
ETIOLOGY OF GINGIVAL RECESSIONS - A LITERATURE REVIEW

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ABSTRACT

Gingival recession (GR) is a mucogingival defect that can affect all ages. GRs are most commonly diagnosed on the vestibular or proximal root surfaces of the teeth, predominantly in adult patients.

GR can be associated with anatomical, physiological or pathological factors - accumulation of dental plaque and dental calculus, traumatic brushing, anatomical developmental defects, mechanical trauma, occlusal trauma, thin periodontal phenotype, orthodontic treatment outcome, iatrogenic factors, previous periodontal treatment, abnormal gingivobuccal ligaments and frenulum attachments, extraction of neighbouring teeth, as well as smoking and tobacco chewing habits.

The etiology of GR can be a result of various factors and, in most of cases, a combination of several different ones.

Keywords: *etiology, gingival recession, risk factors, prognosis*

INTRODUCTION

The results of different studies about the occurrence and severity of gingival recessions in adult patients are variable between different populations. That is why it is necessary to be informed about the predisposing factors and epidemiology of this mucogingival condition, to identify all the etiological factors that can lead to gingival recessions, and to propose proper measures for prevention.

For the prevention of the occurrence of gingival recessions, it is important to investigate the main eti-

ological factors. The etiology of gingival recessions is determined by various factors and, in most cases, a combination of such.

The objective of this literature review article is to summarize and analyze the most important risk factors that are associated with the occurrence of gingival recessions.

METHODS

The article is based on a literature survey on the etiology of gingival recessions and on the analyses of previous systematic reviews of the problem. Its objectives are to answer some clinically related and common questions: Does traumatic toothbrushing cause gingival recession? Does orthodontic treatment impact the occurrence of gingival recession? Is thin gingival phenotype a condition associated with occurrence of such mucogingival condition? Are the thickness of the gingival tissues and the thickness of underlying alveolar bone crest important in the prevention of gingival recession? What is the impact of re-

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storative treatment in the cervical zone of teeth for the development of gingival recession?, etc.

LITERATURE SURVEY

Gingival recession (GR) is one of many mucogingival defects that can affect all ages. According to the American Academy of Periodontology (1992), it is determined as the distance of retraction of marginal gingival tissues apically to cementoenamel junction (CEJ) of the tooth (1). Some authors consider that the term „marginal tissue recession“ is more precise than the term „gingival recession,“ because the marginal tissues may include also alveolar mucosa. Therefore, marginal tissue recession is defined as the retraction of soft marginal tissues apically to the CEJ (AAP,1996) (2).

GRs can be located only on vestibular, lingual or approximal root surfaces of the teeth or on all tooth surfaces. They are most commonly diagnosed on the vestibular or proximal root surfaces of the teeth, predominantly in adult patients. GRs can occur in subjects with poor or good oral hygiene habits (3). They lead to localized or generalized exposure of the root surface, which may be associated with aesthetic complaints by the patient, especially in the frontal teeth area, or also with dental hypersensitivity, carious cervical lesions of the root, erosion or abrasion of the root surface, cervical tooth wear, and anxiety about tooth loss (4). The exposed root surface may also cause pulp hyperaemia. Interproximal recessions lead to the so-called black triangles between adjacent teeth, which predispose to the retention of dental plaque and food debris (5).

GRs can be associated with anatomical, physiological or pathological factors (6). Pathophysiologically they can be divided into gingival recessions caused by direct factors and such induced by predisposing factors (7,8).

In one study, Sarpangala et al. found that the most prevalent etiological factor for occurrence of gingival recessions is the accumulation of dental plaque (44.1%), followed by traumatic brushing (42.7%), smoking and tobacco chewing (7.1%), malocclusion (4.6%), abnormal frenulum attachments (0.4%), and other factors such as lack of attached gingiva, occlusal trauma, etc. (1%) (9).

The Impact of Gingival Inflammation

The most usual etiological factor related to the onset of GR is dental plaque accumulation and dental calculus (44.1%) resulting in gingival or periodontal inflammation (10,11,12,13).

