RSBO

ISSN:
Electronic version: 1984-5685
RSBO. 2015 Oct-Dec;12(4):389-93

Case Report Article

Gingival resection surgery complementation through botulinum toxin application at the management of gummy smile

Irineu Gregnanin Pedron[1]

Corresponding author:
Irineu Gregnanin Pedron
Rua Flores do Piauí, n. 508
CEP 08210-200 – São Paulo – SP – Brasil
E-mail: igpedron@usp.br

[1] Professor of the Training Course on Botulinum Toxin in Dentistry, Unochapecó – Chapeco – SC – Brazil.

Received for publication: December 20, 2014. Accepted for publication: November 20, 2015.

Keywords: gingival overgrowth; dental esthetics; type A botulinum toxin.

Abstract

Introduction: The gummy smile is characterized by a marked gingival exposure on smiling and it has been considered as one of the main complaints of patients, also influencing on self-esteem and social relationship. The development of new techniques such as botulinum toxin application may be a more conservative treatment option than surgical intervention (myectomy and Le Fort I osteotomy) in the treatment of gummy smile. **Objective:** To present the case of a patient who presented dental-gingival discrepancy and gummy smile, treated by gingival resection surgery and complemented by the application of botulinum toxin. **Case report:** A female patient, 23 years old, presented dental-gingival discrepancy and gummy smile, treated by gingival resection surgery and complemented by the application of botulinum toxin. **Results:** The gingival resection surgery promoted improvement of dental relationship, caused by increase of dental zenith and the application of botulinum toxin caused uniform dehiscence of the upper lip, increasing the harmony of the smile and improving self-esteem and quality life. **Conclusion:** Botulinum toxin is an additional option in the cosmetic improvement of the smile and gives better results when combined with gingival resection surgery.

Introduction

Currently the demand for cosmetic procedures has grown exponentially. Both dental and medical procedures, aim at health promotion principle, seeking aesthetics. In dentistry, the search for the perfect smile is notorious as the smile is a communication and socialization way that expresses different feelings [8-11].

The facial aesthetic harmony directly correlates with the smile and this in turn is formed by the union of three components: the teeth, the gum and the lip [2, 8-11]. The smile becomes aesthetically pleasing when these elements are arranged in proper proportion and the exposure of the gingival tissue is limited to 3 mm. When gingival exposure is greater than 3 mm, unaesthetically condition so-called gummy smile is stablished that psychologically affects some patients [3, 5, 5 6, 6 13].

Several therapeutic modalities were proposed to correct the gummy smile, including the gingivectomy or gingivoplasty [3, 6, 13], myectomy [3, 13] and orthognathic surgery (osteotomy Le Fort I) [3, 4, 13]. The latter two procedures are more invasive and presenting high morbidity [5]. However, the use of botulinum toxin can be considered as a treatment option, with a more conservative, effective, fast and safe method when compared to most invasive surgical procedures [6, 14].

The Botulinum toxin is synthesized by the Gram-positive anaerobe bacteria *Clostridium botulinum* [3, 4, 13] and acts by inhibiting the release of acetylcholine at the neuromuscular junction preventing muscle contraction. There are seven distinct toxin serotypes (A, B, C1, D, E, F, and G). However, the type A is the most common and powerful subtype used in clinics [13].

Currently, botulinum toxin has been found effective in the treatment of gummy smile, in patients with overactive smiling muscles as well to treat temporomandibular disorders (masseter hypertrophy, bruxism) and myofascial pain [5, 8]. The purpose of this study was to report the case of a patient with gummy smile treated by associating gingival resection surgery (gingivectomy) with the application of botulinum toxin.

Case Report

A female, leucoderma patient, aged 23 years, appeared in private practice with chief complaint of gummy smile (figure 1 and 2).

Figure 1 – Marked gingival exposure, characterizing gummy smile

Figure 2 – Close view of the gummy smile

Clinically, the patient had anatomical discrepancy between the length of the teeth #11, #12, #13, #21, #22, and #23, in addition to severe gingival exposure, featuring the gummy smile (figure 3).

Figure 3 – Initial clinical aspect showing mild anatomical discrepancy among the sizes of teeth #11, #12, #13, #21, #22, and #23

Treatment planning comprised gingival resection surgery (gingivoplasty) followed by the application of botulinum toxin for the correction of the gummy smile. However, the patient was advised as to the recurrence of the gummy smile, on average, 4 to 6 months of application. Under local anesthetic infiltration, bleeding points were determined with the help of millimeter probe and the union of these points was performed with electrocautery (BE 3000 ®, KVN, São Paulo, Brazil) [8, 9]. The length of the teeth has been increased, characterizing the tooth zenith. Subsequently, the *scraping* has been performed, resembling the external bevel technique, aiming at improving tissue repair (figure 4 and 5). There was no need for the use of the surgical cement, considering that the wound process occurs by secondary intention. Analgesic and anti-inflammatory association (ketorolac trometamol (Toragesic® 10 mg, EMS Sigma Pharma, São Paulo, Brazil) was administered. The patient reported no complaints or complications after surgery.

