

Gingival Recession, Types and Treatments: Literature Review

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Received: November 18, 2020; **Published:** December 29, 2020

Abstract

The term Gingival Recession (GR) is used to describe the exposure of the root portion of the tooth secondary to gingival margin displacement at the apex of the Cement-Enamel Junction (CEJ). The etiology of GR includes the presence of a destructive periodontal disease, inadequate and excessive teeth brushing, dehiscence of an alveolar bone, tooth malposition, insufficient gingival thickness or width, occlusal traumas, extensive frontal pull, high muscular attachments, smoking, and other iatrogenic factors as orthodontic and prosthetic therapies. The types of GR are variable based on the used classification system. Many classification systems have been developed, however, not many of them are still used. We could tell that Miller's and Cairo's classification are the most reliable and widely used classification systems by most clinical trials. However, a much more recent classification was developed in an evidence-based approach for the classification and management of GR by Chambrone and colleagues and seems to be more reliable even more than Cairo's and Miller's. However, future studies are needed to validate it. We have also identified many non-surgical modalities for the treatment of GR. This is due to the urge to favor the non-surgical approaches over the surgical ones which are invasive and has many side effects that can simply be avoided by proper intervention and non-surgical management.

Keywords: Gingival Recession; Classification; Types; Treatment; Surgical; Non-Surgical

Introduction

The gingiva is identified as the part of the masticatory mucosa that surrounds the teeth from their cervical portions and covers the alveolar process [1]. The term Gingival Recession (GR) is used to describe the exposure of the root portion of the tooth secondary to gingival margin displacement at the apex of the Cement-Enamel Junction (CEJ) [2,3]. It is considered not only one of the commonest functional and aesthetic disorders of the periodontium but also one of the commonest complex disorders regarding etiology and treatment. Previous studies have reported that the prevalence rate was about 50% of the investigated populations, with these lesions occurring at least at a single site of 1 mm exposure of the underlying root [4-7]. Increasing prevalence rates have been linked to age and male gender [8,9].

Moreover, it has been reported in patients with both bad and good oral hygiene [9]. The lesion can be also localized or generalized and can involve more than one aspect of the underlying tooth, however, the buccal surfaces have been reported to be the most affected ones [9].

As well as the effect of patients' demographics on the prevalence of the lesions [8,9], many predisposing factors that are correlated with the functional problems due to root exposure have been identified. These include plaque retention, dentinal hypersensitivity, root caries, gingival inflammation, in addition to losing alveolar bone, and subsequent tooth loss [10-18]. However, the mechanism behind the development of GR has not been fully comprehended, yet. On the other hand, many factors have been identified as possible etiologies for GR. These include the presence of a destructive periodontal disease, inadequate and excessive teeth brushing, dehiscence of an alveolar bone, tooth malposition, insufficient gingival thickness or width, occlusal traumas, extensive frontal pull, high muscular attachments, smoking, and other iatrogenic factors as orthodontic and prosthetic therapies [7,11,19, 20,21].

Besides, an adequate mucogingival complex application has been recommended to maintain the attachment of teeth with the underlying soft tissues. However, many problems have been identified with this approach including pathological pocket formation and GR and clefts [22]. Many classifications of GR have been introduced based on the diagnosis and prognosis of the disorder. Additionally, the management of GR has been also identified as a complex procedure. However, many approaches, including surgical and non-surgical ones, have been introduced to treat GR. These include the application of guided tissue regeneration, using various flap designs, tissue grafting, and orthodontic treatment. In this study, we aim to review the types and treatment approaches of GR.

Methods

We performed an extensive literature search of the Medline, Cochrane, and EMBASE databases on 15 October 2020 using the medical subject headings (MeSH) "[Gingival Recession [MeSH Terms]". Papers discussing the types and treatment approaches of GR were screened for relevant information. There were no limits on date, language, age of participants or publication type.