Other prevalent etiologic factors that are associated with gingival recessions include traumatic toothbrushing (gingival abrasion - 42.7%) (9,11,14,15), anatomical developmental defects (such as bone fenestrations, dehiscences and teeth malposition), mechanical trauma (such as frictional injury due to scratching of gingiva), occlusal trauma, thin periodontal phenotype, lack of attached gingiva, shallow depth of the vestibulum that obstructs the effective personal oral hygiene, orthodontic treatment outcome (16,17), iatrogenic factors associated with improperly restored marginal edges of restorations (overhanging edges), previous periodontal treatment (repeated scaling and root planing), abnormal gingivobuccal ligaments and frenulum attachments or other tissue deformities (e.g. clefts or fissures) (4), extraction of neighboring teeth as well as smoking and tobacco chewing habits (5,7,18).

The Impact of Gingival Thickness

Yared et al. (2006) reported that 93% of the teeth that developed recession had a gingival thickness less than 0.5 mm (19). Some studies revealed that teeth with thinner gingival phenotype after augmentation by surgical procedures with soft tissue grafts have more stable soft tissues over time in comparison to the teeth with thin gingival phenotype without grafting procedures. Likewise, the occurrence and the progression of gingival recessions can be prevented for more than 20 years in cases of established proper personal oral hygiene habits (20).

The Impact of Traumatic Toothbrushing Methods

Incorrect and traumatic toothbrushing methods are the most significant mechanical etiologic factors associated with the development of GR, and following correction of the brushing technique no further progression was observed (21). Different studies show that traumatic toothbrushing factors like horizontal strokes, brushing force, duration of toothbrushing, the hardness of bristles, frequency of changing the toothbrush are etiologic risk factors for the occurrence of GRs (22).

The Impact of Aging

Woofter supposes in his studies that the development of GRs may also be a result of the physiological process of aging of the tissues (23). Some factors physiological aging of the soft tissues and alveolar bone and a long period (years) of exposure to risk agents that cause GR can explain the relationship between the occurrence of GRs and age. One research in the Bulgarian population also showed that the occurrence and frequency of GRs increase with increasing of age (24).

In young patients usually the occurrence of GR is localized and is related to separate etiological factors. On the other hand, the generalized prevalence of GRs in adults may be associated with the multifactorial acting of some etiologic factors, such as previous periodontal treatment accompanied by traumatic brushing (12).

The Impact of Mechanical Trauma

Carranza concludes that the progressing apical proliferation of the gingival margin may also be a result of chronic recurrent minor trauma (such as frictional injury due to scratching of gingiva) directly to the gingival tissues (25).

The Impact of Smoking

The prevalence of GRs in smokers is comparatively higher to that in non-smokers. Subjects below 35 years who are smokers (between 11 and 20 cigarettes per day) and have GR ≥ 1 mm have a notably higher prevalence compared to non-smokers. The relative risk of localized recessions is 2.1 times higher for smokers compared to non-smokers, and the risk of GRs is 4.2 higher for smokers and up to 7 times higher for heavy smokers (more than 20 cigarettes per day) (26).

The Impact of Cervical Restorative Margins

The incorrect placement of cervical restoration margins subgingivally may cause a direct mechanical trauma to the soft tissues. Such "improper" cervical restorations may also facilitate the retention and accumulation of subgingival dental plaque that can lead to gingival inflammation in the adjacent gingival tissues, resulting in the development of marginal tissue recession. One recent systematic review demonstrated that teeth with minimal or no keratinized gingival tissues and restored with incorrect subgingival cervical restorative margins are more predis-

posed to gingival inflammation resulting in the development of GRs. In such cases, when teeth must be restored with intracrevicular cervical restoration but have minimal or no keratinized gingival tissues, there is an indication for gingival augmentation (1).

The Impact of Orthodontic Treatment

The initiation or progression of GR can also be a result of orthodontic movement during or after orthodontic treatment (27). Some studies have revealed that GR may develop during or after orthodontic therapy (16). In a long-term observation, Karring et al. reported an increase of the prevalence of GR during orthodontic movement of up to 47%. They noted that, when a tooth in vestibular position is moved in a lingual direction within the alveolar process, the apicocoronal width of the facial keratinized gingival tissues will increase in its dimension (28). A recent systematic review showed that for the occurrence and progression of gingival recessions during orthodontic therapy significant factors can be the thickness of the gingival tissues and the direction of the orthodontic movement. When the thickness of gingiva is < 2 mm there is a higher risk of gingival recession during tooth movement. Therefore, in areas where the gingival thickness is < 2 mm, there can be an indication for augmentation of gingival tissues before starting with the orthodontic treatment (1).

