Journal of Oral Medicine and Dental Research

Genesis-JOMDR-6(1)-83
Volume 6 | Issue 1
Open Access
ISSN: 2583-4061

Gingival Recession Due to Orthodontic Treatment: Prevention and Treatment Methods

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Citation: Sozen O, Erolu EG, Karadede Unal B. Gingival Recession Due To Orthodontic Treatment: Prevention And Treatment Methods. J Oral Med and Dent Res. 6(1):1-6.

Received: October 15, 2024 | **Published:** January 15, 2025.

Abstract

Introduction: Gingival recession, characterized by the apical migration of gingival tissues from the enamel-cementum junction, is a significant periodontal complication observed during and after orthodontic treatment. This condition can lead to both aesthetic concerns and functional problems such as dentin sensitivity and root caries. Various factors, including tooth anatomy, mechanical trauma, and thin gingival biotype, contribute to the development of gingival recession. In particular, orthodontic forces moving teeth beyond alveolar bone margins can exacerbate this risk. Therefore, preventive measures such as controlled force application and personalized treatment plans are critical.

General Information: Gingival recession risk is heightened in individuals with thin keratinized gingiva, and the timing of surgical interventions is essential for maintaining periodontal health. Techniques like connective tissue grafting and regenerative procedures such as Guided Tissue Regeneration (GTR) offer effective solutions for preserving and restoring gingival tissues.

DOI: *https://doi.org/10.52793/JOMDR.2025.6(1)-83*

Additionally, Free Gingival Graft have proven to be highly effective surgical interventions for treating post-orthodontic gingival recession. These methods not only restore gingival health but also improve aesthetics and functionality.

Conclusion: In conclusion, managing gingival recession during orthodontic treatment requires a multidisciplinary approach. A combination of non-surgical and surgical methods, applied at the appropriate time, is crucial for achieving long-term periodontal health and treatment success.

Keywords

Orthodontics; Gingival recession; Tooth movement

Introduction

The gingiva is a part of the masticatory mucosa and is the tissue covering the alveolar bone and surrounding the cervical region of the tooth [1]. Gingival recession is defined as retraction of gingival or soft tissues in the facial, lingual or interproximal (papillary) region and displacement of the marginal tissue towards the apical part of the enamel-cementum junction line [2]. As a result of gingival recession, dentin sensitivity and root caries may occur, which may cause functional problems as well as aesthetic concerns in patients. Therefore, the closure of the areas where gingival recession occurs is of critical importance in terms of eliminating the patient's complaints. Factors such as tooth anatomy and malposition, mechanical trauma, traumatic habits, occlusal trauma, thin alveolar bone and gingival structure, orthodontic tooth movement, local plaque retention factors, periodontal diseases and smoking can lead to gingival recession [3]. As a result of gingival recession, complications such as dentin sensitivity, root caries, root abrasions, plaque retention and increased gingival bleeding can be observed in addition to aesthetic disorders [4].

Malocclusion is a dentofacial growth and development disorder that represents an important health problem, has a psychosocial impact on the lives of adolescents and can lead to functional problems, and is an abnormal occlusion with incompatibility between the jaws in sagittal, vertical and transverse planes and/or anomalies in the position, number, shape and development of teeth [5-6]. In 1899, Edward Angle accepted the upper first molar tooth as the key to occlusion and defined the relationship in which the mesiobuccal pulley of the upper first molar sits in the buccal groove of the lower first molar as the ideal occlusion [7]. According to studies, the incidence of malocclusion varies between 20% and 100% and has been stated as the most common dental problem [8-10].

Although orthodontic treatment is a treatment method applied to provide aesthetic and functional harmony of the teeth and jaw structure, some undesirable periodontal effects may also occur. One of these effects is gingival recession. Gingival recession is observed more frequently, especially in individuals with a thin gingival biotype and when the teeth are moved beyond the alveolar bone margins[11]. This complication is an important problem in terms of long-term protection of periodontal health as well as aesthetic concerns. Therefore, it is of great importance to carefully observe gingival health and take necessary precautions during orthodontic treatment [12]. In this review, the current literature on the

prevention and treatment of gingival recession associated with orthodontic treatment will be reviewed.

General Information

Gingival recession during orthodontic treatment is an important periodontal problem that can occur under the influence of various biological and mechanical factors. The factors underlying this recession are evaluated in a wide range from the gingival structure of the individual to how tooth movements are performed. Movement of the teeth beyond the alveolar bone margins, the effect of mechanical forces on periodontal tissues and patient-specific risk factors are the main factors that increase the risk of gingival recession. In order to prevent this complication during orthodontic treatment, it is necessary to be careful in treatment planning and to closely observed the periodontal health of the individual. [13-16]. Biomechanical forces applied during orthodontic treatment can cause gingival recession by moving the teeth outside the alveolar bone boundaries (Figure 1a, 1b).

