DOI: https://doi.org/10.17921/2447-8938.2024v26n4p215-220

Correction of Gingival Smile Using a Surgical Guide: Case Report

Correção de Sorriso Gengival com Uso de Guia Cirúrgico: Relato de Caso

Najla Moura[a]; Verlange Laurido[a]; Ana Paula Tulio Manfron[a]; Gabriela Fracasso Moraes[ab]

Faculdade Herrero, Dentistry course. PR, Brazil
Universidade Positivo,Post-Graduate Program in Administration. PR, Brazil.
E-mail: ana.tulio@herrero.com.br

Abstract

There are different techniques for removing gum tissue, including gingivoplasty and gingivectomy. Gingivoplasty involves the selective removal of gum tissue to reshape the gums and improve the aesthetics of one's smile. The objective of this article is to report a clinical case of gummy smile correction through the use of a surgical guide. Patient L.L.P, female, 22 years old, attended the Dentistry Clinic at Faculdade Herrero in Curitiba- PR in 2023, with aesthetic complaints due to the crown of her teeth being short. After clinical examination and initial photographs, additional tests were carried out, such as computed tomography (CT) and scanning for better case planning. After these steps, a surgical guide was developed, following the planned measures, thus facilitating surgical incisions, which would result in an increase in the clinical crown, bringing more comfort and a harmonious smile for the patient

Keywords: Surgery, Oral. Esthetics Dental. Gingival Overgrowth. Gingival Retraction Techniques.

Resumo

Existem diferentes técnicas para remover o tecido gengival, incluindo a gengivoplastia e a gengivectomia. A gengivoplastia envolve a remoção seletiva de tecido gengival para remodelar a gengiva e melhorar a estética do sorriso. O objetivo deste artigo é relatar um caso clínico de correção de sorriso gengival por meio da utilização de guia cirúrgico. Paciente L.L.P, do sexo feminino, 22 anos, compareceu a Clínica de odontologia da Faculdade Herrero, com queixa estética devido a coroa dos dentes se apresentarem curtas. Após exame clínico e fotografias iniciais, realizou-se exames complementares, como tomografia computadorizada (T.C) e escaneamento para melhor planejamento do caso. Após essas etapas foi desenvolvido um guia cirúrgico, seguindo as medidas previstas, sendo assim, facilitando as incisões cirúrgicas o que proporcionaria como resultado um aumento da coroa clínica trazendo mais conforto e um sorriso harmônico para paciente.

Palavras-chave: Cirurgia Bucal. Estética Dentária. Crescimento Excessivo da Gengiva; Técnicas de Retração Gengival

1 Introduction

The gingival smile can be characterized by a gum exposure greater than 3 mm, and may be related to systemic changes, the lack of oral hygiene or medicines [1] Correction surgery is traditionally performed from periodontal probing and manual demarcation of the tissue, followed by the primary incision for the removal of the gingival collar with scalpel cord and blade, increasing the risk of failures such as excessive removal of gum and bone tissue, resulting in gingival recession followed by tooth sensitivity due to root exposure. Therefore, with the help of technology, the surgical guide seeks to make the procedure safer for the dentist and for the patient[2].

Excessive gingival exposure has been a challenge in the periodontal surgical area. The diagnosis and planning of this condition should be established through a careful evaluation of facial and dental proportions and dynamics to establish facial and tooth harmony[3]. However, with the evolution of aesthetic dentistry, dentists now have the ability to alter not only teeth, but also the gingival arch and underlying bone structures to produce even more impressive aesthetic results[4]. The composition of a smile considered beautiful, attractive and healthy, involves the balance between the shape and symmetry of the teeth, lips and gums, as well as the way they relate to the face of patients. Using the surgical guide, an increasingly less invasive, less traumatic and more predictable treatment is possible[5]. Digital planning assists in diagnostic interpretation, and contributes to documentation, accuracy and interprofessional communication, facilitating the elaboration of an integral treatment plan respecting the functional, aesthetic and emotional needs of the patient[6].

