CASE REPORT

GINGIVECTOMY AND GINGIVOPLASTY FOR ORTHODONTIC INDICATIONS: A CASE REPORT

GENGIVECTOMIA E GENGIVOPLASTIA POR INDICAÇÃO ORTODÔNTICA: UM RELATO DE CASO

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ABSTRACT

Patients undergoing treatment with fixed orthodontic appliances are at increased risk of dental plaque accumulation due to the presence of components that impair proper oral hygiene. This condition may lead to gingival alterations associated with increased dental biofilm accumulation, including gingival hyperplasia, resulting in both aesthetic and functional discomfort. This study aimed to report a clinical case of inflammatory gingival hyperplasia in a patient undergoing orthodontic treatment, evaluating and comparing the effectiveness of different therapeutic approaches employed for its management. The patient underwent basic periodontal therapy followed by gingivectomy using two different surgical approaches: internal and external bevel techniques. The internal bevel technique was performed in the maxillary arch, while the external bevel technique combined with gingivoplasty was performed on the mandibular arch. The proposed treatment aimed to facilitate oral hygiene and improve aesthetics. Both surgical techniques proved functionally effective in restoring gingival morphology and achieving favorable outcomes. Internal bevel gingivectomy preserved the oral epithelium and maintained uniform gingival pigmentation, which was not observed with the external bevel technique in a non-aesthetic area. Patient adherence and consistent supragingival biofilm control were essential for preventing recurrence of gingival hyperplasia.

Keywords: Gingival hyperplasia; Orthodontic appliances; Gingivectomy; Compliance; Aesthetics.

RESUMO

Os pacientes submetidos ao tratamento ortodôntico por meio do uso de aparelhos fixos são mais propensos ao acúmulo de placa bacteriana na cavidade oral, em razão desses dispositivos dificultarem a realização adequada da higiene bucal. Tal condição pode propiciar o desenvolvimento de alterações gengivais, como a hiperplasia gengival, que pode comprometer tanto a estética quanto a função oral. O objetivo deste estudo foi relatar um caso clínico de hiperplasia gengival inflamatória em uma paciente submetida a tratamento ortodôntico, avaliando e comparando a eficácia de distintas abordagens terapêuticas para o tratamento. A paciente foi submetida à terapia periodontal básica e, posteriormente, foi realizada gengivectomia com duas técnicas diversas: do bisel interno e do bisel externo. A primeira foi empregada na arcada superior, enquanto a segunda, associada à gengivoplastia, na inferior. O tratamento proposto teve a finalidade de facilitar a higienização por parte da paciente e restabelecer a estética. Concluiu-se que ambas as técnicas cirúrgicas foram funcionalmente eficazes, originando uma morfologia gengival adequada e alcançando resultados estéticos e funcionais favoráveis. A gengivectomia associada ao bisel interno preservou o epitélio oral e a uniformidade da pigmentação gengival, o que não ocorreu na técnica do bisel externo em área não estética. A colaboração e o controle do biofilme supragengival, realizado rotineiramente pela paciente, constituem fatores essenciais para a não recidiva da hiperplasia gengival.

Palavras-chave: Hiperplasia gengival; Aparelho ortodôntico; Gengivectomia; Cooperação do paciente; Estética.

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INTRODUCTION

Fixed orthodontic appliances tend to create plaque-retentive areas that favor biofilm accumulation and hinder its removal by means of routine oral hygiene practices. Additionally, bonded orthodontic brackets and excess cement provide sites for bacterial colonization and retention, constituting local risk factors for periodontal health (1,2). Therefore, maintaining adequate oral hygiene in individuals undergoing fixed orthodontic treatment is essential to prevent complications such as caries, enamel demineralization, white spot lesions, gingivitis, gingival hyperplasia, and periodontitis (3).

"Biofilm-Induced Gingivitis, Modified by Local Risk Factors," as described in the 2018 classification of the European Federation of Periodontology (EFP) (4), may develop because of this process and is associated with both tissue growth and gingival recession (5). Therefore, gingival hyperplasia results from excessive gingival tissue growth, which may be localized or generalized (1,4,5), affecting all three components of the gingiva (marginal gingiva, interdental papilla, and attached gingiva). The response to this bacterial challenge varies among individuals in terms of clinical presentation and onset and may depend on the quality and/or quantity of the biofilm and the host immune response (6). Furthermore, allergic contact stomatitis caused by dental metals, particularly nickel released from orthodontic brackets, has also been associated with gingival hyperplasia (7). As inflammation and gingival hyperplasia progress, the gingival sulcus may deepen into a periodontal pocket (pseudopocket), creating an area where effective plaque removal becomes difficult or impossible (7).

