Botulinum toxin type A associated with resective gingival surgery for the management of gingival smile

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Objective: *The aim of this article is to present the case of a patient with gingival smile and dentogingival discrepancy who was treated with resective gingival surgery and the application of botulinum toxin type A.* ***Methods:*** *Resective gingival surgery (gingivoplasty) and the application of botulinun toxin type A were performed.* ***Results:*** *Resective gingival surgery (gingivoplasty) increased the dental zenith and provided dental, gingival and facial proportion; while the application of botulinum toxin caused dehiscence of the upper lip, thus optimizing smile harmony.* ***Conclusion:*** *The development of new techniques, such as botulinum toxin associated with resective gingival surgery, may be another therapeutic option for gingival smile treatment.* ***Keywords:*** *Gingival overgrowth. Botulinum toxin type A. Dental esthetics. Gingivoplasty.*

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» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

Introduction

Currently, the demand for cosmetic procedures has grown exponentially. Dental procedures, as well as medical ones, besides working to obtain the principle of health promotion, seek to smile esthetics, being a form of communication and socialization that expresses many feelings.[1,2]

The aesthetic facial harmony correlates directly with the smile and this, in turn, is formed by the union of three components: teeth, gums and lips.[1,2,3] The smile becomes aesthetically pleasing when these elements are disposed in suitable proportion, and the exposure of gingival tissue is limited to 3 mm. When gingival exposure is superior to 3 mm, it is characterized as a non-aesthetic condition called gummy smile, which affects some patients psychologically.[4-7]

Several therapeutic modalities have been proposed for the correction of gummy smile, among them gingivectomy or gingivoplasty,[4,5,7] myectomy[5,7] and orthognathic surgery,[5,7,8] the last two ones being more invasive procedures and presenting high morbidity.[6] In contrast, the use of botulinum toxin can be considered as a therapeutic option to surgery, which is a method more conservative, more effective, faster and safer, when compared to surgical procedures.[4,9]

Botulinum toxin is produced by the anaerobic Gram-positive bacterium *Clostridium botulinum*,[5,7,8] and it acts by inhibiting the release of acetylcholine at the neuromuscular junction, preventing muscle contraction. There are seven distinct serotypes of toxins (A, B, C1, D, E, F and G). However, the type A is the most frequently used clinically and more potent subtype.[5]

The purpose of this study was to report a case of a patient who presented dentogingivofacial discrepancy and gummy smile and was treated by associating resective gingival surgery (gingivectomy) and botulinum toxin.

Case Report

A 28-years-old Caucasian female attended the private clinic complaining of gummy smile (Figs 1 and 2).

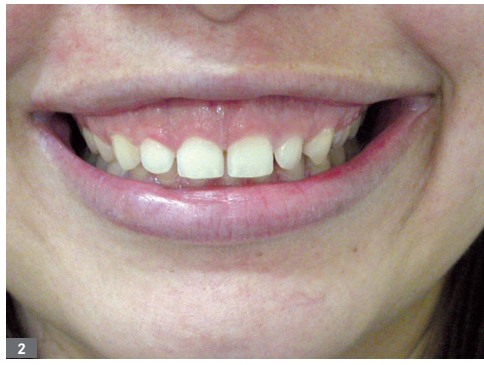

Figure 1: Accentuated gingival exposure, characterizing the gummy smile.

Figure 2: Approximate view of the gingival smile.

Figure 3: Initial intraoral view, showing dentogingival discrepancy of the teeth #11, #12, #13, #21, #22 e #23.

Figure 4: Immediate postoperative of the teeth #21, #22 e #23.

Figure 5: Immediate postoperative of the teeth #11, #12, #13, #21, #22 e #23.

Figure 6: Postoperative at 30 days: satisfactory tissue repair.

Clinically, the patient presented anatomic discrepancy between the length of the teeth 11, 12, 13, 21, 22 and 23, and prominent gingival exposure, with more than 3 mm, featuring gummy smile (Fig 3).

The resective gingival surgery (gingivoplasty) was proposed and, subsequently, after the presentation of the results, it was suggested the application of botulinum toxin for the correction of gummy smile, as a therapeutic option. However, the patient was counseled about the likely recurrence of the gummy smile after 6 months of application.

Under local infiltrative anesthesia, resective gingival surgery was performed by determining the bleeding points with the use of millimetered probe and the union of these points was made with the electric scalpel.[2] The length of the anterior-superior / maxillary teeth was increased, characterizing the dental zenith. Subsequently, the scraping was performed, similar to the technique of external bezel, with the purpose of enhancing tissue repair (Figs 4 and 5). There was no need to use the surgical cement, due to the fact that the healing process occurs by secondary intention. The patient was instructed and analgesics were administered after surgery.

After 30 days, satisfactory tissue repair was observed (Fig 6) and no changes or complaints were reported by the patient. However, the patient still complained of the persistence of gummy smile (Figs 7 and 8). In the same consultation botulinum toxin was applied. Before application of botulinum toxin, the surface of the skin was disinfected with ethanol, to prevent local infection and remove skin oils.