It is important to consult a dentist to determine the cause of this excess and receive appropriate treatment. In addition, good daily oral hygiene can help prevent and treat excess gums. Knowing the etiology of oral alterations is essential for differential diagnosis. After surgery, it is important to follow the instructions, including brushing and the use of proper mouthwashes to help accelerate healing and prevent complications aiming for proper gum care, promote rapid and successful recovery. It is worth mentioning regular follow-up with the dentist to monitor gum health.

The objective of this study was to report the case of gingivoplasty performed through a surgical guide, in order not to generate damage to excessive removal of gingival tissue, in addition to a planning with digital techniques to establish a periodontal perspective, communication between dentist, patient and laboratory.

2 Case Report

This is a single case study, because it intends to report a surgery to correct the gingival smile, that is, gingivoplasty with the use of a surgical guide. In addition to evaluating the aesthetics and postoperative control. Being treated as an observational study, bringing the resolution of the problem requested by the patient who reported aesthetic dissatisfaction due to the gingival smile. The examined patient signed the Free and Informed Consent Form (TCLE), authorizing the realization of records of photographs and analysis of medical records. (Study approved by the Ethics and Research Committee of Faculdade Herrero-Curitiba-PR, number 6.437.937). CT scan of the maxilla region (Figura1A.B.C) and intraoral scanning (STL files) were requested through the use of the 3Shape scanner (3Shape, Copenhagen K, Denmark) for digital planning. Tomography was performed by the Orthophos XD device and loaded in the SIDIEXIS XG software.

Figure 1A, 1B and C – Tomographic color of the maxilla region

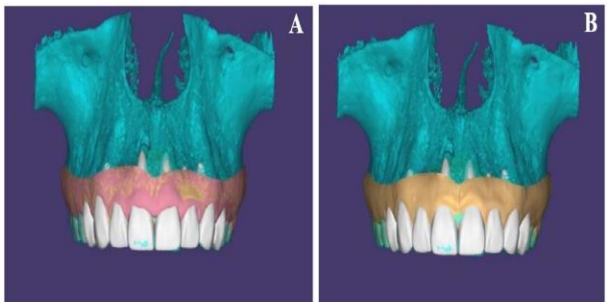
Source: research data.

Patient L.L.P, female, 22 years old, attended the Dentistry Clinic at Faculdade Herrero, with aesthetic complaints due to short teeth and large gums. (Figure 2A and B). In the clinical examination it was possible to verify that the superior anterior teeth were short and with excess gum tissue, which determined the planning of increase of the clinical crown of the tooth 15 to 25, through gingivoplasty. The periodontal examination showed depths of 3mm probes with adequate levels of periodontal health, without the presence of plaque, gingival bleeding or periodontal pocket. After clinical examination, the upper and lower arch molding was performed and initial photographs were obtained. Through these photographs and the measurements obtained on tomography were transferred to a software (EXOCAD – DentalCAD 2.2 Valletta), in which it is possible to overlap with the images acquired with the scan and can evaluate the aesthetic treatment plan proposed to the patient. thus, a virtual waxing following the harmony of the face (Figure 3 A.B) was then sent to the company (Guided Surgery/ Planning Center planner responsible Dr Leandro Perussolo) specialized in the making of the models, that carried out all the planning and sent a video with the guide prototype to be previously approved before printing (Figure 4). After approval of the project, the guide was sent and the surgery was scheduled.

Figure 2. A - Initial intraoral photography. B. Initial portrait photograph

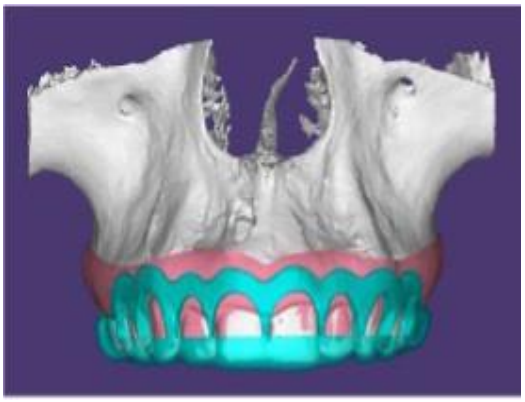
Source: the authors.

Figure 3 - Photo without waxing; B. Digital waxing through Exocad Software



Source: the authors.