The Impact of Orthodontic Anomalies

Bindu and Cherufound found in their studies that the most common etiological factor for the appearance of GR are orthodontic anomalies (29). GRs are prevalent in teeth in malposition (vestibular or oral position). In these cases the alveolar bone is thin or sometimes missing, resulting in thin gingival tissue in these areas. In cases of insufficient keratinized gingiva the risk of gingival recession occurrence is higher, especially due to the presence of less connective tissue in this area. This leads to localized inflammatory reaction that triggers various processes affecting the width of the attached gingiva, and subsequently leads to the occurrence of gingival recessions. In mandibular anterior teeth this may be one of the most prevalent etiologic factors of gingival recessions (12). The current consensus is that for the maintenance of periodontal health there must be at least 2 mm of keratinized gingival tissues and about 1 mm of attached gingiva around teeth (21).

The Impact of Cervical Carious and Non-Carious Lesions

The development of GRs can be associated with other etiological risk factors like root caries and non-carious cervical lesions (NCCLs). The presence of these conditions may cause some concavities of different depth and extension in the cervical area of the root surface that will lead to disappearance of the original CEJ (30).

GRs are most frequently recorded in mandibular incisors (43.0%), followed by maxillary molars (13.2%), mandibular premolars (12.2%), maxillary incisors and premolars (8.9%), mandibular molars (4.9%), maxillary canines (4.6%), and mandibular canines (4.3%). Recession was more commonly observed in the mandibular arch (66%) than in the maxillary arch (34%) (11). The occurrence of GR in mandibular incisors is mainly associated with poor oral hygiene (31), whereas in the area of premolars it is mainly caused by traumatic brushing (1).

However, the results in several other studies revealed that GRs are more common in maxillary first molars (32,33). This may be due to the angulation of the root cones of maxillary first molars in the bone. Some authors suggest that the most common cause of GRs in maxillary first molars is probably traumatic brushing (34), while others believe that most often they are a result of poor oral hygiene, presence of dental calculus, and dental plaque in this area (11).

In regard to the sex of the subjects, several studies report that the prevalence of GRs is higher in males compared to females (7,24).

DISCUSSION

The emergence and progression of GRs are associated with dentin hypersensitivity, dental plaque retention, carious/non-carious cervical lesions on the exposed root surface, and aesthetic complaints (35).

Epidemiology is useful in establishing the need for treatment or preventive care. It studies the correlation between two or more etiologic factors. Based on these relationships, there are different assumptions about the etiology of the disease. However, different correlations do not show the cause, but only the connection (33,36).

The aim of this article is to summarize the possible etiological risk factors associated with the oc-

currence of GRs. Studies by Dodwad (33), Bindu and Cheru (29), and Chrysanthakopoulos (32) indicate that the etiology of GRs is determined by many factors, such as traumatic brushing (15), teeth malposition, lack of function, abnormal frenulum attachment, bad habits, poor oral hygiene, etc., and there is often a cumulative effect involving two and more factors.

Most studies have found that the most common etiologic factor associated with GRs is dental plaque followed by traumatic brushing (31,32,37). The localized inflammatory process, induced by the dental plaque, causes proliferation of the junctional epithelium in an apical direction to the CEJ at the site of pathologically damaged tissues. This apical proliferation is clinically manifested as GR. On the other hand, Bindu and Cheru found in their studies that orthodontic anomalies are the most common etiologic factor for the appearance of GRs (29). Banihashemrad et al. find that GRs are more common in smokers (38).

In addition to the factors mentioned in the literature review, there are some other predisposing factors for the occurrence of GRs, such as chemical trauma, lack of function, that are not mentioned in the article.

CONCLUSION

The summary of the information in this article is likely to help develop long-term strategies for the prevention of the occurrence of GRs, and will allow us to predict the success rate of therapeutic measures. The etiology of these mucogingival conditions can be determined by different factors or a combination of factors as it is observed in most of the cases. That is why it is important to gather detailed information, to assess the epidemiology of GRs, to identify the etiological factors and to establish all possible preventive measures and correct treatment planning.

The adequate information and education in maintaining good personal oral hygiene should have a beneficial long-term effect in preventing the onset of GRs.

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