

---

# Harmonization of gummy smile by techniques of gingivoplasty and botulinum toxin application

*Harmonização do sorriso gengival pelas técnicas de gengivoplastia e aplicação da toxina botulínica*

Irineu Gregnanin Pedron<sup>1</sup>, Felipe Paes Varoli<sup>2</sup>, João Marcelo Ferreira de Medeiros<sup>3</sup>, Caleb Shitsuka<sup>4</sup>

<sup>1</sup>Botoxindent Institute, São Paulo-SP, Brazil and Department of Periodontology and Integrated Clinic, University Basil, São Paulo-SP, Brazil; <sup>2</sup>Department of Oral Radiology and Imaginology, University Brasil and University Paulista, São Paulo-SP, Brazil; <sup>3</sup>Department of Endodontics and Integrated Clinic, University Brasil, São Paulo-SP, Brazil; <sup>4</sup>Department of Pediatric Dentistry and Cariology, University Brasil and Faculdades Metropolitanas Unidas, São Paulo-SP, Brazil.

---

## Abstract

The esthetic excellence has become the main objective in the dental treatment. The gummy smile is one of the complaints from the patients, since this situation may influence their self-esteem, social relationship and quality of life. The development of new techniques search to be therapeutic option more conservative, in the treatment of gummy smile, such as the association between the gingivoplasty and application of botulinum toxin, in comparison with other surgical procedures as the orthognathic surgery. The purpose of this article is to present a case of a patient with dentogingival discrepancy and gummy smile, who was treated with the association of these techniques, in order to optimize the harmony of the smile.

**Descriptors:** Botulinum toxins type A; Gingival overgrowth; Gingivoplasty; Gingivectomy; Dental esthetics

## Resumo

A excelência estética tornou-se o principal objetivo no tratamento odontológico. O sorriso gengival é uma das queixas dos pacientes, uma vez que esta situação pode influenciar a sua autoestima, relação social e qualidade de vida. O desenvolvimento de novas técnicas busca ser uma opção terapêutica mais conservadora, no tratamento do sorriso gengival, como a associação entre a gengivoplastia e a aplicação da toxina botulínica, em comparação com outros procedimentos cirúrgicos como a cirurgia ortognática. O objetivo deste artigo é apresentar um caso de uma paciente com discrepância dentogengival e sorriso gengival, que foi tratada com a associação dessas técnicas, a fim de otimizar a harmonia do sorriso.

**Descritores:** Toxinas botulínicas tipo A; Crescimento excessivo da gengiva; Gengivoplastia; Gengivectomia; Estética dentária

---

## Introduction

The search for esthetic procedures has grown exponentially. Dental procedures, as well as medical, besides craving the principle of promoting health, look for smile esthetics<sup>1-3</sup>.

The facial aesthetic harmony is formed by the union of three components: teeth, gingiva and lips<sup>1-4</sup>. The smile becomes esthetically pleasing when these elements are arranged in suitable proportion, and gingival exposure is limited to 3 mm. When gingival exposure is larger than 3 mm, it characterizes a non-esthetic condition called gummy smile, which affects some patients psychologically<sup>1,5-7</sup>.

Several therapeutic modalities were proposed for the correction of gummy smile, among them are gingivoplasty<sup>1-7</sup>, myectomy<sup>6</sup>, and orthognathic surgery<sup>6-8</sup>. The last two procedures are more invasive and present high morbidity<sup>1</sup>. On the other hand, the use of botulinum toxin can be considered as a therapeutic option to the surgical procedure, as it is a method more conservative, effective, faster and safer, when compared to surgical procedures<sup>1,5,9</sup>.

Botulinum toxin is synthesized by the anaerobic Gram-positive *Clostridium botulinum* bacterium, and inhibits the release of acetylcholine at the neuromuscular junction, impeding the muscle contraction<sup>1,6-8</sup>. There are seven distinct serotypes of the toxin and the

type A is the most frequently used clinically and it is a stronger subtype<sup>1,6</sup>.

The botulinum toxin has shown efficiency in the treatment of gummy smile, as well as other disorders such as temporomandibular dysfunction (bruxism, clenching and masseteric hypertrophy) and orofacial pains<sup>1,4-10</sup>. The purpose of this article was to report a case of a patient who presented gummy smile and was treated by associating gingivoplasty and botulinum toxin.

## Case Report

A female patient, 30-years-old, attended the particular clinic complaining of gummy smile (Figure 1).

Clinically, the patient presented anatomic discrepancy between the length of the maxillary teeth (Figure 2). The Chu's proportion gauge and digital pachimeter were used to measure the length of teeth and the gummy smile (Figures 3 and 4). Gummy smile, with more than 3 mm was observed (Figure 5). Systemic alterations were not reported.

