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Gingival Recession Revealed: Etiology Clinical Significance and Modern Treatments

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Abstract

Gingival recession is a prevalent condition characterized by the apical migration of the gingival margin, exposing the root surface and leading to potential attachment loss, hypersensitivity, root caries, and aesthetic concerns. Its etiology is multifactorial, involving aging, anatomical factors, trauma, systemic diseases, and vitamin deficiencies. Pathogenesis can be either trauma-associated or plaque-associated. Classification systems, such as Miller's, help in assessing the severity of recession. Evaluation involves measuring both vertical and horizontal dimensions of recession. Treatment approaches include non-surgical methods, like monitoring, use of desensitizing agents, and orthodontic corrections, and surgical methods, such as pedicle grafts, free grafts, and guided tissue regeneration. Effective management requires addressing the underlying causes and employing appropriate therapeutic techniques to enhance patient outcomes and oral health.

Keywords: Hypersensitivity, Desensitizing agents, Clinical Significance, Root surface, Plaque-associated.

Introduction

Gingival recession is a common condition in which there is apical migration of the gingival margin, resulting in exposure of the root surface.[1] It can result in attachment loss, hypersensitivity, and formation of root caries, and restorative challenges.[2] The etiology is multifactorial leading to recession. Some of the factors including age, anatomic factors, trauma, and systemic diseases such as diabetes, osteoporosis, autoimmune disorders, and vitamin deficiency have been elaborated in this review article. Additionally, recession can lead to aesthetic

concerns when it affects the anterior teeth. The management of gingival recession consists of surgical and non-surgical approaches. This review article focuses on the etiology, pathogenesis, classification, evaluation, clinical significance, treatment, and management of gingival recession.

Etiology

There are many factors contributing to the occurrence of gingival recession.

Ageing

The extent, prevalence, and severity of gingival recession increases with age and is most commonly found in males. Albander and Kingman conducted a study consisting of 9,869persons between 30-90 years of age from 1988-1994. They estimated that approximately 23.8 million people had gingival recession of 3mm or more.[3]

Anatomical factors

Abnormal tooth position - when there is crowding, there can be protrusion of teeth when the underlying permanent teeth emerge through gums. Consequently, the root of the tooth is not adequately covered by the jawbone.[4]Thin gingival biotype-there are susceptible to trauma, bone loss, poor resilience, and leads to inflammation.[5]High frenum attachment can lead to localized gingival recession.[6]Bone anatomy- When the root surfaces are not covered by the bone(dehiscence), it increases the risk of gingival recession.[6]

Pathological factors

Periodontal disease caused due to bacterial plaque and dental calculus can affect the supporting bone, resulting in the extrusion of teeth, and mobility leading to recession.[7]

Trauma

Trauma from tooth brushing is the most common cause leading to recession as it can lead to loss of the supporting periodontium.[8]

Iatrogenic factors

Orthodontic treatment, restorative, and prosthodontic treatment have shown the development of gingival recession. The labial or lingual movement of teeth during orthodontic treatment can cause the supporting alveolar bone plate to thin, dehisce, or fenestrate. If the alveolar bone does not adequately support the gingival margin, apical migration may occur, eventually leading to gingival recession.[9][10]

Systemic diseases

Diabetes – there will be poor blood sugar control, which decreases the blood flow to the gums and bone, leading to bacterial growth and infection.[11]Osteoporosis- as this condition weakens the alveolar bone, there will be an increased risk of infection.[12]Autoimmune diseases- lowers the natural defense mechanism of our body against infection, thereby making the gums more susceptible to gingival diseases. E.g.: Rheumatoid Arthritis [13].Hormonal changes- diseases affecting the hormone levels such as hyperthyroidism can alter the gum tissue integrity thereby leading to recession.[14]

Vitamin deficiencies

Vitamin Cis essential for the production of collagen synthesis and is a major component of the connective tissue in gums. Deficiency in Vitamin C leads to impairment in collagen synthesis and weakening of the gum tissues, leading to an increased risk of infections including gum infections like gingivitis and periodontitis, which can contribute to gum recession.[15]

Vitamin Kis crucial for the production of clotting factors that stop bleeding. Deficiency in Vitamin K leads to

persistent bleeding irritates the gum tissue and potentially leads to recession over time.[15]

Pathogenesis

The pathogenesis can be trauma-associated or plaque-associated.

