



Comparative Evaluation among Three Therapeutic Modalities in the Removal of Gingival Hyperplasia in Orthodontic Patient: Case Report

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Received: October 16, 2019; **Published:** October 25, 2019

Abstract

Orthodontic apparatus hinders oral hygiene and may contribute to the formation of inflammatory gingival hyperplasia. In some cases, this lesion may be reversible through basic periodontal therapy and oral hygiene guidance. However, most of the time, when the lesion cannot be reversed by basic procedures, surgical treatment is required. The purpose of this article was to present the case of a patient under orthodontic treatment who developed gingival hyperplasia and was treated by conventional surgery, electrosurgery and laser surgery. The advantages and disadvantages of the therapeutic modalities employed were discussed.

Keywords: Gingival Hyperplasia; Orthodontics; Periodontics; Gingivectomy; Laser Therapy; Electrosurgery

Introduction

The effects of orthodontic apparatus on the periodontium are widely known. Usually the orthodontic appliance hinders proper oral hygiene, contributing to the development of gingival inflammation, being more evident in children, adolescents and young adults. This situation is aggravated when the patient presents previous periodontal changes and, especially, if the patient is not undergoing periodontal maintenance, becoming a risk patient [1-4].

Gingival growth (of inflammatory origin) affecting orthodontic patients is generally characterized by gingival tissue growth; generalized or localized, beginning with the interdental papillae, of flabby consistency and erythematous color, usually presenting bleeding on probing (in the early phase), or fibrous and pink (when in the mature phase) [1,2,5-9]. The lesion begins 1 to 2

months after the start of orthodontic treatment and may persist after removal of orthodontic appliances [8].

The deposition of dental biofilm, accumulated by the difficulty of removal in orthodontic patients is the main etiological factor of these lesions [1-3,6,8-11]. The trauma caused by the invasion of the biological space promoted during placement and persistence of brackets and bands; the possible allergic process triggered by the acrylic resin monomer of the base of removable orthodontic appliances, associated with fungal presence (*Candida albicans*), causing slight increase in the Plaque and Gingival Indexes were also related [1,2,10]. Bracket type (shape) has also been reported as a triggering factor for dental biofilm accumulation and gingival inflammation. Van Gastel, *et al.* [9] (2007) demonstrated that, by the model, teeth with self-bonding brackets (Speed) presented greater periodontal pocket depth compared to traditional double brackets

(GAC) and control group (without brackets). However, no significant difference in gingival fluid flow was found between both study groups. Qualitative changes in the oral microbiota, which implies the growth of periodontopathogenic bacteria, could be associated with gingival inflammation around the different brackets. In addition to triggering factors of gingival hyperplasia, orthodontic brackets, bands and wires provide a mechanical barrier, favoring the recurrence of gingival proliferation [12].

Hyperplastic and inflammatory gingival responses during orthodontic treatment are common and may lead to complications at this stage of treatment, requiring periodontal therapy [1,2,6-9,11-14]. The purpose of this paper was to present the case of an orthodontic patient who developed gingival hyperplasia. Quadrant surgical treatments were instituted - laser (diode) and electrosurgery surgeries compared with the conventional technique (gingivectomy). The characteristics inherent to each therapeutic modality were discussed.

Case Report

A 19-year-old male feoderma patient attended the Clinic of the School of Dentistry of the University of São Paulo, with an indication of gingivectomy by the orthodontist.

Clinically, the patient presented more pronounced gingival growth in the region of the anterior and premolar teeth, pink in color, with a normal-looking texture ("orange peel"), featuring mature gingival hyperplasia (Figure 1). Oral hygiene was assessed and found to be satisfactory, but it was reinforced to prevent recurrence of the lesion.



Figure 1: Generalized gingival hyperplasia in the upper and lower teeth (A: right lateral view; B: frontal view; C: left lateral view).

Evaluating the concepts of dental, gingival and facial aesthetics, it was observed that the patient's dolico-facial profile (long face) (Figure 2) was not considered harmonious with the gingival and dental status, in which the face shape of the patient is proportional to the shape of the maxillary central incisor [15].



Figure 2: The patient's dolico-facial profile (long face) was not considered harmonious with the patient's gingival and dental status. Note the disharmony between the shape of the patient's face and the shape of the upper central incisors.

