillary tissue. Creation of dehiscence during orthodontic movement often results in GR, more commonly this occurs in the lower incisors and the mesio-buccal root of first molars, especially in premolar extraction cases, but it can occur in any location. Studies have shown that the volume of soft tissue may be a key factor in predicting whether GR will occur during or after orthodontic therapy.

Restorative and prosthodontic procedures like crown preparations extending subgingivally, impression techniques involving gingival retraction, sub-gingivally placed restorations and crowns and overhanging restorations.^[16] Similarly, poorly designed dentures and

clasp placements can favor plaque accumulation around the abutment teeth consequently to GR.^[17,18]

Anatomical factors: Alveolar bone dehiscence, aberrant frenal attachment, tooth position and gingival morphology can play role in GR development.^[19-25] Narrow band of keratinized gingiva(KG) is commonly associated with GR.^[19,20] However, some studies refute the idea and have shown that with appropriate periodontal maintenance, areas of inadequate KG do not demonstrate further GR when compared with grafted gingival sites. Nevertheless, in patients who discontinued the maintenance program, inflammation recurred concomitant with recession.^[26] The morphology or biotype of the periodontium can be thin and scalloped, or thick and flat.^[27] Recession of the papillary and facial gingiva is common in thin biotype because the bone is also thin and there is higher incidence of dehiscence and fenestrations in thin bone. Minimal brushing force can result in soft tissue recession and exposure of the root in teeth with dehiscence covered with thin gingiva. Recession often continues until the soft tissue margin approaches the bone margin however, it fails to proceed in the absence of inflammation and this phenomenon has been termed as self-limiting recession. The position of the tooth in relation to the bucco-lingual dimension of the alveolar process has an effect on the position and thickness of the gingiva that will be established around the teeth. When a tooth is positioned facially, the bone and soft tissue on the facial of that tooth are thinner and more susceptible to soft tissue recession than the adjacent teeth. Studies have also shown association between root prominence and GR.

PATHOGENESIS OF GINGIVAL RECESSION

The mechanism of GR due to localized inflammatory processes in CT with the accumulation of mononuclear cells was described by **Baker and Seymour in 1976**^[28] they explained the different stages in the development of GR. In the initial stage there is normal or subclinical inflammation, following this inflammation appears clinically and histologically there is proliferation of epithelial rete pegs. Stage 3 shows increased epithelial proliferation resulting in loss of CT core and finally there is merging of oral and sulcular epithelium resulting in separation and recession of the gingival tissues due to loss of nutritional supply.

Waerhaug^[29] proposed that the distance between the periphery of plaque on the tooth surface and the labial, apical extension of the inflammatory infiltrate hardly ever exceeds 1-2 mm. Thus if the free gingiva is voluminous the infiltrate will occupy only a small portion of the connective tissue however, if it is thin the entire connective tissue portion may be involved consequently there is proliferation of epithelial cells from the oral and dento-gingival epithelium. Thus the zone of CT decreases and it is obliterated by the fusion of these two epithelia. Finally, the epithelium loses its nutritional source, and GR ensues.

CLASSIFICATION OF GR:

Classifications are used both as diagnostic and prognostic tools for root coverage procedures.

Sullivan and Atkins in 1968^[30] classified GR into four categories according to their morphology as Deep and Wide, Shallow and Wide, Deep and Narrow, Shallow and Narrow. [Figure 1]

Bengue et al in 1983^[31] classified the recessions based on their morphology and prognosis: "U" type recession has poor prognosis, "V" type recession has fair prognosis and "I" type recession has good prognosis.[Figure 2]

Miller in 1985^[32] proposed a classification which is the most widely used today. Miller's classification is as follows: Class I—Marginal tissue recession that does not extend to the mucogingival junction (MGJ), with no periodontal loss in the interdental area; the tooth is well aligned in the arch. One hundred percent root coverage can be anticipated. Class II—Marginal tissue recession that extends to or beyond the MGJ, with no periodontal loss in the interdental area; the tooth is well-aligned in the arch. One hundred percent root coverage can be anticipated. Class III—Marginal tissue recession that extends to or beyond the MGJ; bone or soft tissue loss in the interdental area is present, or there is mal-positioning of the teeth. Partial root coverage can be expected. Class IV—Marginal tissue recession that extends to or beyond the MGJ. The bone or soft tissue loss in the interdental area and/or mal-positioning of the teeth is so severe that root coverage should not be attempted.