Gingivoplasty was suggested. However, the application of botulinum toxin was proposed to complement the result of gingivoplasty. Additionally, the patient was counseled about the recurrence of the gummy smile after 6 months of the application. The patient agreed with the proposed treatment and signed the term of consent for the application of botulinum toxin.



**Figure 1.** Gingival exposure, featuring gummy smile



**Figure 2.** Intraoral clinical aspect presenting anatomic discrepancy between the length of the maxillary teeth



**Figure 3.** Use of the Chu's proportion gauge to measure the length of tooth 11



**Figure 4.** Length of tooth 21 measured by the pachymeter (9.0mm)



**Figure 5.** Gummy smile measured by the digital pachymeter (5.1mm)



Figure 6. Immediate post-operative of the teeth 21, 22 and 23



Figure 7. Immediate post-operative after gingivoplasty



Figure 8. Post-operative (30 days) after gingivoplasty



Figure 9. Length of tooth 11 measured by the Chu's proportion gauge, after gingivoplasty

Under local infiltrative anesthesia, gingivoplasty was performed, by the determination of the bleeding points with the aid of a millimeter probe and the union of these points was made with the electric scalpel. The length of the teeth was increased, characterizing the dental zenith. Posteriorly, the scraping was performed, resembling the technique of external bevel, with the purpose of increasing the tissue reparation (Figures 6 and 7). There was no need for the surgical cement, given that the wound repair process occurs by second intention. The patient was oriented and analgesics were administered postoperatively.

After 30 days, satisfactory tissue reparation was observed (Figures 8 and 9) and the patient reported no changes or complaints. However, the persistence of the gummy smile was observed. In the same treatment session, botulinum toxin was applied. Prior to application, the surface of the skin was disinfected with ethanol, to avoid local infection and remove the skin oiliness. Posteriorly, local anesthetic (Emla®, Astra, São Paulo, Brazil) was applied, with the purpose to promote comfort during the procedure. The botulinum toxin type A (Botox® 200 units, Allergan Pharmaceuticals, Westport, Ireland) was diluted in 2 ml of saline solution, according to the manufacturer's instructions, and 2 units were injected at the recommended site, laterally to each nostril, at the level of the nose wing, at the insertion of the le-

vator labii superioris alaeque nasi muscle. After application, the patient was advised to not lower her head and not engages in physical activity during the first 4 hours after the procedure.

After 15 days, the patient was evaluated. She presented uniform dehiscence of the upper lip (Figures 10 and 11). Side effects or complaints were not reported. The clinical effect of botulinum toxin application remained for 6 months.

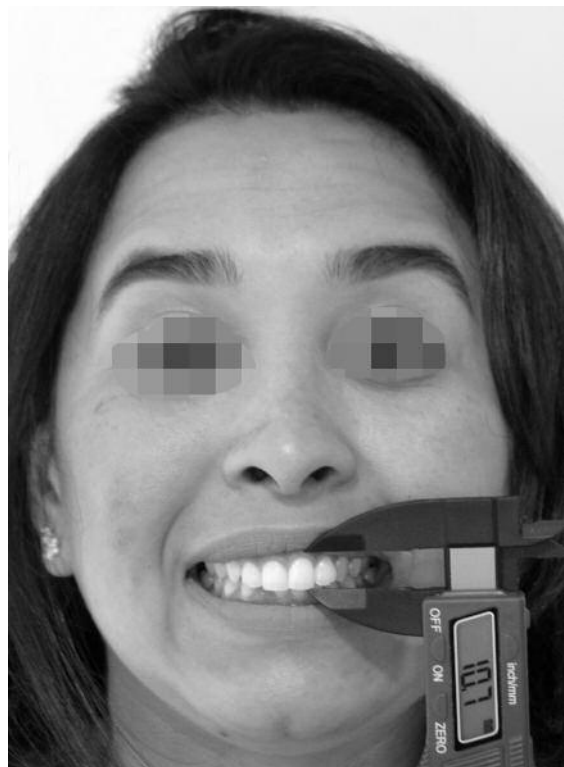
## Discussion

Several etiologies were suggested to the gummy smile, like the vertical excess of maxilla<sup>1,4-8</sup>, delayed passive eruption<sup>1,4,6,8</sup>, hyperfunction of the muscles involved in the smile<sup>1,6,8</sup> and reduced length of the teeth clinical crown<sup>1-3</sup>, which may occur singly or in combination, and determine the type of treatment to be applied. In gummy smile caused by muscular hyperfunction, botulinum toxin was indicated. It is the treatment of first choice for the facility and security of applications, besides being a more conservative approach when compared to surgical procedures (myectomy or Le Fort I osteotomy)<sup>1,4,10</sup>.