Types and classification of gingival recession

Many classification approaches targeting both the diagnosis and prognosis of GR since 1968. Sullivan, *et al.* [23] was the first report that classified GR based on the morphology of the lesions into four groups. These include (1) deep and narrow, (2) shallow and wide, (3) deep and wide, and (4) shallow and narrow. Additionally, a classification that is based on both the morphology and prognosis was then developed in 1983 by Benque *et al.* [24] where the lesions were classified into three categories including the "U", "V", and "I" describing the poor, fair, and good prognosis of the recessions, respectively. Two years later, Miller *et al.* [25] developed a classification system that is still widely used worldwide until the moment. The system consisted of four classification grades of GR [25]. These are (1) Class I: the presence of marginal tissue recession that does not interfere with the Mucogingival Junction (MGJ). Moreover, there 100% root coverage, no periodontal loss, and the tooth is well-fixed in the arch. (2) Class II: the presence of marginal tissue recession that extends to or beyond the MGJ with 100% root coverage, no periodontal loss, and the tooth is well-fixed in the arch. (3) Class III: the presence of marginal tissue recession that extends to or beyond the MGJ in addition to the presence of bone and soft tissue loss in the interdental area, or the presence of a malpositioned tooth, and partial anticipation of root coverage. Class IV: the presence of marginal tissue recession that extends to or beyond the MGJ in addition to the presence of bone and soft tissue loss in the interdental area, and/or the presence of a malpositioned tooth that is too severe to anticipate root coverage. The reason behind the superiority of Miller's classification on a clinical and research basis among all other classification systems is that it is well-deigned to be reproducible and clinically-oriented [25]. This can be proved by the fact that most of the published trials investigating the surgical management of GR have used Miller's classification system [26,27] which indicates the superiority of this scale up to the moment.

In 1997, Smith *et al.* [28] developed a scale measuring the index of recession and is consistent with two horizontal and vertical components of the recession site. The scale of the horizontal component is composed of 0-5 degrees based on the severity of exposure of any of

the facial and lingual aspects of the tooth where 5 represents a 75%-100% exposure of the CEJ and fewer grades represent less exposure. On the other hand, the other component is composed of a 0-9 scale measuring the vertical extension of the recession and represented in millimeters where 9 represents an 8 mm exposure of the tooth root from the CEJ to the base of the affected soft tissue. These two scales are then combined to form a two-digit scale representing both the vertical and horizontal exposure. Other classification systems have been also proposed in the following years including Norland and Tarnow classification in 1998 [29], Cairo classification in 2011 [30], Rotundo, *et al.* in 2011 [31], and Ashish Kumar classification in 2013 [32]. However, similar to Millers' classification, Cairo classification seems to be the most widely accepted recent classification among others. It is primarily based on the intradermal clinical attachment level (ICAL) to be used as an identification measurement [30]. Accordingly, three recession types (RT) have been developed including RT1 where there is no loss of the intradermal attachment, RT2 where the intradermal attachment loss is similar to or less than the buccal attachment loss, and RT3 where the intradermal attachment loss is greater than that of the buccal attachment. The recent wide acceptance of this scale even led to its involvement in the 2017 World Workshop that was held for the Classification of Periodontal and Peri-Implant Diseases and Conditions where it was used to manage mucogingival deformities and conditions [33,34].

Despite the difference in assessment between Miller's and Cairo's classification systems and the reliability and wide acceptance of each, Chambrone, *et al.* [27] argued that Cairo's measurement can be considered more reliable in predicting root coverage. On the other hand, many controversial points have been reported. For instance, Miller's classification considers the presence of keratinized tissue, however, it is clinically irrelevant in measuring the stability of the gingival margin unless minimal amounts of gingival attachment were present [35,36]. Moreover, both Miller's and Cairo's classification did not consider lingula defects but focused on the gingival phenotypes. Recent studies have reported that lingual defects after root covering procedures should be accounted for when making a decision [26,27,35-40]. Based on these claimed disadvantages, approaches have been contributed to adjust these elements and reach a better classification system. For this purpose, Chambrone, *et al.* [41] in 2020 proposed a classification system based on the type of the GR and the width of the attached gingiva and gingival thickness into three grades and three subtypes. By this, the authors have developed the most recent, reproducible, and accurate classification system and also being clinically practical as the authors depending on the findings of previous studies [42,43]. However, further studies are needed for further validation of this novel classification system.

Moreover, other classification options have been proposed. Mahajan, *et al.* [44] reported a modification on Miller's classification where they considered the severity of both soft and hard tissue in the interproximal site in the classification where GR was classified into four grades. The authors then furtherly subdivided these grades based on the prognosis of each where Grade I and II with thick gingival margins had a better prognosis than these with thin margins. Moreover, Grade III with gingival margins had a fair prognosis while Grade IV with thin margins possessed the worst prognosis. An additional classification of GR based on the palatal aspect has been also introduced. The classification was composed of three grades based on the presence and position of interdental bone or soft-tissue concerning the CEJ. Each grade was also sub-divided into two categories based on the distance between the marginal tissue and the CEJ, being less or more than 3 mm [24].

