

# Gingivoplasty and Botulinum Toxin Application to Improve Gummy Smile: Case Report

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## Abstract:

Currently, oral aesthetics has become the main objective in dental treatment. Gummy smile is one of the complaints of patients, characterized by the presentation of more than 3mm of gum in the act of smiling. This condition can negatively influence self-esteem and inhibit social relationships. State-of-the-art techniques, such as the application of botulinum toxin, have been widely used in Dentistry for this indication of gummy smile. The purpose of this article is to present the case of a patient with dentogingival disharmony between the maxillary teeth and gummy smile, which was treated by the association between gingivoplasty and the application of botulinum toxin.

**Keywords:** botulinum toxins type A; gingival overgrowth; gingivectomy; gingivoplasty; gummy smile; surgical crown lengthening.

## Introduction

Currently, oral esthetics has become the main objective in dental treatment. Procedures involving white esthetics, such as tooth whitening, porcelain veneers, and dental implants, or those related to red esthetics, which include gingival, lip, or perioral procedures have grown exponentially<sup>1-4</sup>.

Teeth, gingiva and lips compose esthetic facial harmony<sup>1-3,5</sup>. When these elements are arranged in suitable proportion, the smile becomes esthetically pleasing. Usually, gingival exposure is limited to 3mm. Gummy smile is characterized when gingival exposure is larger than 3mm, and it can negatively influence self-esteem and inhibit social relationships<sup>1,4,6-12</sup>.

Gummy smile can be treated by several therapeutic modalities, among them are gingivoplasty<sup>1-3,5-8</sup>, myectomy<sup>7</sup>, and orthognathic surgery<sup>7,8,13</sup>. The last two procedures are more invasive and can present high morbidity<sup>1</sup>. In contrast, the application of botulinum toxin can be considered as a therapeutic option to the surgical procedures. This procedure is a method more conservative, effective, faster and safer, depending on the indication<sup>1,6,9-12,14</sup>.

In Dentistry, beyond the gummy smile, botulinum toxin has been indicated for parafunctional habits, such as bruxism and briquism (clenching) and headache secondary; masseteric hypertrophy; orofacial pain and symptomatic temporomandibular disorders (TMD), including trismus, ankylosis, temporomandibular joint (TMJ) dislocation, and adjuvant in procedures such as arthrocentesis; reduction of chewing forces due to excessive muscle contraction, preventing fractures of implant and prosthesis; facial palsy; orofacial or oromandibular dystonia; and sialorrhea<sup>1,4-18</sup>.

The purpose of this article is to present the case of a patient with dentogingival disharmony between the maxillary teeth and gummy smile, which was treated by the association between gingivoplasty and the application of botulinum toxin.

### Case Report

A female patient, 21-years-old, presented to the dental clinic complaining of gummy smile (Figure 1).

Clinically, the patient presented anatomic discrepancy between the length of the maxillary teeth (Figura 2) and gummy smile. Tooth 21 was used as the clinical parameter for planning and execution of the case. The dental crown length was measured using a digital pachymeter with 9.7 mm, between the incisal edge and the cervical gingival margin (Figure 3). Additionally, the gummy smile was measured with 13.8 mm, between the incisal edge of tooth 21 and the lower edge of the upper lip (Figure 4). Therefore, the gummy smile was measured at 4.1 mm. The diagnosis was also aided by the use of the Chu's proportion gauge (Figure 5).



Figure 1: Patient presenting gummy smile.



Figure 2: Intraoral clinical aspect presenting anatomic discrepancy between the maxillary teeth.

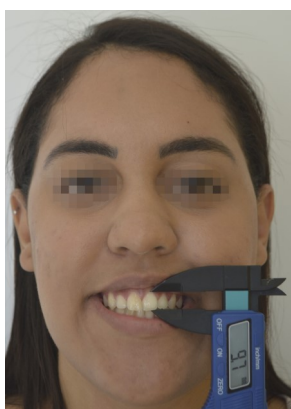


Figure 3: Measurement of crown length of tooth 21 at 9.7 mm.