No systemic impairment was observed and the surgical procedure was indicated. Under the patient's consent, the three techniques were suggested: laser (diode), electrosurgery and conventional surgery (gingivectomy). Starting from the upper arch, truncular anesthesia was performed on the right side, using the electrosurgery technique. With periodontal probe, the bleeding points were demarcated and, joining these points, the incision was made with an electric scalpel (BE 3000®, KVN, São Paulo) (Figure 3). On the left side, after truncular anesthesia, the bleeding points were demarcated, followed by the primary incision, interconnecting the bleeding points with the Kirkland scalpel; subsequently, between the interdental niches, secondary incisions were made using the Orban scalpel. After removal of the gingival tissue, scrapping was proceeded, with the purpose of promoting the best aesthetic gingival repair (Figure 4). Both sides were evaluated for the purpose of visualizing the acquired aesthetics (Figure 5). The operated region on the left side was protected with surgical cement (Figure 6), being removed in 10 days.



Figure 3: Immediate postoperative aspect using the electric scalpel after the excision of gingival hyperplasia on the right upper side. Observe the carbonization of the gingival tissue.

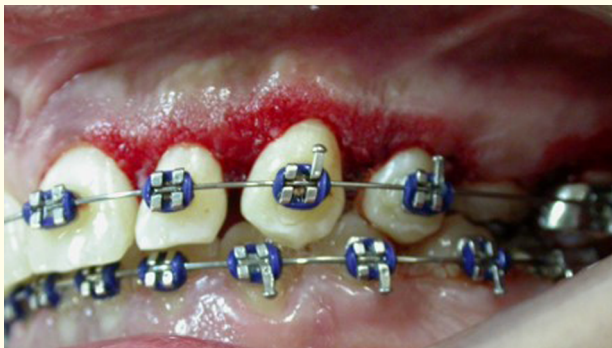


Figure 4: Immediate postoperative aspect using the conventional gingivectomy technique after gingival hyperplasia excision on the upper left side. Observe the bloody area of the remaining gingival tissue after scrapping.

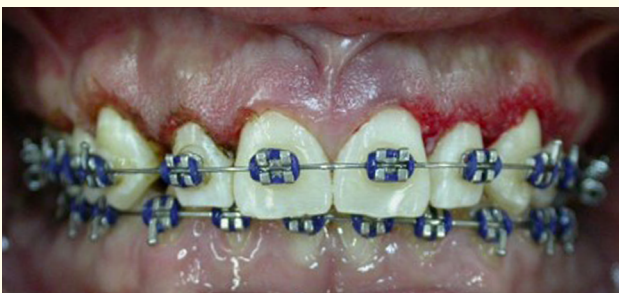


Figure 5: Frontal assessment to visualize acquired aesthetics and harmony and contralateral balance.

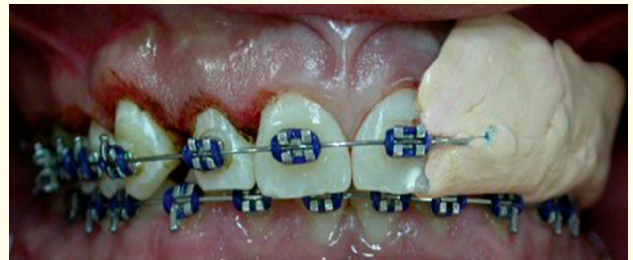


Figure 6: Protection by placing the surgical cement on the upper left side.

The removed gingival fragment was fixed in 10% formaldehyde and sent to the Surgical Pathology Laboratory of the School of Dentistry (University of São Paulo). Histopathological examination revealed parakeratinized stratified squamous epithelium, emitting long, thin projections toward connective tissue. The lamina propria consisted of well-celled and collagenized dense connective tissue, permeated by an intense chronic inflammatory infiltrate. The diagnosis was inflammatory gingival hyperplasia (Figure 7).

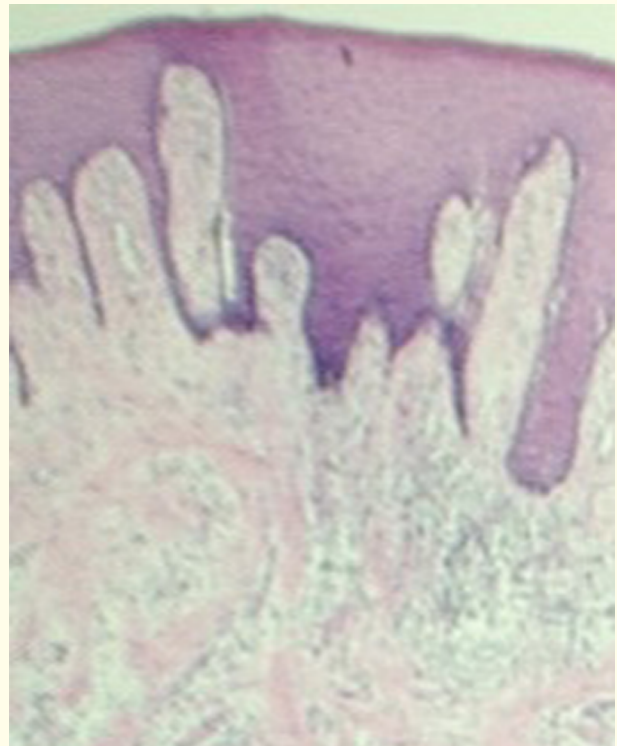


Figure 7: Histopathological aspects of inflammatory gingival hyperplasia.