Management of gingival recession

Non-surgical therapeutic approaches

These approaches are indicated when surgical approaches are not urgent and when a contraindication to conduct the surgery was present. In general, these approaches aim to improve and maintain the exposed root surfaces and periodontium to obtain a better prognosis of the lesion. Moreover, it has been suggested that no treatment modalities should be applied in mild cases of GR with no present predisposing factors. However, it is essential to identify the risk factors and the underlying etiology that caused the lesion for the prevention of further attacks. This can be achieved by maintaining good oral health as an interventional approach against the development of oral plaque retention that will eventually lead to gingival inflammation. Moreover, in cases of hypersensitivity, desensitizing agents should

be used as an interventional method to prevent hypersensitivity that is considered a predisposing factor. Small GR caused by caries can be treated by tooth-colored composite, however, this should be done carefully to prevent accidental plaque formation and the development of another GR. Ali, *et al.* [45] in 2018, reported that non-surgical treatment of GR using platelet-rich plasma was an effective treatment modality in terms of efficacy, cost, preparation, and side effects. However, different GR classifications showed various responses to this treatment modality. The mechanism of healing behind the application of platelet-rich plasma is that it contains many growth factors that stimulate the proliferation and eventual healing of the affected tissues in addition to stimulating the proliferation of stem cells which will boost the healing process [46]. In the same context, Aimetti, *et al.* [47] also reported that the application of polishing for removing toxins from the exposed roots was effective in the prevention of future GR. Moreover, applying scaling and root planing for reducing root convexity was associated with a coronal shift to the gingival margin.

Surgical therapeutic approaches

Surgical approaches for the management of GR are needed in cases of decreasing root sensitivity, reducing cervical dental root caries, increasing the area of the attached gingiva, and enhancing esthetics. Many surgical treatment modalities have been reported. Among these, connective tissue grafting has been used to achieve root coverage. However, the success rate for this procedure has been reported to be variable as it depends on many factors including the site of GR and classification of the lesion, in addition to the used techniques for the operation [3,48]. Another modality is pedicle grafting which can be done as full or of partial-thickness and differs from tissue grafting having its blood supply intact which provides the required nourishment and induce the formation of new blood vessels connecting it with the target area [49,50]. Other related modifications to this approach have been reported later on. For example, a lateral sliding flap was first reported by Grupe, *et al.* [51], however, this technique should be done in the presence of adequate gingival tissue only that is being lateral to the GR site. Edentulous pedicle grafting has been also reported in the treatment of GR. On the other hand, when no adequate gingiva was present, a double-papilla repositioned flap could be used to cover the defected area. However, it may lead to pulling of the destruction of these papillae secondary to pulling the sutures [52,53].

Furthermore, Bernimoulin, *et al.* [54], reported another modality which is coronally positioned grafts which were done following a free autogenous tissue grafting. The full steps and details of the procedure have been described by Maynard, *et al.* [55]. Previous studies have compared between this procedure and lateral sliding flap procedures, however, no significant differences were found except for a 1 mm-exposure of the root with the later one [56]. Other techniques and approaches of this modality have been reviewed by Kassab, *et al.* [48]. Another modality is the free autogenous soft tissue grafts. Two types under this modality have been reported. These include epithelialized free autogenous gingival grafts and connective tissue autogenous grafts. Miller, *et al.* [57] reported a success rate of 90% of the first one, in obtaining a 100% root coverage, however, most of these cases were done in the mandible and few were in the maxilla. A combination of one or more of the aforementioned modalities has been also reported by Nelson, *et al.* [58] and Harris, *et al.* [59]. Guided Tissue Regeneration (GTR) has been also reported in the management of GR. It is basically on the induction of regeneration and compensation of the affected tissues and inducing their replacement with healthy tissues. Additionally, the use of bioabsorbable materials has been suggested to dispense with the need to perform another unnecessary surgical interventions [60]. Chambrone, *et al.* [41] classified the surgical modality based on the classification and severity of GR. For instance, gingival thickness augmentation using a bilaminar procedure has been indicated with the third degree of GR where no coverage is expected in addition to the presence of ≥ 1 mm of attached gingiva, and < 1 mm of gingival thickness.

Conclusion

In conclusion, the management of GR is mainly dependant on the identification of the underlying etiology and predisposing factors. Moreover, future efforts should be forwarded for the primary prevention of such events which may be the key to proper management. As for GR classification, the types of GR are variable based on the used classification system. Many classification systems have been devel-

oped, however, not many of them are still used. We could tell that Miller's are Cairo's classification are the most reliable and widely used classification systems by most clinical trials. We have also identified many non-surgical modalities for the treatment of GR. This is due to the urge to favor the non-surgical approaches over the surgical ones which are invasive and has many side effects that can simply be avoided by proper intervention and non-surgical management.

Acknowledgement

None.

Conflict of Interest

None.

Funding

None.

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Volume 20 Issue 1 January 2021

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