The smile activity is determined by several facial muscles, such as the *levator labii superioris*, the *levator labii superioris alaeque nasi*, and the *zygomaticus major*



**Figure 10.** Result presented after 15 days of botulinum toxin application



**Figure 11.** Gummy smile measured by the pachymeter, after gingivoplasty and botulinum toxin application (reduction of 3.4mm)

and minor<sup>1,4-9</sup>. The fibers of these muscles converge to the same area, forming a triangle, suggesting that the appropriate election point comprehends the 3 muscles in a single injection. The proposed site of the injection was laterally to wing nose<sup>1,4,7-9</sup>. The toxin, when injected, can be spread in an area of 20 mm, allowing the effective extension<sup>1,4,5</sup>. The toxin decreases the contraction of muscles responsible for the elevation of the upper lip, reducing gingival exposure<sup>4-9</sup>.

The botulinum toxin is a hydrophilic powder, stored under vacuum, sterile and stable<sup>1,6,7</sup>. The reconstitution occurs from the smooth injection of the diluent (sodium chloride 0.9%) into the bottle, and it have to be stored at 2 to 8°C, and used in 4 to 8 hours, in order to guarantee its effectiveness<sup>1,8</sup>.

Clinical effects present into 2-10 days after the injection, and the maximum visible effect occurs after 14 days of injection<sup>1,4,6</sup>. This effect last approximately 3-6 months<sup>1,5,6,8</sup>.

Contraindications to the use of botulinum toxin include: pregnant and lactating, patients with neurodegenerative and autoimmune diseases, and concurrent use of aminoglycoside antibiotic that enhances the action of the toxin<sup>1,8</sup>.

## Conclusion

In this report, the result was satisfactory to the harmony of the smile by association of treatments - gingivoplasty and application of botulinum toxin. The institution of isolated treatments could not culminate in the

excellence of the earned results. Initially, the creation of the new dental zenith after gingivoplasty promoted the new dental architecture, favoring harmony gingival-dental-facial for the patient. Subsequently, the application of botulinum toxin reduced the gummy smile, by the uniform dehiscence itself of the upper lip, still promoting smoothness to facial lines of the smile, as can be seen in the nasolabial folds, adjacent to the nostrils.

## References

1. Pedron IG. Toxina botulínica - Aplicações em Odontologia. Florianópolis: Ed. Ponto; 2016.
2. Narayan S, Narayan TV, Jacob PC. Correction of gummy smile: a report of two cases. J Indian Soc Periodontol. 2011;15(4):421-4.
3. Pedron IG, Utumi ER, Silva LPN, Moretto LML, Lima TCF, Ribeiro MA. Gingival resective surgery to the treatment of disharmony of smile. Rev Odontol Bras Central. 2010;18(48):87-91.
4. Hwang WS, Hur MS, Hu KS, Song WC, Koh KS, Baik HS, et al. Surface anatomy of the lip elevator muscles for the treatment of gummy smile using botulinum toxin. Angle Orthod 2009;79:70-7.
5. Mazzuco R, Hexsel D. Gummy smile and botulinum toxin: A new approach based on the gingival exposure area. J Am Acad Dermatol 2010;63(6):1042-51.
6. Polo M. Botulinum toxin type A in the treatment of excessive gingival display. Am J Orthod Dentofacial Orthop 2005;127 (2): 214-8.
7. Indra AS, Biswas PP, Vineet VT, Yeshaswini T. Botox as an adjunct to orthognathic surgery for a case of severe vertical maxillary excess. J Maxillofac Oral Surg 2011;10(3):226-70.

8. Jaspers GWC, Pijpe J, Jansma J. The use of botulinum toxin type A in cosmetic facial procedures. *Int J Oral Maxillofac Surg* 2011;40(2):127-33.

9. Sucupira E, Abramovitz A. A simplified method for smile enhancement: botulinum toxin injection for gummy smile. *Plast Reconstr Surg* 2012;130(3):726-8.

10. Niamtu J 3rd. Botox injections for gummy smiles. *Am J Orthod Dentofacial Orthop* 2008;133(6):782-3.

**Corresponding author:**

Irineu Gregnamin Pedron  
Rua Flores do Piauí, 508  
São Paulo-SP, CEP 08210-200  
Brazil

E-mail: [igpedron@alumni.usp.br](mailto:igpedron@alumni.usp.br)

Received September 2, 2019  
Accepted September 30, 2019