

Gingivoplasty and botulinum toxin application result in improvement of severe gummy smile

Irineu Gregnanin Pedron,^a
Marcelo do Lago Pimentel Maia^b
Estevam Rubens Utumi,^c
João Marcelo Ferreira de Medeiros,^d
Caleb Shitsuka^e &
Leopoldo Penteado Nucci da Silva^f

- ^a Bottoxident Institute, and Department of Periodontology and Integrated Clinic, Universidade Brasil, São Paulo, Brazil
^b Professor and speaker, Department of Implantology, Derig Implants Co., São Paulo, Brazil
^c Private practice, São Paulo, Brazil
^d Department of Endodontics and Integrated Clinic, Universidade Brasil, São Paulo, Brazil
^e Department of Pediatric Dentistry and Cariology, Universidade Brasil, and Centro Universitário das Faculdades Metropolitanas Unidas, São Paulo, Brazil
^f Department of Periodontology, Uniceplac, Brasília, Brazil

Corresponding author:

Dr. Irineu Gregnanin Pedron
Bottoxident Institute
Rua Flores do Piauí, 508
São Paulo—SP
08210-200
Brazil

igpedron@alumni.usp.br

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Abstract

Background

Currently, the search for esthetic excellence has become the main objective in dental treatment. Gummy smile is among patients' complaints, since this condition may influence their self-esteem and social relationships. The development of new techniques such as the application of botulinum toxin may offer more

conservative therapeutic options for the treatment of gummy smile.

Case presentation

A patient with dentogingival discrepancy and severe gummy smile was treated with gingivoplasty and application of botulinum toxin in order to optimize the harmony of the smile. The result was satisfactory regarding the harmony of the smile by combination of the treatments. The use of each of these treatments alone could not have achieved the excellence of the result. Initially, the creation of the new gingival zenith after gingivoplasty promoted the new dental architecture, favoring gingival, dental and facial harmony for the patient. Subsequently, the application of botulinum toxin reduced the gummy smile, by the uniform descent of the upper lip, smoothing the facial lines of the smile, as could be seen in the nasolabial folds, adjacent to the nostrils.

Keywords: Botulinum toxin type A; gingival overgrowth; gingivectomy; gingivoplasty; gummy smile; surgical crown lengthening.

Introduction

The demand for esthetic procedures has grown exponentially. Dental and medical procedures, besides pursuing the principle of promoting health, seek to achieve smile esthetics.^{1–3} Facial esthetic harmony is formed by the union of 3 components: teeth, gingiva and lips.^{1–4} 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 nonesthetic condition called gummy smile, which affects some patients psychologically.^{1, 5–7}

Several therapeutic modalities have been proposed for the correction of gummy smile, among them are gingivoplasty,^{1–7} myectomy⁶ and orthognathic surgery.^{6–8}



Fig. 1

The last 2 procedures are more invasive and present high morbidity.¹ However, the use of botulinum toxin can be considered a therapeutic alternative to the larger surgical procedure, as it is a more conservative and effective, faster and safer method compared with surgical procedures.^{1,5,9}

Botulinum toxin is synthesized by the anaerobic Gram-positive *Clostridium botulinum* bacterium and inhibits the release of acetylcholine at the neuromuscular junction, impeding muscular contraction.^{1,6–8} There are 7 distinct serotypes of the toxin, and type A is the most frequently used clinically and is a stronger subtype.^{1,6} Botulinum toxin has shown efficiency in the treatment of gummy smile, as well as of other disorders, such as temporomandibular dysfunction (bruxism, clenching and masseteric hypertrophy), sialorrhea, facial palsy and orofacial pain.^{1,4–10} The purpose of this article is to report a case of a patient who presented with severe gummy smile and was treated by a combination of gingivoplasty and botulinum toxin.



Fig. 2



Fig. 3



Fig. 4

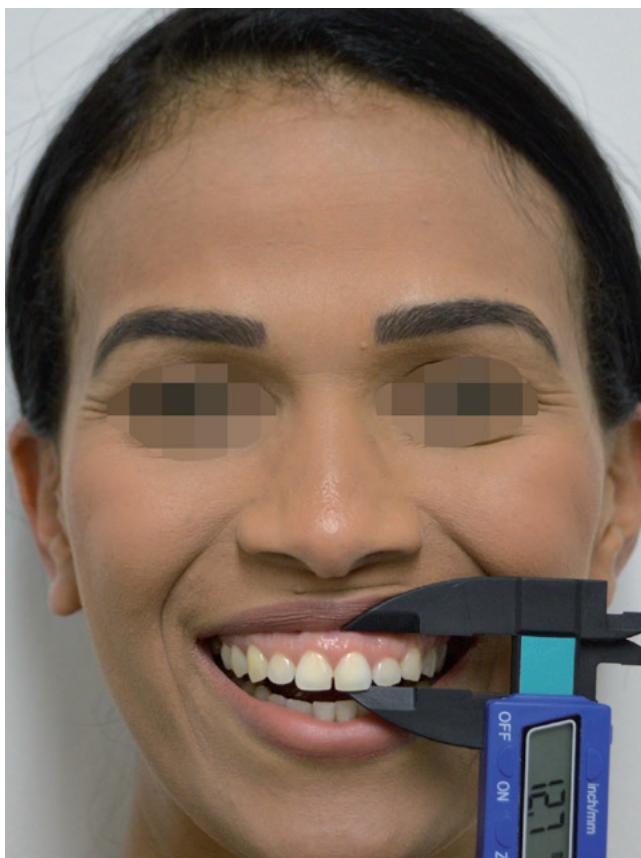


Fig. 5



Fig. 6



Fig. 7



Fig. 8

Case report

A 36-year-old female patient attended the clinic complaining of gummy smile (**Fig. 1**). Clinically, the patient presented with an anatomic discrepancy of more than 4 mm between the length of the maxillary teeth (**Figs. 2 & 3**) and severe gummy smile. Initially, the length of tooth #21 was used as a clinical parameter and was measured as 8.8 mm (**Fig. 4**). The gummy smile was measured as 12.7 mm in height (**Fig. 5**).