Figure 4 - Digital Design of the Surgical Guide



Source: the authors.

After preparation of the patient, infiltrative anesthesia was performed with the use of lidocaine 2% with epinephrine vasoconstrictor 1:100.000, and the guide after disinfection with PVPI was taken to the patient's mouth and placed in position (Figure 5). The initial incision was performed in chamfered with a 15 C scalpel blade followed by intra-sulcular incisions for collar removal, preserving the palatine papillae (Figure 6 A,B,C and D).

Figure 5 - Surgical Guide

Source: research data.

Figure 6 - A. Marking with North Carolina millimeter probe. B.Guide in Position. C. Surgical Procedure. D. Immediate postoperative

Source: research data.

For the removal of gingival tissue, the electric scalpel was used (BE3000,São Paulo, Brazil). The patient was medicated to control pain and edema with ibuprofen 600mg every eight hours for three days, in addition to the use of mouthwash with chlorhexidine solution 0.12% – 5 ml for 60 seconds, every 12 hours, for 14 days. The patient returned to the clinic for control 10 days after surgery, was observed adequate healing process, periodontal health, there was less exposure of the gums in the smile, but the gum was still a little emaciated. In the imaging examination (periapical radiography), it was possible to observe an apical lesion in the tooth and thermal test of pulpal vitality indicated the need for endodontic treatment prior to restorative treatment. In addition, whitening was performed in a single session office (WHITENESS HP Blue 35% - FGM). Through digital waxing, it was verified that the complementary restorative treatment with facets, could finish the case in a more harmonious way. Using the same digital waxing for the surgical procedure, a guide was made for the realization of facets in composite resin from tooth 14 to 24 (VITTRA EBL/ VITTRA TRANS resin – N - FGM). The patient returned to the clinic for control 10 days after surgery, was observed adequate healing process, periodontal health, there was less exposure of the gums in the smile, but the gum was still a little emaciated. After 45 days of surgery, the patient returned to a new evaluation and it was possible to notice an improvement in healing and a reduction in gum tissue edema and a high level of aesthetic satisfaction of the patient.

Clinical and photographic follow-up was scheduled during the periods of 10, 45 and 90 days (Figure 7A.B – Figure 8A.B – Figure 9A.B) after the surgical intervention. During this period it was possible to verify the success of the treatment, since periodontal surgery, along with the specialties restored harmony in the patient's smile, so she was surprised by the aesthetic result, exceeding all her expectations. The aesthetic/restorative work achieved the objective of returning the patient's self-esteem, in addition to the function.

Figure 7 - A. Spontaneous Smile. B. Intraoral smile 10 days postoperative

Source: research data.

Figure 8 - A. ous Smile. B. traoral smile - 45 dayserative

Source: research data.

Figure 9 - A. Spontaneous Smile. B.Intraoral smile - 90 days postoperative - Final Result

Source: research data.

2.1 Discussion

A smile considered within normal patterns, displays a gingival exposure ranging from 1 mm to 2 mm of gingival margin from the upper central incisors to the lower edge of the upper lip. When exposure exceeds 4 mm, it is generally considered aesthetically unfavorable, characterizing what is known as gingival smile. In addition, its etiology is considered multifactorial[7].

In the case reported here, the patient's periodontal examination showed a gingival margin between 3mm and 4mm. When assessing the smile and the amount of gums exposed, the professional will present several treatment options, such as lip repositioning, crown elongation, botulinum toxin Type A injections, orthognathic surgery and lip positioning adjustment[8.9]. Gingivoplasty aims to improve the aesthetics of the gums, restoring the biological and physiological space[11.12] . Excessive vertical growth of the maxilla can be classified into three degrees; specifically in Grade II, when gingival collagen and mucosa are 4-8mm below the lower edge of the upper lips, treatment may involve the combination of periodontal and restorative treatment or orthognathic surgery, depending on the amount of root present in the bone and the crown/root ratio[4.13]. Studies suggest that botulinum toxin Type A can be used as a treatment or alternative to surgical procedures, being a simple therapy to correct the gingival smile. The application of the toxin can be focused on hypertonic perioral muscles, and there are several articles that address the effectiveness of this approach in correcting the gingival smile. The application of botulinum toxin Type A in therapy has a remarkable impact on decreased gingival exposure.