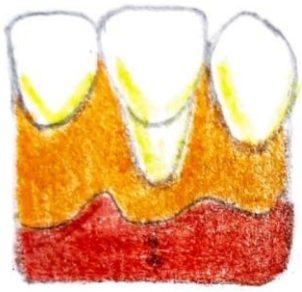
In trauma-associated, the outer epithelium of the healthy gingiva gets affected, initiating an inflammatory response in the connecting tissue leading to abrasion. When the trauma continues, it leads to ulceration and further leads to the apical migration of the gingival margin leading to recession.[16]

In plaque-associated, the presence of subgingival plaque in the gingival sulcus initiates an inflammatory response in the underlying connective tissue. When the bacterial proliferation continues, the junctional epithelium gets separated from the enamel and there will be complete involvement of the connective tissue. The epithelium loses its support and starts to migrate apically leading to gum recession.[16]

Classification

Various classifications were proposed, and the most widely used one is Miller's classification of gingival recession.[17]

Figure 1:



Class I: Marginal tissue recession not extending to the mucogingival junction. No loss of interdental bone or soft-tissue

Figure 2:

Class II: Marginal recession extending to or beyond the mucogingival junction. No loss of interdental bone or soft-tissue

Figure 3:

Class III: Marginal tissue recession extends to or beyond the mucogingival junction. Loss of interdental bone or soft tissue is apical to the cementoenamel junction, but coronal to the apical extent of the marginal tissue recession

Figure 4:

Class IV: Marginal tissue recession extends to or beyond the mucogingival junction. Loss of interdental bone extends to a level apical to the extent of the marginal tissue recession.

Sullivan and Atkins in 1968[17]

Based on the depth and width of the defect

Figure 5: Deep wide

Figure 6: Shallow wide

Figure 7: Deep narrow

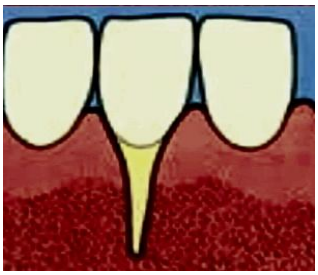
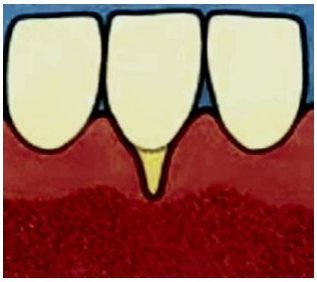


Figure 8: Shallow narrow



Evaluation of Gingival Recession

The gingival recession can be apparent or actual.

Actual gingival recession extends from the base of the sulcus to the gingival margin. Apparent gingival recession extends from the gingival margin to the cementoenamel junction.

To evaluate the gingival recession, both the vertical dimension (from the cementoenamel junction to the gingival margin) and the horizontal (mesiodistal) are done.

Clinical Significance

Dentin hypersensitivity- As there are exposed root surfaces that lack enamel, it can lead to increased sensitivity to temperature and acidic foods, resulting in pain and discomfort to the patient.[19]

Aesthetic concerns- Gingival recession can negatively impact the appearance of the smile. As there is exposure of the root surface, it appears darker or discolored compared to the surrounding enamel leading to an unesthetic smile.[20] This in turn can cause psychological impact.

Increased risk of root caries– because of lower mineral content in the dentin and the cementum, plaque accumulation occurs, resulting in caries.[21][22]

Compromised Periodontal health- As there will be an accumulation of plaque and calculus, it leads to the periodontal pockets. When they are left untreated, there will be attachment loss, and bone loss, thereby progressing to periodontal disease.[7][23]

Tooth mobility and tooth loss- when there is compromised periodontal health, it results in the loss of supporting structures, leading to mobility of teeth and loss.[7]

Restorative challenges- Restorative procedures on exposed root surfaces can be challenging due to the anatomical differences compared to enamel-covered crowns.

Treatment and Management

The treatment consists of two approaches, non-surgical and surgical approaches.