Thirty days after the surgical procedure in the upper arch, the left lower gingivectomy was performed, following the same technique used in the upper arch. On the right side, hyperplasia was removed using the diode laser (Zap® Lasers, Pleasant Hill, CA, US), using the same technique of electric scalpel application (Figure 8).



Figure 8: Immediate postoperative aspect using the laser diode after resection of gingival hyperplasia in the upper right side. Note the more subtle carbonization of the gingival tissue compared to that resulting from the electric scalpel.

The questionnaire was applied immediately after surgery and at home, whose questions were summarized in table 1.

Therapeutics	Conventional	Electro surgery	Laser
Advantages	Technology Independence	Hemostasis	Hemostasis
Disadvantages	Gory; bleeding	Relative device cost	High device cost
Postoperative	With surgical cement	Without surgical cement	Without surgical cement
Trans symptomatology	Absent	Dentin hypersensitivity on contact with bracket	Absent
Post symptomatology	Throbbing	Minimum	Absent
Anesthesia	3	3	1 tube and 1/3

Table 1: Comparative analysis between clinical variables and patient complaints regarding conventional surgery, electrosurgery and laser procedures.

The patient was evaluated after 30 days, with satisfactory gingival repair (Figure 9). The patient has been followed for 14 years, even after removal of the orthodontic appliance, showing no signs of recurrence (Figure 10).



Figure 9: Satisfactory gingival repair after 30 days postoperatively.



Figure 10: 14-year follow-up of the surgical procedure after removal of the orthodontic appliance, with no signs of recurrence of gingival hyperplasia.

Discussion

Several therapeutic modalities have been suggested. A priori, the removal of causal factors through basic periodontal treatment (sessions of scaling and root planing and oral hygiene instructions) were indicated [1,2,6,11-14,16,21]. Diversified surgical techniques were also recommended, such as total lesion excision through curettage [1,14,16], retail surgery [1,2] or gingivectomy technique [2,4,5,8,11,12,14,16,17] as well as the use of electrocautery [13,21] as presented by us.

The use of CO₂ and Nd:YAG surgical lasers were proposed with superior benefits compared to conventional surgery [6,7,18-20]. The diode laser showed excellence as a hemostatic agent due to

its high affinity to melanin. Because it is used in contact, it also provides tactile feedback during the surgical procedure. In addition, the pulsatile soft tissue application mode reduces the painful sensitivity that is caused by heating in continuous mode. Another advantage cited was the use of topical anesthetic with the use of laser, reducing the need for infiltrative or trunk anesthesia [4,17].

The application of high power laser has the effect of suppressing transoperative pain, reducing bleeding and accelerating the healing process, allowing greater intervention in the same session [17-20]. In addition, the use of lasers in orthodontic practice improves gingival shape and contour and dental proportion, resolving crown asymmetries [4].

The advantages offered by the laser diode and observed by the application of the questionnaire (Table 1) were raised hemostasis, reduced amount of local anesthetic, absence of trans and postoperative symptoms, and unnecessary application of surgical cement, and, as a disadvantage, high cost. The electric scalpel has transient benefits as well as cost savings, not being as costly as the laser device.

Usually, the conduct adopted by us initially recommends the orientation and instruction of oral hygiene, followed by the establishment of basic periodontal procedures (scaling and root planing) and the performance of resective surgical techniques, represented by gingivectomy, when necessary. Besides periodontal evaluation, another detail must be considered: the harmony between the dental, facial and body anatomy. The patient's dolico-facial profile (long face) was evaluated, and there was harmony between these factors [15]. Another factor to be praised is that, in the case presented, the techniques employed could be performed by the appropriate band of present keratinized gingiva. If there was little band of keratinized gum, another resective surgical technique should have been employed, such as the modified Widman flap technique.

Some considerations should be made in following up cases of gingival hyperplasia in orthodontic patients. A priori, the orthodontist should use proper orthodontic components without risk to the periodontium. Periodontal changes should be early diagnosed and treated, and if necessary, control of periodontal diseases (basic periodontal treatment and reinforcement of oral hygiene) should be instituted [1,11,12,19,21]. Oral hygiene and periodontal health

are indispensable for orthodontic treatment, and orthodontists play an important role in monitoring oral hygiene through gingival bleeding assessments, pocket probing and attached gingiva loss [2].