Some research suggests that repeated injections of toxin may provide a permanent result due to prolonged muscle relaxation[8,9,10]. The success of the application depends on the understanding of anatomy, physiology, dosage technique and potential complications[14]. Indications for gingivoplasty are increased clinical crown, correction of gingival zeniths, correction of hyperplasia and elimination of melanin pigments. However, it is contraindicated when the patient presents systemic diseases, lack of bacterial control and lack of keratinized gums remaining. The benefits of this treatment approach include the simplicity of the surgical technique, the aesthetic recovery and the ease of brushing teeth after the procedure. The disadvantages are the amount of surgical sites and the healing that happens by second intention[12]. To perform these surgical procedures we can analyze different instruments to perform incisions, such as conventional scalpel, electric scalpel or laser.

Articles report that there are some advantages of the use of electric scalpel when compared to conventional scalpel, include reduced blood loss, rapid and clean tissue separation, providing less trauma compared to conventional scalpel[13-15]. The use of high-power diode laser treatment has emerged as a faster and more comfortable alternative. Despite the high costs and advanced equipment requirements, laser ablation has become an essential intervention in the modern cosmetic field. Several studies show that the laser has some layers of different tissue components[16.17].

The main reasons for laser use include minimizing bleeding during operation and reducing postoperative pain compared to conventional techniques such as electrosurgery. Laser is a non-invasive procedure that, in some cases, can be used in the treatment of gingival smile, and occasionally does not require local anesthesia[18.19]. The traditional corrective intervention usually begins with periodontal probing and manual delimitation of the tissue. Then, an initial incision is made for removal of the gingival collar, using scalpel cable and blade. However, this traditional method increases the risk of complications, such as excessive elimination of gingival and bone tissue. This excessive removal can result in gum recession, followed by tooth sensitivity due to root exposure. Given this concern, the periodontal surgical guide, known as *perioguide* ,emerges as a technological innovation. Its purpose is to improve the safety of the procedure for both the dentist and the patient, offering a more accurate and controlled approach. This technology represents a significant advance in

the field of corrective surgery[2].

In the area of periodontics, the frequent use of digital flow is becoming an increasingly common practice and with the emergence of new technologies, the options for corrective surgery of the gingival smile are expanding. As observed, chronological studies indicate that periodontal surgery, when associated with previous waxing, (*mock*-up) and the use of digital tools to designate the smile represents the current trend in reverse planning of periodontal plastic surgery. The etiology of the *word perioguide* is derived from English, which means periodontal guide related to the dental specialty focused on the study of supporting tissues and protecting teeth. The same was designed by Exocad 20.21 planning software.

Research has pointed out that the use of the periodontal guide results in reduced trauma, reduced treatment time, improved rehabilitation, increased patient comfort and long-term stability and forecasting, with aesthetic results developed[2,22-24]. The incompatibility between the use and non-use of a surgical guide in a gingivoplasty is significant, affecting several aspects of the procedure.[2,15,20,25-27]. The surgical guide is widely used in dentistry in several areas, especially in aesthetic and prosthetic rehabilitation (*mock*-up), implantology, endodontics*(endo-guide*) and surgeries. Pre-surgical technologies and procedures, such as digital smile design, diagnostic closure and the surgical guide itself, not only guide the execution and improve the predictability of the surgical procedure, but also play a crucial role in communication when used to discuss the case with the patient.

The surgical guide can be made of acrylic resin or silicone. Authors highlight that the choice of the guide made of acrylic resin is supported in the literature, with several cases of its successful use. This option presents advantages, such as ease of material handling, and reduction in waiting time for surgery[2]. Therefore, the proper preparation of the guide enables the surgery to be carried out safely, avoiding risks and allowing the removal in the correct amount for the appearance of the patient's smile. As for the reduction of operative time, the guide contributes to balance tooth proportions, assists in gingival cutting with higher results and promotes a shorter rehabilitation period. In the safety aspect, in addition to increasing accuracy and proper positioning, the guide protects against cuts out of the planned adjustment, ensuring the desired safety during the procedure[24-27].)