Mahajan modification of Miller's classification^[33] in 2010, Mahajan classified GR based on the severity of soft and hard tissue loss in the inter-proximal area. Class I: GRD not extending to the MGJ, Class II: GRD extending to the MGJ/beyond it, Class III: GRD with bone or soft-tissue loss in the interdental area up to cervical 1/3 of the root surface and/or mal-positioning of the teeth and Class IV: GRD with severe bone or soft tissue loss in the interdental area greater than cervical 1/3rd of the root surface and/or severe mal-positioning of the teeth. Based on the class of recession prognosis was suggested. Class I and Class II with thick gingival profile has best prognosis, Class I and Class II with thin gingival profile has good prognosis, Class III with thick gingival profile has fair prognosis and Class III and Class IV with thin gingival profile has poor prognosis.

Smith's index of recession (IR) 1997^[34] in this index two digits separated by a hyphen describe the horizontal and vertical components of a recession site, prefixed by F or L. The horizontal component is a whole number value between 0–5 depending on the severity of the CEJ exposure on either the facial or lingual aspects of the tooth, between the mesial and distal midpoints. The second digit of the IR gives the vertical extent of recession measured in millimeters on a range from 0–9. An asterisk denotes involvement of the MGJ. Table 1 and 2 shows the scoring based on the extent of recession.