Figure 4 - Immediate post-surgical photograph of teeth #11, #12, and #13

Figure 5 - Immediate post-surgical photograph of teeth #11, #12, #13, #21, #22, and #23

Elapsed 21 days, satisfactory tissue repair was observed (figure 6) and the patient did not report changes or complaints. At the same appointment, botulinum toxin was applied. Prior to application of the botulinum toxin, the skin surface was disinfected with ethanol, avoiding local infection and removing oils. The application points were marked next to each nostril. Following, local anesthetic (Emla®, Astra, São Paulo, Brazil) was applied to promote comfort during the procedure. Type A Botulinum toxin (Dysport®, Ipsen Biopharm Ltd., Wrexham, UK) was diluted in 1.7 ml saline, according to manufacturer standards, and two units at the recommended site were injected laterally to each nostril. After application, the patient was advised to not throw your head during the first 4 hours and not engage in physical activity during the first 24 hours after the procedure.

Figure 6 - Post-surgical photograph (21 days): satisfactory tissue healing

Elapsed 10 days, the patient showed the uniform dehiscence of the upper lip (figures 7 and 8). No side effects or complaints were reported.

Figure 7 - Esthetic result 10 days after the application of botulin toxin

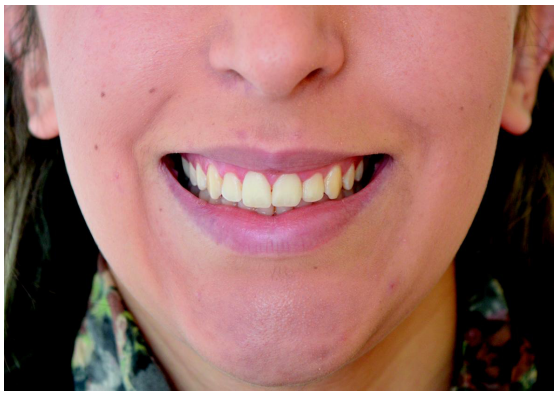

Figure 8 – Close view of the esthetics result: observe the uniform dehiscence of the upper lip

Discussion

Botulinum toxin has been an excellent aid in the treatment of various dental disorders. Although botulism toxin is known for cosmetic use in the reduction of hyperkinetic facial lines, it can also be used for therapeutic purposes in cases of bruxism, temporomandibular disorder, masseter hypertrophy, and severe gingival exposure [1-7 10-14].

The gummy smile is the exposure of more than 3 mm of gum tissue during smiling [5, 6, 6 14], frequently found in women [14]. The higher prevalence in females can be explained by the fact that male patients had lower smile line [2, 6].

Several etiologies have been suggested to explain gummy smile: vertical excess of maxilla [2-4, 6, 10, 13], delayed passive eruption [2, 4, 5, 13], hyperfunction of the muscles involved in smiling [4, 5, 10, 11, 13] and reduced length of the clinical crown of the teeth [5, 8-11], which can occur alone or in conjunction and determines the type of treatment to be employed.

In the gummy smile caused by muscle hyperfunction, the application of botulinum toxin was indicated and is the treatment of first choice due to ease and security of applications, fast effect, and more conservative method compared to surgical procedures (myectomy or Le Fort I osteotomy) [2-7, 10, 11, 13, 14].

The activity of the smile is determined by several facial muscles, such as the elevator muscle of upper lip and nose wing, zygomatic major and minor, orbicularis oris and Risorius [2-4, 6, 13, 14]. Among them, the first three plays the higher role and determine the largest amount of lip lifting and should, therefore, the muscles affected by toxin injection... The fibers of these muscles converge to the same area, forming a triangle, suggesting that the preferred point comprises the three muscles in a single injection. The toxin, when injected, can be spread in one area from 0 to 30 mm, allowing the effective range [2, 6, 10, 11]. The proposed site of injection was laterally to nose wing [2-4, 10, 11, 14]. To be injected into predetermined sites, the toxin reduces the contraction of muscles responsible for the elevation of the upper lip, reducing gingival display [2-7, 10, 11, 13, 14].

Each muscle involved in the elevation of upper lip has a function during smiling. The local for the injections are determined by the contraction of specific muscle groups, which result in different areas of gingival visualization [2, 14]. Several classifications were proposed for gummy smile: anterior, posterior, mixed and asymmetrical, involving different muscle groups [2, 14]. The anterior gummy smile should be treated by the conventional technique with applications laterally to the nose wing. In patients with posterior gummy smile, the application of the toxin must involve the zygomatic minor and major muscles, with application of the toxin at two different points: the point of greatest contraction of the nasolabial sulcus during smiling, and the 2 cm laterally to point 1, at the level of the *tragus* line. Patients who have mixed gummy smile, the application of the toxin must be performed on all those points. However, the dose should be reduced to 50% at the point lateral to the nose wing [6]. In cases lip asymmetry, occurring due to differences in muscle activity [2], patients should receive injections at different doses on each side of the face [6, 14].