Non-Surgical Approach Includes

Monitoring and prevention of further recession

If there is a minimal recession, which does not affect the aesthetics, dentin hypersensitivity, or root caries it may be acceptable to the patient to do nothing. It is crucial to

identify and manage the cause of the recession, to prevent further progression.[24]

Pink porcelain or composite

When there are small or localized defects such as sensitivity and root caries, tooth-colored materials like composite and gingival-colored porcelain can be used to restore aesthetics.[24][25]

Desensitizing agents

Some including varnishes, dentin bonding agents, and glass ionomer cement can be used as desensitizing agents to treat dentin hypersensitivity. Their mechanism of action is either by blocking the dentinal tubules or preventing nerve stimulation.[24]

Removable gingival veneers

This is mainly indicated in aesthetic concerns where surgery cannot be performed.[24]

Orthodontics

Orthodontic repositioning of the root toward the center of the alveolar envelope reduces gingival recessions.[26] It is indicated in cases of buccal or labial malposition teeth and dehiscence.[24]

Surgical Approach Includes

Pedicle graft

These types of grafts stay attached at the base, while the soft tissue is positioned over the recession. They maintain their blood supply during the transfer to a new location. E.g.: Laterally repositioned flap, Double papilla rotation flap, and Coronally repositioned flap.[27]

Laterally Repositioned Flap

A split-thickness pedicle flap is raised, rotated, and placed on the exposed root surface and connective tissue. Relieving incisions for tension-free flap closure can be given apically, followed by suture application applied over the pedicle flap.

Double papilla rotation flap

Split-thickness flaps of the papillae on either side of the recession are given. Then, vertical releasing incisions on both sides are given, followed by approximating two flaps from either side, placing them on the exposed root surface, and finally sutured along the midline of the root.[28]

Coronally repositioned flap

It involves the use of vertical releasing incisions on either side of the recession defects beyond the mucogingival junction, one on the mesial side and the other on the distal side, followed by raising a split-thickness flap and also the coronal interdental papillae are de-epithelialized to receive the coronally repositioned flap. At last, the flaps are sutured 1mm coronal to the cementoenamel junction so that it can compensate for the shrinkage of the flap.[29]

Free graft

The Soft tissues are transferred from a distant area to the defective site. These techniques are employed when there is insufficient donor tissue near the recipient site or when the goal is to increase tissue thickness.E.g. Free gingival graft, Subepithelial connective tissue graft.[27]

Free gingival graft

A split thickness flap removes the epithelium and exposes the connective tissue, followed by harvesting free gingival graft from the palate of 1.5mm thickness. In the case of a one-stage procedure, the graft is sutured over the root surface. In the case of a two-stage procedure, the graft is placed apical to the recession defect.[30]

Subepithelial connective tissue graft

It involves raising a split-thickness flap at the recipient site, followed by harvesting connective tissue graft from the palate. The graft is sutured 1mm over the site above the CEJ.

This subepithelial connective tissue graft is indicated in single and multiple recession cases.

Guided Tissue Regeneration [GTR]

Resorbable and non-resorbable membranes are used in this method to treat gingival recession.

Step 1: Raising a full-thickness flap around the recession.

Step 2: Placement of the membrane.

Step 3: Covering it with a coronally advanced flap.

GTR is performed to allow normal connective tissue attachment by preventing the formation of long junctional epithelium. The main advantage of this method is that no need for a secondary surgical procedure. The results of this method show a significant root coverage.[31]

Conclusion

Gingival recession occurs as a result of multifactorial etiology. If there is good oral hygiene, and timely visit to the dentist helps in the early detection of gingival recession and can be treated accordingly. It also prevents the occurrence of periodontal problems such as tooth mobility, and bone loss. The first line of treatment must remove the etiological factor followed by treatment methods that include non-surgical and surgical approaches.Non-surgical approach includes modified oral hygiene practices, using desensitizing agents and Surgical approach includes the use of various grafts to cover the exposed areas such as pedicle graft, free gingival grafts and guided tissue regeneration. By combining patient education, preventive measures, and advanced therapeutic techniques, dental professionals can effectively manage gingival recession, leading to better patient outcomes and improved oral health.

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