Treatment of gingival hyperplasia involves controlling the infection by removing plaque and instructing oral hygiene, as well as scaling the supragingival and subgingival calculus. The aim is to reduce gingival inflammation while reinforcing patient motivation to improve oral hygiene practices and adhere to treatment (7). In cases where the gingival tissue remains fibrotic and enlarged, surgical correction by means of gingivectomy may be necessary. This procedure can be performed using different techniques, including internal bevel gingivectomy or external bevel gingivectomy combined with gingivoplasty. In the former, excess tissue is removed internally while preserving the oral epithelium; in the latter, a portion of the epithelium is removed, extending into the connective tissue (8).

Additionally, gingival hyperplasia associated with fixed orthodontic appliances induces a series of significant periodontal alterations (9,10). The placement of orthodontic brackets leads to both quantitative and qualitative modifications in dental plaque composition, increasing the risk of periodontal disease and dental caries (11). An increase in spirochetes and other periodontal pathogens, such as *Prevotella intermedia*, *Aggregatibacter actinomycetemcomittans*, *Porphyromonas gingivalis*, *Fusobacterium nucleatum*, and *Candida sp.*, has been reported. Oral hygiene becomes significantly more difficult in interproximal areas due to the presence of orthodontic appliances. Moreover, as these appliances are usually placed during adolescence—a period often characterized by limited adherence to oral hygiene—maintaining adequate oral health becomes even more challenging (12). Consequently, gingival alterations of varying severity have been reported in most patients undergoing fixed orthodontic treatment (13). However, gingival hyperplasia is associated not only with the accumulation of existing biofilm and the quantitative increase of microorganisms, but also with the specific composition of oral microbiota, as well as with ligatures and materials used in orthodontic brackets (12,14).

The use of interdental brushes in conjunction with dental floss and/or interdental tape significantly reduces microorganisms within dental biofilm, thereby contributing to improved gingival health. Therefore, gingival hyperplasia caused by biofilm accumulation associated with orthodontic appliances can be resolved with effective plaque control and proper oral hygiene maintenance by the patient (15). Considering this, the study aimed to report a clinical case of inflammatory gingival hyperplasia in a patient undergoing orthodontic treatment, evaluating and comparing the effectiveness of different therapeutic approaches employed for its management.

CASE REPORT

A 20-year-old Black female patient with fixed braces, referred by an orthodontist within the Brazilian Unified Health System (Sistema Único de Saúde, SUS), presented to the Periodontics Specialization Clinic at the Universidade do Estado do Rio de Janeiro (UERJ). Her main complaint was excessive gingival growth following the placement of orthodontic appliances eight years earlier. The patient reported aesthetic concerns when smiling, difficulty in brushing, bleeding during oral hygiene, caries, and calculus accumulation.

During the anamnesis, the patient reported not taking any regular medication and denied any history

of allergies. At the initial evaluation, her blood pressure was 110 x 70 mmHg. After data collection, periodontal examination was performed, revealing buccal gingival hyperplasia extending from teeth 15 to 25. A similar condition was observed in the mandibular arch, with sulcus depth/pseudopocket depth ranging from 4 to 6 mm. During the clinical examination and photographic documentation, the patient was noted to present a "gummy smile" (gingival display > 3 mm) (Figure 1). In addition to inflammatory gingival hyperplasia and plaque accumulation, excess light-cured composite resin was observed around the brackets (Figure 2). However, gingival hyperplasia was the main cause of the patient's dissatisfaction.

Figure 1 – Patient showing excessive gingival display when smiling.

Figure 2 – Gingival hyperplasia registered at baseline before treatment.

The proposed treatment plan consisted of basic periodontal therapy, including biofilm control, instruction and motivation for oral hygiene, and supragingival and subgingival scaling, with the aim of reducing inflammation and eliminating the local etiological factors associated with gingivitis. The following complementary tests were requested: blood count, prothrombin time, partial thromboplastin time, and HbA1c.

After reevaluation, gingivectomy and gingivoplasty were planned for teeth 15–25. The results of the blood tests were within normal limits. The surgical procedure was initially scheduled for the maxillary region, followed by treatment of the mandibular area. On the day of the first surgery, the patient rinsed with 0.12% chlorhexidine digluconate for 60 seconds to reduce bacterial load. Extraoral antisepsis was then performed using 0.2% chlorhexidine, followed by the application of topical anesthetic Benzotop® (DFL, Rio de Janeiro/RJ, Brazil). Finally, the middle and anterior superior alveolar nerves were blocked with Alphacaine 100® (2% lidocaine hydrochloride with epinephrine 1:100,000; DFL, Rio de Janeiro, Brazil). After the anesthetic diffusion time, the base of the pseudopockets was identified using a PCPUNC156 probe (Hu-Friedy®). The measurements were then transferred to the buccal surface to create three bleeding points (mesiobuccal, midbuccal, and distobuccal), which served as reference points for the gingival incision. The highest point on the central incisors was displaced 1 mm distally to achieve a more esthetic contour. During this first surgical procedure, an internal bevel incision was performed using 15C blades (Swann-Morton®), connecting the bleeding points. The collar was then removed using a Mini Gracey 5-6 curette (Hu-Friedy®) (Figure 3).