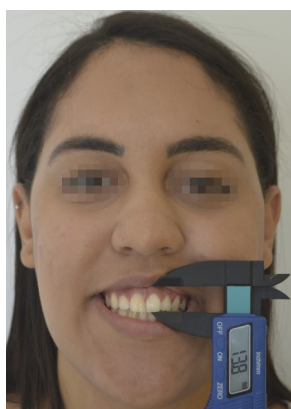


Figure 4: Measurement of gummy smile at 13.8mm.



Figure 5: Chu's proportion gauge demonstrating disharmony of proportions.

No radiographic changes were observed. Systemic alterations do not were 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 gingivoplasty and application of botulinum toxin.

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.



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



Figure 7: Immediate post-operative after gingivoplasty.

After 30 days, satisfactory tissue reparation was observed (Figure 8) and the patient reported no changes or complaints. The improvement of the length ratio of the maxillary teeth was observed (Figure 9). The length of tooth 21 increased to 10.2 mm (Figure 10). However, the persistence of the gummy smile was observed (Figure 11). 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 *levator 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.



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

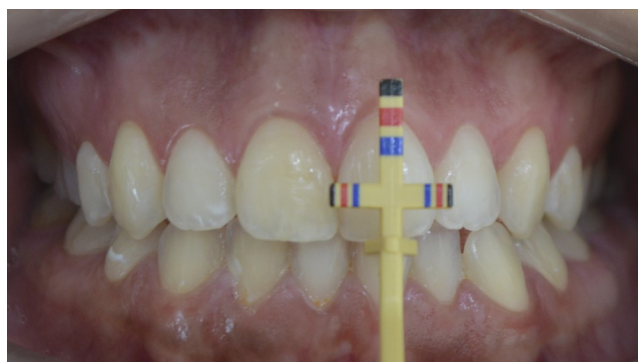


Figure 9: Chu's proportion gauge demonstrating improvement and harmony of dental proportions.

After 15 days, the patient was evaluated. She presented uniform dehiscence of the upper lip (Figure 12). The gummy smile was measured at 11.3mm, with reduction of 1.1mm (Figure 13). Side effects or complaints were not reported. The clinical effect of botulinum toxin application remained for 6 months.



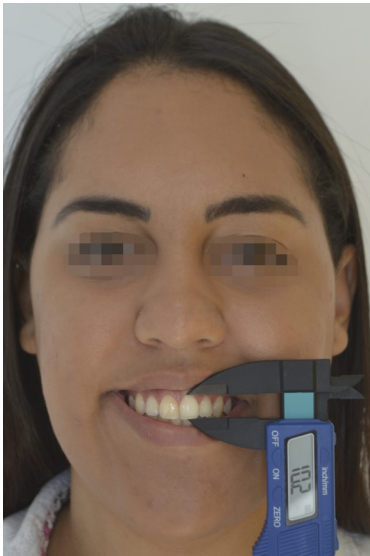


Figure 10: The length of tooth 21 increased to 10.2 mm



Figure 11: Persistence of the gummy smile after gingivoplasty.



Figure 12: Clinical result presented after 15 days of botulinum toxin application.

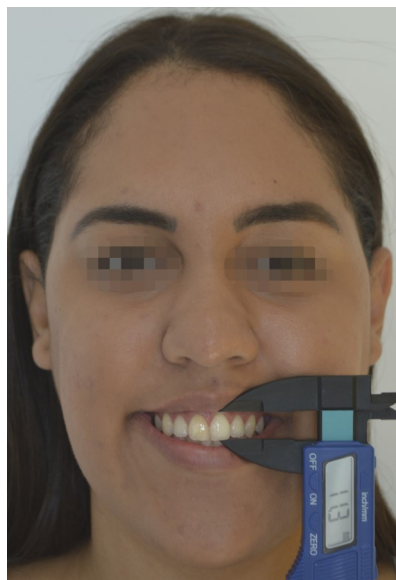


Figure 13: Measurement of gummy smile at 11.3mm.