Figure 1: Sullivan & Atkins Classification

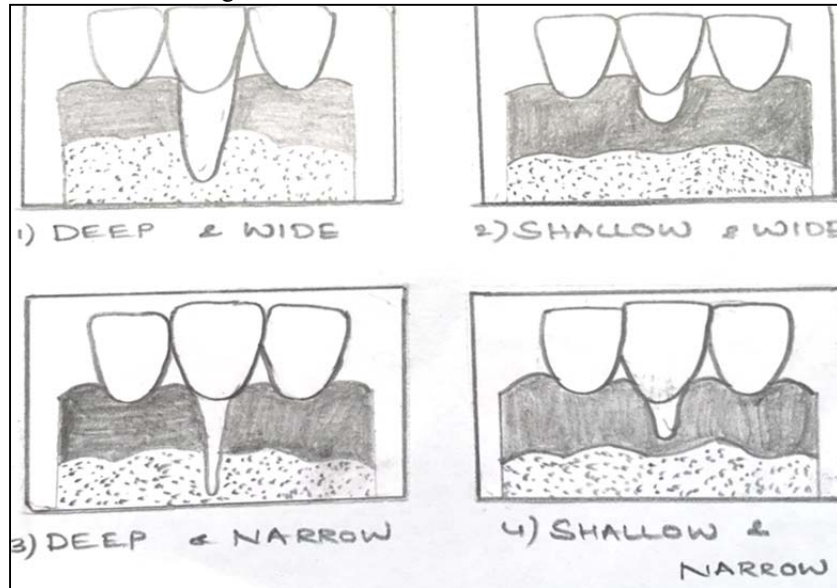


Figure 2: Bengue classification

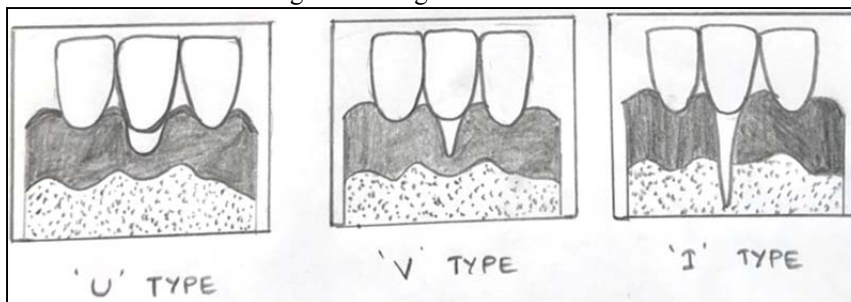
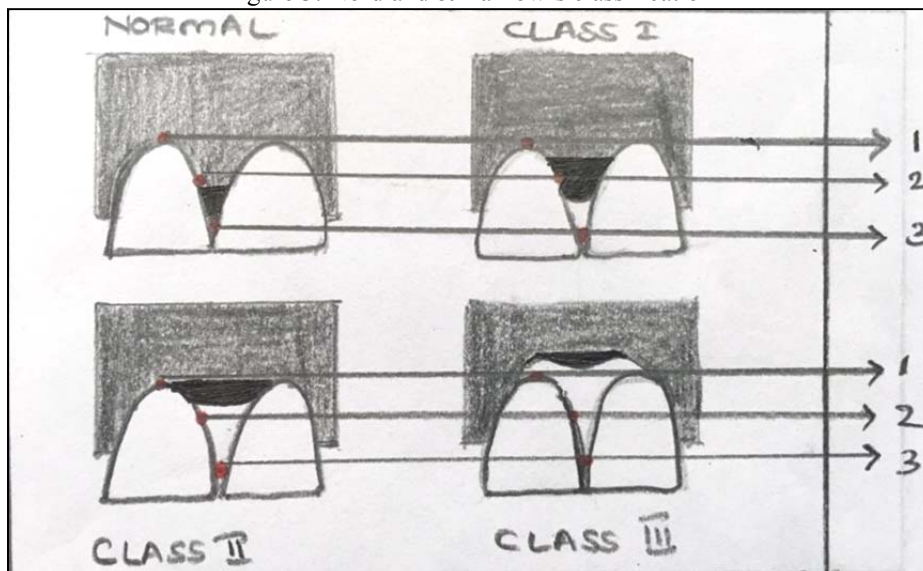


Figure 3: Nordland & Tarnow's classification



- 1- The interidental contact point
- 2- The apical extent of the facial CEJ
- 3- The coronal extent of the proximal CEJ

Table 1: Shows the scoring for horizontal extent of recession in Smith's index for GR

The horizontal extent of recession	
Score	Criteria
0	No clinical evidence of root exposure
1	No clinical evidence of root exposure plus a subjective awareness of dentinal hypersensitivity in response to a 1 sec air blast, and/or there is clinically detectable exposure of the CEJ for upto 10% of the estimated midmesial to mid distal distance
2	Horizontal exposure of the CEJ > 10% but < 25% of the estimated midmesial to mid distal distance.
3	Exposure of the CEJ >25%of the mid mesial to mid distal distance but not exceeding 50%
4	Exposure of the CEJ >50%of the mid mesial to mid distal distance but not exceeding 75%
5	Exposure of the CEJ >75%of the mid mesial to mid distal distance upto 100%

Table 2: Shows the scoring for vertical extent of recession in Smith's index for GR

The vertical extent of recession	
Score	Criteria
0	No clinical evidence of root exposure
1	No clinical root exposure plus a subjective awareness of dentinal hypersensitivity is reported and/or there is clinically detectable exposure of the CEJ not exceeding > 1mm vertical to the gingival margin.
2 to 8	Root exposure 2 to 8 mm extending vertically from the CEJ to the base of the soft tissue defect
9	Root exposure > 8mm from the CEJ to the base of the soft tissue defect.