Systemic alterations were not reported. Gingivoplasty was suggested. However, the application of botulinum toxin was proposed to complement the result of gingivoplasty, and the patient was counseled about the recurrence of gummy smile 6 months after the application. The patient agreed to the proposed treatment and signed the terms of consent for the application of botulinum toxin and use of images.

Under local infiltrative anesthesia, gingivoplasty was performed by determination of the bleeding points with the aid of a millimeter probe and the union of these



Fig. 9

points with an electric scalpel.² The length of the teeth was increased, characterizing the gingival zenith. Posteriorly, scraping was performed, resembling the external bevel technique, with the purpose of increasing the tissue reparation (**Figs. 6 & 7**). There was no need for surgical cement, given that the wound repair process occurs by secondary intention. The patient was instructed on care and analgesics were administered postoperatively.

After 30 days, satisfactory tissue reparation was observed (**Fig. 8**) and the patient reported no changes or complaints. With use of Chu's proportion gauge (Hu-Friedy), the improvement of the relation between



Fig. 10



Fig. 11



Fig. 12



Fig. 13

the length and width of the teeth after the gingivoplasty was observed (**Fig. 9**). However, the persistence of the gummy smile was observed too (**Fig. 10**). The length of tooth #21 had been increased from 8.8 mm to 9.7 mm (**Fig. 11**). The gummy smile had increased because of the higher dynamics of the upper lip, despite gingivoplasty (**Fig. 12**).

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) was applied with the purpose of promoting comfort during the procedure. Botulinum toxin type A (Botox 200 units, Allergan Pharmaceuticals) 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 not to lower her head or engage in physical activity during the first 4 h after the procedure. After 15 days, the patient was evaluated. She presented with uniform descent of the upper lip (**Fig. 13**) and reported no side effects or complaints. The clinical effect of botulinum toxin application remained for 6 months.

Discussion

Several etiologies of gummy smile have been suggested, such as vertical excess of the maxilla,^{1,4–8} delayed passive eruption,^{1,4,6,8} hyperfunction of the muscles involved in smiling^{1,6,8} and reduced length of the clinical crowns.^{1–3} These etiologies may occur singly or in combination and determine the type of treatment to be applied. In gummy smile caused by muscular hyperfunction, botulinum toxin is indicated. It is the treatment of choice owing to its facility and security of application, besides being a more conservative approach compared with surgical procedures (myectomy or LeFort I osteotomy).^{1,4,10}

Smiling is performed by several facial muscles, such as the *levator labii superioris*, the *levator labii superioris alaeque nasi*, and the *zygomaticus major* and *minor*.^{1,4–9} The fibers of these muscles converge at the same area, forming a triangle, making it possible to include the 3 muscles in a single injection. The

proposed site of the injection was lateral to the nose wing.^{1,4,7–9} The toxin, when injected, can spread over an area of 20 mm, allowing effective extension.^{1,4,5} The toxin decreases the contraction of the muscles responsible for the elevation of the upper lip, reducing gingival exposure.^{4–9}

Botulinum toxin is a hydrophilic powder, stored under vacuum, sterile and stable.^{1,6,7} Reconstitution is by effortless injection of the diluent (0.9% sodium chloride) into the bottle. It has to be stored at 2–8°C and used within 4–8 h in order to guarantee its effectiveness.^{1,8} Clinical effects present 2–10 days after the injection, and the maximum visible effect occurs after 14 days of injection.^{1,4,6} This effect lasts for approximately 3–6 months.^{1,5,6,8} Contraindications to the use of botulinum toxin include pregnancy and lactation, neurodegenerative and autoimmune diseases, and concurrent use of an aminoglycoside antibiotic that would enhance the action of the toxin.^{1,8}

In this report, the result was satisfactory regarding the harmony of the smile by combination of the treatments—gingivoplasty and application of botulinum toxin. Each of these treatments in isolation could not have achieved the same level of excellence. Initially, the creation of the new gingival zenith after gingivoplasty promoted the new dental architecture, favoring gingival, dental and facial harmony for the patient. Subsequently, the application of botulinum toxin reduced the gummy smile, by the uniform descent of the upper lip, smoothing the facial lines of the smile, as can be seen in the nasolabial folds, adjacent to the nostrils, by comparing **Figures 1 & 13**.

Competing interests

The authors declare that they have no competing interests.

Figure legends

Fig. 1 – Severe gingival exposure, indicating gummy smile.

Fig. 2 – Discrepancy between the lengths of the maxillary teeth.

Fig. 3 – Length of tooth #11 measured with Chu's proportion gauge.

Fig. 4 – Length of tooth #21 measured with a digital pachymeter (8.8 mm).

Fig. 5 – Gummy smile measured with a digital pachymeter (12.7 mm).

Fig. 6 – Immediate postoperative photograph of teeth #21, 22 and 23.

Fig. 7 – Immediate postoperative photograph after gingivoplasty.

Fig. 8 – Thirty days after gingivoplasty.

Fig. 9 – Improvement of the relation between the length and the width of the teeth after gingivoplasty.

Fig. 10 – Persistence of the gummy smile after gingivoplasty.

Fig. 11 – Increase of the length of tooth #21.

Fig. 12 – Reduction of the gummy smile by the gingivoplasty.

Fig. 13 – Result 15 days after botulinum toxin application.

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