In particular, excessive displacement of the teeth in the labial or lingual directions can lead to fenestration and dehiscence of the alveolar bone, causing damage to periodontal tissues and gingival recession. Controlled and slow application of forces is a critical measure for the protection of periodontal tissues [13, 17, 18].

Figure 1a: 7 mm Gingival Recession Developed During Orthodontic Treatment. **Figure 1b:** 4 mm Wide Gingival Recession Developed During Orthodontic Treatment.

Personal characteristics and lifestyle of the individual during orthodontic treatment are important factors that increase the risk of gingival recession. Factors such as poor oral hygiene, smoking and genetic predisposition contribute to gingival recession. Poor oral hygiene can trigger gingival inflammation by causing plaque accumulation and accelerate gingival recession. Smoking further increases the risk of recession by negatively affecting gum health. In addition, genetic predisposition may cause individuals to be more vulnerable to gingival recession [13,17,19]. Controlling these factors contributes to the protection of gingival health during orthodontic treatment. Gingival biotype is one of the most important factors directly affecting the risk of gingival recession. The risk of gingival recession during and after orthodontic treatment is quite high in individuals with thin keratinized gingival structure. Studies have reported that this complication is more common in individuals with thin biotyped gingiva undergoing orthodontic treatment. In patients at risk of gingival recession, the timing of surgical intervention is of great importance for the success of orthodontic treatment. Performing surgical intervention before orthodontic treatment may help to preserve gingival tissues, especially in patients with thin keratised gingiva [20-24].

Connective tissue grafting applied before or after orthodontic treatment is generally a preferred technique

to prevent gingival recession and strengthen periodontal tissues. This procedure encourages the formation of new tissue on the root surfaces where gingival recession occurs, thus preventing possible gingival recession during the orthodontic treatment process [25]. Regenerative procedures also play an important role in the prevention and treatment of gingival recession. Such procedures are performed with resorbable membranes or proteins that regenerate gingival tissue (such as enamel matrix proteins). Guided tissue regeneration (GTR) enables re-covering of the tooth root and remodelling of the periodontal tissues. Such regenerative procedures, especially before surgical interventions and during orthodontic treatment, are an ideal option for tissue preservation during tooth movements. [26-28]. Free Gingival Graft and Pinhole Surgical Technique have an important place among The surgical methods used for gingival recession after orthodontic treatment. Free Gingival Grafting allows the tooth roots to be covered with tissue taken from the palatal region of the patient in order to strengthen the gingival tissue in areas where gingival recession occurs (Figure2a,2b). This method aims both aesthetic and functional improvement by thickening the gum tissue. It is a particularly recommended method for gingival recession after orthodontic treatment and provides long-term stable results [25] Pinhole Surgical Techniqe stands out as a minimally invasive method and offers an approach that does not require sutures or incision lines in the treatment of gingival recession. By opening a small pinhole, the gingival tissue is loosened with special instruments and slid over the tooth roots. One of the biggest advantages of PST is the fast recovery time and a more comfortable postoperative period for patients. This technique offers an effective solution for aesthetic and functional correction of gingival recession after orthodontic treatment [29] (Figure2a,2b).

Figure 2a: T0: Patient with Keratinized Gingival Recession. **Figure 2b:** T1: Free gingival graft was adapted and sutured to the recipient site with absorbable sutures.

In the early stages of gingival recession during orthodontic treatment, non-surgical interventions may be preferred. Plaque control, regular cleaning and maintenance of hygiene habits prevent gingivitis and prevent the progression of recession [23]. Surgical interventions are necessary in advanced cases of gingival recession. Connective tissue grafting is one of the most commonly used methods and aims to regenerate the receding gingival tissue. Directed tissue regeneration helps to regenerate periodontal tissues in cases where bone loss is also present [24].

Conclusion

In conclusion, gingival recession during orthodontic treatment is an important periodontal complication that can have serious aesthetic and functional consequences. Especially in individuals with thin gingival biotype, the risk is higher, therefore preventive surgical interventions are of great importance. Surgical methods such as Free Gingival Graft and Pinhole Surgical Technique allow effective treatment of gingival

recession after orthodontic treatment. Maintaining gingival health requires a multidisciplinary approach and the application of surgical and non-surgical methods at the right time. For the long-term protection of periodontal tissues and success in the treatment process, it is critical to create a patient-based treatment plan before and after orthodontic treatment.

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