After performing the gingival plastic, an improvement in the aesthetics of the smile is expected, providing benefits for both the overall appearance and the dental harmony. This transformation is achieved to ensure a regular and consistent gingival contour[27].

The aesthetic perception is subjective and is subject not only to the proportion of the elements, but also to the cultural, sexual, body type and age characteristics of the patient. Consequently, personalized treatment plan and smile planning play crucial roles in this context[27]. In the area of periodontics, the integration of digital flow is becoming an increasingly common practice. With the emergence of new technologies, the options for corrective surgery of the gingival smile are expanding. The contemporary approach in the reverse planning of periodontal plastic surgery involves the combination of periodontal surgery with steps such as previous closure, mock-up and the application of digital for the conception of the smile[19.2.]

3 Conclusion

The use of a surgical guide during gingivoplasty brings significant benefits, such as precision, predictable results and faster recovery. The absence of a guide can result in greater variation in results and increase the risk of excessive tissue removal, making the procedure relatively more challenging. Therefore, the use of surgical guides is a common and useful practice in gingivoplasty aiming to achieve the best clinical and aesthetic results. And through digital planning, it is possible to provide more accurate and dynamic results, and allow the treatment to be performed in a personalized and safe way for the patient. Given that an aesthetic and harmonious smile depends on a combination of factors, it can be said that periodontics alone would not bring a satisfactory result for the patient and the professional then along with the other specialties such as endodontics and restorative dentistics, the aesthetic result exceeded all expectations.

References

1. Diaspro A, Cavallini M, Piersini P, Sito G. Gummy smile treatment: proposal for a novel corrective technique and a review of the literature. Aesthet Surg J 2018;38(12):1330-8. doi: 10.1093/asj/sxy155.
2. Garber DA, Salama MA. The aesthetic smile: diagnosis and treatment. Periodontol 2000. 1996;11:18-28. doi: 10.1111/j.1600-0757.1996.tb00112.x.
3. Joly JC, Silva RC, Carvalho PCM. Reconstrução tecidual estética. Porto Alegre: Artmed; 2010.
4. Coachman C, Van Dooren E, Gürel G, Landsberg CJ, Calamita MA, Bichacho N. Smile design: from digital treatment planning to clinical reality. In: Cohen M. Interdisciplinary treatment planning: comprehensive case studies. Chicago: Quintessence; 2012. p.119-74.
5. Bhimani RA, Sofia ND. Lip repositioning, aesthetic crown lengthening, and gingival depigmentation: A combined approach for a gummy smile makeover. J Cutan Aesthet Surg 2019;12(4):240. doi: 10.4103/0974-2077.273052.
6. Duruel O, Erduran NE, Tözüm TF. A modification for treatment of excessive gingival display: tooth-based lip-repositioning technique. Int J Periodontics Restorative Dent 2020;40(3):457-66. doi: 10.11607/ijp.6618.
7. Vergara-Buenaventura A, Mayta-Tovalino F, Correa A, Breen E, Mendoza-Azpur G. Predictability in lip repositioning with botulinum toxin for gummy smile treatment: A 3-year follow-up case series. Int J Periodontics Restorative Dent 2020;40(5):703-9. doi: 10.11607/ijp.6619.

8. Santana GMB, et al. Toxina butolínica tipo A na correção do sorriso gengival na odontologia moderna: revisão de literatura. RGS 2022;24(2):61-9. doi: 10.17648/1984-8153-rgs-v1n24-14.

9. Mezzadri J, Silva K, Moraes GF, Manfron APT. Cirurgia periodontal guiada – fluxo digital para correção de sorriso gengival. Full Dent Sci 2022;13(51):88-91. doi: 10.24077/2022;13512429231.

10. Ramesh A, Vellayappan R, Ravi S, Gurumoorthy K. Esthetic lip repositioning: a cosmetic approach for correction of gummy smile - a case series. J Indian Soc Periodontol 2019;23(3):290-4. doi: 10.4103/jisp.jisp_174_18.