Nordland and Tarnow 1998^[35] proposed a classification system for interproximal papillary height based on three anatomical landmarks: The interdental contact point, the apical extent of the facial CEJ and the coronal extent of the proximal CEJ. Normal: interdental papilla fills embrasure space to the apical extent of the interdental contact point/area. Class I: tip of interdental papilla lies between the interdental contact point and most coronal extent of interdental CEJ. Class II: tip of interdental papilla lies apical to interproximal CEJ but coronal to apical extent of facial CEJ. Class III: tip of interdental papilla lies in level with or apical to facial CEJ. Figure 3 shows the classification.

Cairo classification in 2011^[36] proposed a newer classification using the inter-dental clinical attachment level (ICAL) as an identification criterion wherein Recession Type 1 (RT1) is associated with no interdental attachment loss, Recession Type 2 (RT2) the loss of ICAL is equal or smaller than the buccal attachment loss and Recession Type 3 (RT3) the loss of ICAL is higher than the amount of buccal attachment loss.

Ashish Kumar in 2013^[37] classified recessions on the facial surfaces of maxillary teeth, palatal recessions, facial and lingual recessions of mandibular teeth, including interdental papillary recessions.

Class I: there is no loss of interdental bone or soft tissue. This is sub classified into 2 groups: Class I-A: Gingival margin on F/L aspect lies apical to CEJ, but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ. Class I-B: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ. Either of the subdivisions can be on F or L aspect or both(F and L).

Class II: The tip of the interdental papilla is located between the interdental contact point and the level at the CEJ mid-buccally/mid-lingually. Interproximal bone loss is visible on the radiograph. This is sub classified into 3 categories. Class II-A: There is no marginal tissue

recession on F/L aspect. Class II-B: Gingival margin on F/L aspect lies apical to CEJ but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ. Class II-C: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ. Either of the subdivisions can be on F or L aspect or both (F and L).

Class III: The tip of the interdental papilla is located at or apical to the level of the CEJ mid-buccally/lingually. Interproximal bone loss is visible on the radiograph. This is sub classified into 2 categories: Class III-A: Gingival margin on F/L aspect lies apical to CEJ, but coronal to MGJ with attached gingiva present. Class III-B: Gingival margin on F/L aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ. Either of the subdivisions can be on F or L aspect or both(F and L).

Classification of palatal GR: The position of interdental papilla remains the basis of classifying gingival recession on palatal aspect. The criteria of sub-classifications have been modified to compensate for the absence of MGJ.

Palatal recession-I: There is no loss of interdental bone or soft-tissue. This is sub divided into two categories. PR-1-A: marginal tissue recession ≤ 3 mm from CEJ. PR-1-B: Marginal tissue recession of > 3 mm from CEJ.

Palatal recession II: The tip of the interdental papilla is located between the interdental contact point and the level of the CEJ mid-palatally. Interproximal bone loss is visible on the radiograph. This is sub divided into two categories. PR-II-AS: Marginal tissue recession ≤ 3 mm from CEJ. PR-II-B: Marginal tissue recession of > 3 mm from CEJ

Palatal recession III: The tip of the interdental papilla is located at or apical to the level of the CEJ mid-palatally. Interproximal bone loss is visible on the radiograph. PR-III-A: Marginal tissue recession of ≤ 3 mm from CEJ. PR-III-B: Marginal tissue recession of > 3 mm from CEJ

TREATMENT OPTIONS:

NON-SURGICAL TREATMENT OPTIONS:

The objectives of nonsurgical therapy are to maintain or improve the periodontium and the exposed root surfaces when the findings and diagnosis do not warrant surgical treatment or when contraindications to surgery exist.