Subsequently, the local anesthetic (Emla™, Astra, São Paulo, Brazil) was applied, with the aim of promoting comfort during the procedure. Botulinum toxin type A (Dysport™, Ipsen Biopharm Ltd, Wrexham, UK) was diluted in 1.7 ml of saline, according to the instruction of the manufacturer, and it was injected 2 units in the recommended site, laterally to each nostril. After application, the patient was advised not to bow her head in the first 4 hours and not to practice physical activities in the first 24 hours after the procedure.

After 10 days, the patient was evaluated and she presented uniform dehiscence of the upper lip (Figs 9 and 10). Side effects or complaints were not reported.

Discussion

In Dentistry, botulinum toxin has been used for therapeutic purposes in cases of temporomandibular disorders (bruxism, clenching and masseteric hypertrophic), orofacial pain and severe gingival exposure, as presented in this report.[3-10]

The gummy smile is conceptualized by the exposure of more than 3 mm of gingival tissue during smiling,[4,6] which is often found in women. The predominance of females can be explained by the fact that male patients present lower smile line.[3,4]

Several etiologies have been suggested to gummy smile as maxillary vertical excess,[3-5,7,8] delayed passive eruption,[3,5,6,8] hyperfunction of the muscles involved in smiling[5,6,8] and reduced length of the clinical crown of teeth;[1,2,6] they may occur singly or in combination and

Figure 7: Results after surgery, increasing the harmony of the smile with the face.

Figure 8: Approximate view after surgery.

Figure 9: Aesthetic results after botulinum toxin application.

Figure 10: Approximate view after botulinum toxin application.

determine the type of treatment to be applied. In this report, the result was satisfactory to the harmony of the smile of the patient by the association of treatments - resective gingival surgery and botulinum toxin type A. The institution of single treatments could not culminate in excellence of the earned results. The creation of new dental zenith during the course of resective gingival surgery promoted the new dental architecture, favoring gingival-dental-facial harmony of the patient. Subsequently, the application of botulinum toxin type A softened the gummy smile, by the uniform dehiscence of the upper lip itself, still promoting smoothness to facial smile lines, as can be seen in the nasolabial folds, adjacent to the nostrils, as one can compare Figures 1, 2, 9 and 10.

In gummy smile caused by overactive muscle, botulinum toxin was indicated to be the treatment of first choice for the ease and security of applications, quick effect, besides being a more conservative approach when compared to surgical procedures (myectomy or Le Fort I osteotomy).[3-10]

The activity of the smile is determined by several facial muscles, like the elevator of the upper lip and of the nose wing, the major and minor zygomatic, the angle of the mouth, the orbicularis oris and the risorius.[3-5,7-9] Among them, the first three play major function and determine the amount of lip elevation, therefore they need to be the muscles affected by the toxin injection. The fibers of these muscles converge to the same area, forming a triangle, what suggests that the adequate point of election involves the three muscles in a single injection. When the toxin is injected, it can spread in an area of 10 to 30 mm, allowing the effective reach.[3,4] The proposed site of injection was laterally to wing nose.[3,7-9] After being injected at predetermined locations, the toxin decreases the contraction responsible for lifting the upper lip muscles, reducing gingival exposure.[3-10]

Botulinum toxin type A is a hydrophilic powder, stored under vacuum, sterile stable.[5,7] 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.[8]

At the beginning of the treatment, extraoral photographs including the close-up smile were taken. Some authors mentioned the importance of taking the picture of the previous smile and then applying the toxin.[5,9,10] It was proposed that the smile photo has to be performed stimulating the muscles individually with electrical current, in order to ensure that muscle contraction is controlled, precise and repeatable, as spontaneous smiling is extremely difficult to be replicated. Patients understand that the treatment is carried out to produce a different smile, and from this perspective, unconsciously, there is a tendency to smile differently in photographs after treatment.[10]

The clinical effects show up in 2-10 days after the injection, and the most visible effect occurs after 14 days of injection.[3,5] This first effect, scheduled to be progressive, is also reversible, lasting approximately 3-6 months.[4,5,8]

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, dysphonia, dysphagia, ptosis or lengthening of the upper lip and asymmetry of the smile. The dentist should be aware of in relation to dosage, precision of technique and location of puncture.[4,5,8,10] In this report, claims or changes arising from the application were not reported.

Contraindications to the use of botulinum toxin are pregnancy; lactation; hypersensitivity to botulinum toxin, lactose and albumin; muscle and neurodegenerative diseases (*myasthenia gravis*, Charcot's disease and Amiotrophic Lateral Sclerosis); and concurrent use of aminoglycoside antibiotic, which may potentiate the action of the toxin.[8]

In conclusion, the application of botulinum toxin is a procedure less invasive, fast, safe, effective and it produces harmonics and satisfactory results when injected into targeted muscles, respecting the appropriate dose and type of smile, even with temporary effect procedure. Botulinum toxin is, in this perspective, a useful supplement in cosmetic improvement of the smile and it gives better results when combined with resective gingival surgery.

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