11. Santos FR, Zamboni FT, Yamaguchi PS, Storrer CLM, Osternack FHR, Oliverira ND, et al. Correction of gummy smile prior to restorative procedures: case report. RSBO 2016;13(2):124-30. doi: 10.21776/ub.rsob.2016.013.02.10.

12. Andriola FO, Chieza GS, Cavagni J, Freddo AL, Corsetti A. Management of excessive gingival display using botulinum toxin type A: a descriptive study. Toxicon 2021;196:56-62. doi: 10.1016/j.toxicon.2021.06.001.

13. Cengiz AF, Goymen M, Akcali C. Efficacy of botulinum toxin for treating a gummy smile. Am J Orthod Dentofacial Orthop 2020;158(1):50-8. doi: 10.1016/j.ajodo.2019.12.012.

14. Kah N, S. Sorriso gengival. Nova Odessa: Quintessence Nacional; 2017.

15. Santos FR, Kamarowski SF, Villabona Lopez CA, Storrer CLM, Teixeira Neto A, Deliberador TM The use of the digital smile design concept as an auxiliary tool in periodontal plastic surgery. Dent Res J 2017;14(2):158. doi: 10.4103/1735-3327.204052.

16. Longo E, Frosecchi M, Marradi L, Signore A, de Angelis N. Guided periodontal surgery: a novel approach for the treatment of gummy smile. A case report. Int J Esthet Dent 2019;14(4):384-92. doi: 10.5272/ijed.2019.384.

17. Matos IF, Reis GC, Brito Junior AA, Silva DA, Oliveira VS, Tavares Junior I. Digital smile design: planejamento estratégico para cirurgia periodontal plástica. Rev Multidiscip Saúde 2021;2(4):1-8. doi: 10.29327/rs.v2n4.1.

18. Melo AKV, Vasconcelos MG, Vasconcelos RG. A importância do ensaio restaurador (MOCKUP) e do planejamento digital por meio do digital smile design (DSD) na obtenção de procedimentos estéticos odontológicos previsíveis e harmoniosos: revisão de literatura. Rev Salusvita 2029;38(3):795-810. doi: 10.5935/1679-9836.20290003.

19. Omar D, Duarte C. The application of parameters for comprehensive smile esthetics by digital smile design programs: a review of literature. Saudi Dent J. 2018;30(1):7-12. doi: 10.1016/j.sdentj.2017.10.001.

20. Rossi N, Silva JFV, Rodrigues MR, Kukulka EC, Grangeiro MTV, Paes Junior TJA. Aplicabilidade do digital smile design em reabilitações estéticas: revisão de literatura. J Dent Public Health 2020;11(2):139-47. doi: 10.21776/ub.jdph.2020.11.2.5.

21. Alvaro-Chicas OS, Mancía-Arreola IC, Marroquín-Reina RA, Betancourt-Córdova FM. Precisión y diagnóstico protésico en restauración estética anterior mediante uso de Diseño de Sonrisa Digital: reporte de un caso. Rev Minerva 2021;4(1):9-18. doi: 10.21776/ub.minerva.2021.04.01.01.

22. Arias DM, Trushkowsky RD, Luis M Brea LM, David SB. Treatment of the patient with gummy smile in conjunction with digital smile approach. Dent Clin 2015;59(3):703-16. doi: [10.1016/j.cden.2015.03.007

23. Espíndola LCP, Fagundes DS, Lima VHS. Gummy smile diagnosis and correction techniques. RSD 2022;11(2):e45411226051. doi: 10.33448/rsdv10i17.24798.

24. Pinto TB. Técnicas de correção do sorriso gengival. Lisboa: Universidade de Lisboa; 2016

25. Nautiyal A et al. Aesthetic Crown Lengthening Using Chu Aesthetic Gauges And Evaluation of Biologic Width Healing. J Clin Diagnostic Res 2016;10(1):ZC51-5

26. Nahmias HLM, Vieira RM, Goncalves VPD. The use off perioguide in surgery to correct gingival smile. RSD 2022;11(2):e32111225856

27. Levin EI. Estética dentária e a proporção áurea. *J Prótese Dent* 1978;40:244-52