If the recession defect is minimal, not in the aesthetic area with no associated dentine hypersensitivity or root caries no treatment is indicated. It is imperative to identify and manage the etiology in order to prevent further recession. Additionally, it is also important to maintain good oral hygiene so that plaque induced gingival inflammation is prevented as it can result in further recession especially in thin gingival biotypes. In specific cases where the patient has a high smile line and the gingival zeniths are uneven due to recession or where root caries or dentine hypersensitivity develops it may be necessary for intervention and management. If the patient's primary complaint is sensitivity and aesthetics is not of much concern, then management of sensitivity using commercially available desensitizing agents alone may be sufficient.^[38] Small localized recession defects with sensitivity, wear or caries of the root surface can be corrected by bonding tooth colored composite over the exposed root surface. Careful placement of the composite restoration is essential to ensure that there are no plaque retentive margins which would promote further gingival recession.^[39]

Recession along with loss of interdental papillae results in spacing between the teeth these are referred to as 'black triangles'. Some patients also complain of altered speech due to air escaping through these spaces inter-proximally. The use of a removable gingival prosthesis can replace large volumes of receded soft tissue, fill the interproximal spaces to eliminate the black triangles and improve aesthetics.^[38]

Mal-positioned teeth either buccally/ labially may have a buccal dehiscence or associated recession. This is most often seen in buccally placed lower incisors where there is crowding of the lower labial segment. If the patient is willing for orthodontic management then any surgical intervention if planned should be delayed until after orthodontic tooth movement is completed. Scientific evidence indicates that orthodontic movement of the tooth lingually allows alveolar bone growth on the buccal aspect thereby allowing thickening of the gingival tissue and subsequent coronal shift in the gingival margin resulting in self correction of the recession defect.^[38] If following orthodontic treatment surgical intervention is still indicated then the outcome is likely to have higher predictability than if it was performed before orthodontic treatment.^[40]

SURGICAL MANAGEMENT:^[41]

Carlo et al proposed a schematic representation of various root coverage techniques for class I,II,III recessions after periodontal disease. Firstly, the pocket depth has to be assessed. If the pocket depth is <5mm (shallow) with adequate KT a pedicle graft (Coronally advanced flap (CAF)/ Laterally positioned flap/ Double papilla flap) is often recommended. Conversely, inadequate KT with shallow pocket may be indicated for free soft tissue grafts.

(Connective tissue graft (CTG) along with CAF/ Laterally positioned flap/ Double papilla flap/ Envelope technique, or a Free gingival graft (FGG) with CAF).

If deep periodontal pockets with a probing depth >5mm is evident, and KT is adequate then GTR technique can be carried out along with CAF. Inadequate amount of KT apical to the recession indicates the need for free soft tissue graft along with a membrane and CAF.

According to **Craiz Galanza**, when there is presence of adequate width of attached gingiva (WAG) perceived esthetic needs with no or removable root caries, a coronally positioned graft is advisable. When the WAG is inadequate with perceived esthetic needs and adequate donor tissue is available, a CTG/FGG is recommended. A two stage surgical procedure wherein stage I Pedicle graft is recommended followed by stage II maintenance) is advised in the presence of root caries.

CONCLUSION:

Management of recession and its sequelae is based on a thorough assessment of the etiological factors and the degree of involvement of the tissues. It goes without saying, that therapeutic interventions will be undermined in the long run if the cause of the problem is not removed. Once the etiology of the condition has been uncovered and addressed, a treatment plan to arrest or reverse the gingival recession should be formulated. The initial part of the management of the patient with gingival recession should be preventive and the degree of gingival recession should be monitored for further signs of progression. Given the focus on conservative therapy in modern dentistry, preventive therapy in the form of proper dietary and oral hygiene instruction should be the first line of defense against gingival recession. Prevention can be supplemented with scaling, polishing and root planing at appropriate intervals based on patient risk factors. Due to their invasive nature, surgeries are a last source of treatment, and should be used in patients who present with severe recession and/or extensive sensitivity and esthetic concerns. Surgical root coverage is a potentially useful therapy when esthetics is the priority and periodontal health is good. Careful case selection and surgical management are critical if a successful outcome is to be achieved.

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