## Discussion

The etiologies of gummy smile may occur singly or in combination, and determine the type of treatment to be applied. The etiologies of the gummy smile including: reduced length of the teeth clinical crown<sup>1-3,9-12</sup>; delayed passive eruption<sup>1,4,7,9-13</sup>; vertical excess of maxilla<sup>1,5-13</sup>; hyperfunction of the muscles involved in the smile<sup>1,7,9-13</sup>. In the first two cases, the option of choice is to perform gingivectomy or gingivoplasty. In cases of vertical excess of maxilla, orthognathic surgery (Le Fort I osteotomy) is indicated. In the latter case, myectomy or application of botulinum toxin are recommended. However, application of botulinum toxin is the treatment of first choice for the facility and security, besides being a more conservative approach when compared to myectomy<sup>1,5,9-12,15</sup>.

Regarding hyperfunction, some of the muscles involved in the smile present primordial action such as the *levator labii superioris*, the *levator labii superioris alaeque nasi*, and the *zygomaticus major* and *minor*<sup>1,5-14</sup>. They converge to the same anatomic area and suggesting that the appropriate election point comprehends in a single injection point. This site is located laterally to wing nose<sup>1,5,8-14</sup>. The diffusion area of botulinum toxin is approximately 20mm<sup>1,5,6</sup>, reaching the fibers of these involved muscles, decreasing muscle contraction and subsequently reducing gingival exposure<sup>5-13</sup>, as shown in the present case.

Botulinum toxin is synthesized by the anaerobic Gram-positive bacterium *Clostridium botulinum*, and inhibits the release of acetylcholine at the neuromuscular junction, reducing the muscle contraction<sup>1,7-13</sup>. There are seven distinct serotypes (A, B, C1, D, E, F and G) of the toxin and the types A, B and E present therapeutic functions. The type A is the most frequently used clinically and it is the stronger subtype<sup>1,6</sup>.

Commercially, the botulinum toxin is presented as a hydrophilic powder, stored under vacuum, sterile and stable<sup>1,7-12</sup>. According to the manufacturer, the reconstitution occurs from the injection of the 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>1,9-13</sup>. The clinical effects present into 2-10 days after the injection, and the maximum visible effect occurs after 14 days of injection<sup>1,5,7,9-12</sup>. This effect last approximately 3-6 months, depending on the trademark<sup>1,6,7,9-13</sup>.

Patients with neurodegenerative and autoimmune diseases, pregnant and lactating women and simultaneous use of aminoglycoside antibiotic that can increase the action of the toxin are considered contraindications to the use of botulinum toxin<sup>1,9-13</sup>.

The result achieved in this case was satisfactory for the patient. The association between gingivoplasty and the application of botulinum toxin promoted smile harmony. The result achieved by gingivoplasty through the creation of a new dental zenith promoted new dental architecture. In a second moment, the application of botulinum toxin reduced the gummy smile, by dehiscence of the upper lip. Additionally, facial harmony was also contemplated - and can be observed by comparing Figures 1 and 12 - promoting smoothness in the facial lines of the smile by attenuating the nasolabial grooves adjacent to the nostrils.

## Conclusion

The therapeutic association between gingivoplasty and botulinum toxin application showed satisfactory results in the resolution of the gummy smile, favoring harmony gingival-dental-facial for the patient. The institution of isolated treatments could not culminate in the excellence of the earned results. Although the effect of botulinum toxin is temporary, it is an easy-to-use, simple, and effective technique. The patient should always be oriented regarding the recurrence of the gummy smile.

## Conflict of Interest

The authors declare no conflict of interest.

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