Type A botulinum toxin is a hydrophilic powder, stored under vacuum, sterile and stable [3, 13]. The reconstitution occurs from the smooth injection of the diluent (0.9% sodium chloride) within the vial and should be stored form 2 to 8 °C and used within 4 to 8 hours, with the purpose of assuring efficacy [4].

At the beginning of treatment, extraoral photographs, including *close-up smiling* were performed. Some authors mentioned the importance of executing the smiling photograph previous and after the application of the toxin [7, 13, 14]. It has been suggested that the smiling photo should be performed individually stimulating the muscles with electrical current to ensure that muscle contraction is controlled, precise, and also repeatable, because the spontaneous smiling is extremely difficult to be replicated. The patients understand that the treatment is performed to produce a different smile, and from this perspective, unconsciously, there is a trend to smile differently in photographs after treatment [7].

Clinical effects occurred in 2 to 10 days after injection and the maximum visible effect occurred after 14 days after injection [2, 13]. This first, programmed effect is also reversible, lasting about 3 to 6 months [4, 6, 13].

The injection of botulinum toxin, despite being a simple and safe procedure, may be associated with some adverse events such as pain at the injection site, bruising, infection, edema, ptosis or upper lip stretching, and asymmetry of the smile. The dentist should be aware of the dosage, technical precision, and site of the injection [4, 6, 7, 13]. In the present report, there were no reported complaints or changes occurring from the application.

Contraindications to the use of botulinum toxin are pregnancy; lactation; hypersensitivity (allergic) to botulinum toxin itself, lactose and albumin; muscular and neurodegenerative diseases (myasthenia *gravis*, Eaton-Lambert syndrome *myasthenia*, amyotrophic lateral sclerosis, and Charcot disease); and simultaneous use of aminoglycoside antibiotic which can potentiates the toxin action [4, 10-12].

In this report, the result achieved was satisfactory to the patient's smile harmony by combining the treatments – gingival resection surgery and type A botulinum toxin. The institution of individual treatments could not lead to the excellence of the result. *A priori*, the creation of the new dental zenith during the course of gingival surgery promoted the new dental architecture, favoring dental-facial gingival harmony of the patient. Subsequently, the application of type A botulinum toxin softened the gummy smile through the very uniform dehiscence of the upper lip, promoting further softness to facial smile lines, as shown in the nasolabial sulcus, adjacent to the nostrils, comparing the figures 1, 2, 7, and 8.

Conclusion

Despite having a temporary effect on gummy smile correction, the application of botulin toxin in comparison to surgical procedures (myectomy or Le Fort I osteotomy), is a less invasive, fast, safe, effective alternative and produces harmonics and pleasing results. Therefore the application of the botulin toxin becomes a useful auxiliary tool in the aesthetic improvement of the smile and provides better results associated to the gingival resection surgery.

References

1. Cezere MES, Pedron IG. Aplicação da toxina botulínica coadjuvante à cirurgia gengival ressectiva na otimização do sorriso gengival. Revista APCD de Estética. 2014 Apr;2(3):332-40.

2. 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 Jan;79(1): 70-7.

3. 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 Sep;10(3):226-70.

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

5. Mangano A, Mangano A. Current strategies in the treatment of gummy smile using botulinum toxin type A. Plast Reconstr Surg. 2012 Jun;129(6):1015e.

6. Mazzuco R, Hexsel D. Gummy smile and botulinum toxin: a new approach based on the gingival exposure area. J Am Acad Dermatol. 2010 Dec;63(6):1042-51.

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

8. Pedron IG, Utumi ER, Tancredi ARC, Perrella A, Perez FEG. Sorriso gengival: cirurgia ressectiva coadjuvante à estética dental. Rev Odonto. 2010;18(35):87-95.

9. Pedron IG, Utumi ER, Silva LPN, Moretto EML, Lima TCF, Ribeiro MA. Cirurgia gengival ressectiva no tratamento da desarmonia do sorriso. Rev Odontol Bras Central. 2010;18(48):87-91.

10. Pedron IG. Associação terapêutica entre cirurgia gengival ressectiva e aplicação de toxina botulínica no sorriso gengival em paciente ortodôntico. Ortodontia SPO. 2014 May;47(3):245-9.

11. Pedron IG. Utilização da toxina botulínica tipo A associada à cirurgia gengival ressectiva: relato de caso. Rev Periodontia. 2014 Sep;24(3):35-9.

12. Pedron IG. A utilização da toxina botulínica em Odontologia. Rev Assoc Paul Cir Dent. 2014 Jul;68(3):244.

13. Polo M. Botulinum toxin type A in the treatment of excessive gingival display. Am J Orthod Dentofacial Orthop. 2005 Feb;127(2): 214-8.

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