Figure 3 – Right maxillary hemiarch following internal bevel gingivectomy compared with the untreated left maxillary hemiarch.

Next, Castroviejo scissors (I.M.L®) were used for the careful removal of residual tissue and gingival recontouring. Suturing was performed using a 5-0 blue nylon polyamide suture (Techsuture®). No periodontal dressing was applied following the procedure. For postoperative pain management, 1 g dipyrone monohydrate was prescribed every six hours as needed for pain during the first 48 hours. Chemical control was recommended by the topical application of Perioxidin gel® (0.2% chlorhexidine digluconate) to the surgical site. Routine toothbrushing of the mandibular arch and tongue cleaning were maintained in the remaining areas.

The first follow-up visit took place seven days after surgery, at which time some loose sutures were observed. As the surgical site remained edematous, the sutures were not removed at that appointment. Fifteen days after the procedure, the sutures were removed. Intraoral photographs were obtained, and the patient was instructed to resume routine toothbrushing. At the following week's appointment, slight gingival edema was observed in the interproximal area between teeth 12 and 13 (Figure 4).

Figure 4 – Maxillary arch three weeks after the first surgical intervention and periodontal probing with bleeding point marking in the mandibular arch prior to external bevel gingivectomy and gingivoplasty.

Additional oral hygiene instructions and reinforcement of biofilm control measures were provided, focusing on the supragingival region of the edematous papilla. At the subsequent appointment, subgingival biofilm control was performed using a Mini Gracey 5-6 curette (Hu-Friedy®), followed by coronal polishing of teeth 12 and 13. Reevaluation after one week demonstrated a favorable clinical outcome. Nevertheless, the patient was advised of the importance of maintaining effective supragingival plaque control to preserve gingival health and morphology.

The second surgical procedure was performed using external bevel gingivectomy combined with gingivoplasty from teeth 35 to 45 (Figure 5). Bleeding points were marked as described for the first surgery and connected using Kirkland and Orban gingivectomy knives to perform the incision, tissue excision, and gingival recontouring. A periodontal dressing was applied to protect the exposed connective tissue for one week. The same preoperative and postoperative instructions previously described were prescribed.

The patient returned for three follow-up visits focused on evaluation, reinforcement, and motivation regarding oral hygiene practices. Interdental papillae hyperplasia was observed between teeth 22 and 23 and between teeth 12 and 13. At the final follow-up appointment, resolution of the edema was observed, which was attributed to improved biofilm control in the affected areas. As the patient remained under orthodontic treatment, she was informed about the possibility of recurrence of gingival hyperplasia if adequate oral hygiene was not maintained.

Figure 5 – Immediate postoperative view of the mandibular arch following external bevel gingivectomy and gingivoplasty, prior to placement of the periodontal dressing over the surgical wound.

After healing of both arches, preservation of melanin pigmentation was observed in the maxillary arch treated with internal bevel gingivectomy. In contrast, the mandibular arch treated with external bevel gingivectomy and gingivoplasty exhibited loss of pigmentation over most of the treated area. Edematous interdental papillae were also observed between teeth 12 and 13 and between teeth 21, 22, and 23 (Figure 6). At this appointment, supragingival scaling was performed, and excess composite resin around the orthodontic brackets was removed.

Figure 6 – Healing outcomes following different surgical approaches in the maxillary and mandibular arches. Loss of melanin pigmentation is evident in the mandibular arch, while enlargement of the interdental papillae can be observed between teeth 12 and 13 and between teeth 21, 22, and 23.

DISCUSSION

Gingival hyperplasia is caused by inflammation and is characterized by excessive growth of gingival tissues. Lesions may be isolated, localized, or generalized and occur when biofilm-induced gingivitis is aggravated by various local or systemic factors, such as medication use, hormonal alterations, hyposalivation, and nutritional deficiencies (16). The severity of plaque-induced gingivitis may also be influenced by tooth and root anatomy, restorations, endodontic conditions, and other tooth-related factors (16). Therefore, local factors that promote increased biofilm accumulation can lead to gingival hyperplasia, as commonly observed during fixed orthodontic treatment. However, the mechanism underlying gingival growth remains poorly understood, and dental plaque accumulation is often considered a major contributing factor (14). Gingival hyperplasia is thought to represent a cellular adaptation resulting from increased microbial accumulation promoted by fixed orthodontic appliances, in association with mechanical stress (17,18). Consequently, gingival inflammation leads to morphological alterations that hinder oral hygiene, exacerbating the clinical condition (17). Thus, the hyperplastic gingival response is closely associated with biofilm accumulation in patients who use these appliances (5).