Conclusion

It can be concluded that:

1. With inflammatory gingival hyperplasia already present, basic periodontal therapy (scraping and root planing and oral hygiene instructions) should be employed and, when irreversible through basic procedures, surgical procedures become necessary.
2. Regardless of the treatment modality used, submission to histopathological examination is a sine qua non condition, avoiding underestimation of these lesions and possible errors in the final diagnosis, since several lesions are clinically similar.
3. The demand for laser use in Dentistry has been increasing significantly in soft tissue surgeries, due to the comfort level and reduction of symptoms during and after surgery for the patient. In addition, the surgical time and aesthetic and functional results are optimized, making its application in the dental clinic promising.

Bibliography

1. Barack D, Staffileno H, Sadowsky C. Periodontal complication during orthodontic therapy. *Am J Orthod.* 1985;88(6):461-465.
2. Kamin S. Gingival hyperplasia related to orthodontic upper removable appliances: a report of 3 cases. *J N Z Soc Periodontol.* 1991;71:11-14.
3. Kouraki E, Bissada NF, Palomo JM, Ficara AJ. Gingival enlargement and resolution during and after orthodontic treatment. *N Y State Dent J.* 2005;71(4):34-37.
4. Sarver DM, Yanosky M. Principles of cosmetic dentistry in orthodontics: Part 2. Soft tissue laser technology and cosmetic gingival contouring. *Am J Orthod Dentofac Orthop.* 2005;127(1):85-90.
5. Coleman GC, Flaitz CM, Vincent SD. Differential diagnosis of oral soft tissue lesions. *Tex Dent J.* 2002;119(6):484-503.

6. Convissar RA, Diamond LB, Fazekas CD. Laser treatment of orthodontically induced gingival hyperplasia. *Gen Dent.* 1996;44(1):47-51.
7. Garcia VG, Theodoro LH. Gingivoplasty with CO2 laser. *Rev Fac Odontol Lins.* 1998;11(1):38-41.
8. Romero M, Albi M, Bravo LA. Surgical solutions to periodontal complications of orthodontic therapy. *J Clin Pediatr Dent.* 2000;24(3):159-163.
9. Van Gastel J, Quirynen M, Teughels W, Coucke W, Carels C. Influence of bracket design on microbial and periodontal parameters in vivo. *J Clin Periodontol.* 2007;34(5):423-431.
10. Goultchin J, Zilberman Y. Gingival response to removable orthodontic appliances. *Am J Orthod.* 1982;81(2):147-149.
11. Pedron IG, Horliana ACRT, Horliana RF, Aburad A, Tortamano IP. Gingival hyperplasia in patients under orthodontic treatment - Therapeutic indications. *Rev Ortodontia.* 2008;41(1):51-55.
12. Clocheret K, Dekeyser C, Carels C, Willems G. Idiopathic gingival hyperplasia and orthodontic treatment: a case report. *J Orthodont.* 2003;30(1):13-19.
13. Jerrold L. Electrocautery in orthodontics. *Am J Orthod.* 1984;86(3):189-196.
14. Scaramella F, Quaranta M. Hypertrophic and/or hyperplastic gingivopathy during orthodontic therapy. *Dent Cadmos.* 1984;52(2):65-72.
15. Morley J, Eubank J. Macroesthetic elements of smile design. *J Am Dent Assoc.* 2001;132(1):39-45.
16. Binnie WH. Periodontal cysts and epulides. *Periodontol* 2000. 1999;21:16-32.
17. Sarver DM, Yanosky M. Principles of cosmetic dentistry in orthodontics: Part 3. Laser treatments for tooth eruption and soft tissue problems. *Am J Orthod Dentofac Orthop.* 2005;127(2):262-264.
18. Parker S. Lasers and soft tissue: "fixed" soft tissue surgery. *J Br Dent.* 2007;202(5):247-253.
19. Gama KCS, Araújo MT, Pozza HD, Pinheiro LAB. Use of the CO2 laser on orthodontic patients suffering from hyperplasia. *Photomed Laser Surg.* 2007;25(3):214-219.
20. Fornaini C, Rocca JP, Bertrand MF, Merigo E, Nammour S, Vescovi P. Nd:YAG and Diode laser in the surgical management of soft tissues related to orthodontic treatment. *Photomed Laser Surg.* 2007;25(5):381-392.
21. Pedron IG, Cezere MES, Utumi ER, Medeiros JMF, Shitsuka C. Remission of gingival overgrowth after non-surgical periodontal treatment: follow-up of 7-years. *SAODS.* 2019;2(10):43-47.

Volume 2 Issue 11 November 2019
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