A harmonious smile is determined by the shape, color, and position of the teeth, as well as by appropriate gingival display. The position and contour of the gingival margin are also important and are subject to the same aesthetic principles applied to the dentition. Currently, both patients and dentists are increasingly aware of the impact of gingival health on smile aesthetics (15,19). In this context, gingival hyperplasia associated with orthodontic treatment has a direct impact on patients' quality of life (20). The patient in this study reported discomfort when smiling, as well as difficulty and bleeding during brushing throughout her eight-year course of orthodontic treatment. Clinical examination revealed the presence of a gummy smile, with gingival display greater than 3 mm. Furthermore, gingival inflammation and fibrous growth, either alone or in combination, negatively affected both masticatory function and aesthetics and may, in some cases, lead to psychological distress (21).

The patient reported that she had not previously received oral hygiene instruction and presented with substantial biofilm accumulation, particularly around

the brackets and along the gingival margin of the enlarged gingival tissues. Therefore, replacement of her toothbrush with a softer-bristled model was recommended, and the patient was encouraged to remove the local etiologic factor (dental biofilm) daily.

One of the most important determinants of treatment outcomes is patient adherence, and willingness to perform appropriate oral hygiene measures and attend maintenance appointments in a timely manner are considered essential for successful treatment. Therapeutic approaches to gingival hyperplasia are based on the underlying etiology and the resulting tissue alterations it produces (7,20). In this case, a marked accumulation of resin was observed around the brackets, with a rough surface acting as a biofilm reservoir, hindering effective oral hygiene. Thus, the orthodontist was asked to remove the excess resin to improve plaque control and, consequently, reduce gingival inflammation (20).

Melanin is primarily located in the basal and spinous layers of the epithelium. Because the patient exhibited significant gingival exposure when smiling, internal bevel gingivectomy was selected for the maxillary arch to preserve the oral epithelium and, consequently, maintain a uniform melanin pigmentation pattern (1,18,22). After the first surgical procedure, it became evident that additional reinforcement of plaque control measures was necessary. As preservation of gingival pigmentation was not an aesthetic concern in the mandibular arch, external bevel gingivectomy combined with gingivoplasty was performed. This technique is also indicated for the correction of gingival hyperplasia, as both approaches enable the establishment of a harmonious gingival contour and facilitate effective oral hygiene, thereby helping to prevent recurrence. Gingivectomy is a relatively simple surgical procedure that is generally well accepted by patients and can provide satisfactory aesthetic and functional outcomes when appropriately indicated (23,24). Furthermore, because gingival hyperplasia does not resolve spontaneously, surgical correction should be performed using either the external bevel or internal bevel technique (25).

The outcomes of both surgical interventions were favorable, although recurrence was observed in the interdental areas between teeth 12 and 13 and between teeth 22 and 23. Osseous recontouring for the purpose of clinical crown lengthening should not be performed before completion of orthodontic treatment, as the teeth remain subject to movement, which may alter bone morphology and thickness (18).

Both surgical techniques—internal bevel gingivectomy and external bevel gingivectomy combined with gingivoplasty—proved effective from a functional standpoint. However, as this study is a case report, it has the inherent limitations of this study design, including the evaluation of only a single patient and the absence of a control group.

The internal bevel technique, performed in the maxillary arch, enabled preservation of the oral epithelium and, consequently, maintenance of melanin pigmentation. In contrast, the external bevel approach used in the mandibular arch resulted in the removal of most pigmentation, with only faint pigmented lines remaining at the mucogingival junction. Thus, the need to preserve the oral epithelium was a determining factor in the selection of the surgical technique for the maxillary arch, in which maintenance of gingival pigmentation was considered desirable. Comparable findings were reported in a previous study (26), in which external bevel gingivectomy resulted in satisfactory healing and favorable postoperative outcomes. Despite successful treatment of the lesion, long-term follow-up remains necessary to determine whether recurrence of the condition occurs.

CONCLUSION

Both surgical techniques were effective in correcting gingival morphology and achieving favorable aesthetic and functional outcomes. Internal bevel gingivectomy preserved the oral epithelium and maintained the uniformity of gingival pigmentation. Conversely, external bevel gingivectomy resulted in the removal of gingival pigmentation in a non-aesthetic area. Patient cooperation and consistent supragingival biofilm control were essential factors in preventing recurrence of gingival hyperplasia.

The authors declare no conflict of interest.

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