Botulinum toxin type A and surgical crown lengthening in the management of severe gummy smile

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KEYWORDS
- Botulinum toxins type A
- Gingival overgrowth
- Gummy smile
- Surgical crown lengthening

ABSTRACT

Aim The search for esthetic excellence has become the main objective in the dental treatment. The gummy smile is one of the most common complaints from patients, since this condition may influence their self-esteem and social relationship. The beauty of the smile lies not only in shape, position and color of the teeth, but also in the characteristics of the gingival tissue, which should be as harmonious as the teeth. The development of new techniques, such as the application of botulinum toxin, may represent a more conservative treatment option, in comparison to surgical intervention, in the treatment of gummy smile. The purpose of this article is to present resective gingival surgery (gingivoplasty) with posterior application of botulinum toxin type A.

Materials and methods A case is reported of a patient with severe dentogingival discrepancy and gummy smile, who was treated with gingival resection surgery and application of botulinum toxin type A in order to optimize the harmony of the smile.

Results Resective gingival surgery promoted the increase of dental zenith and the application of botulinum toxin type A determined the uniform dehiscence of the upper lip.

Conclusion The application of botulinum toxin, associated with gingival resective surgery, obtained the optimization and harmony of the smile, and, subsequently, increasing the patient quality of life.

Introduction

Currently, the search for esthetic procedures has grown exponentially. Dental as well as medical procedures, besides health promotion, seek smile esthetics, which is a form of communication and socialization that expresses several feelings (1-3). The facial aesthetic harmony has a direct correlation with the smile. This, in turn, is formed by the union of three 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 non-esthetic condition called gummy smile, which can psychologically affect some patients (1,5-8).

Several treatment options have been proposed for the correction of gummy smile, among them are gingivectomy or gingivoplasty (1-6,8), myectomy (6), and orthognathic surgery (6,8,9). The last two procedures are more invasive and present high morbidity (7). On the other hand, the use of botulinum toxin can be considered as a therapeutic option to the surgical procedure, as it is a more conservative, more effective, faster and safer method, when compared to surgical procedures (1,5,10).

Botulinum toxin is synthesized by the anaerobic Gram-positive Clostridium botulinum (1,6,8,9) bacterium, and inhibits the release of acetylcholine at the neuromuscular junction, stopping muscle contraction. There are seven distinct serotypes of the toxin (A, B, C1, D, E, F and G). However, type A is the one most frequently used clinically and it is a stronger subtype (1,6).

Currently, botulinum toxin has shown efficiency in the treatment of gummy smile, in patients with hyperfunction of the muscles involved in the smile, as well as other disorders such as temporomandibular dysfunction (bruxism, clenching and hypertrophy of the masseter muscle) and orofacial pain (1,6,9). The purpose of this article was to report a case of a patient who presented severe gummy smile and was treated by associating resective gingival surgery (gingivectomy) and botulinum toxin.
Case report
A 28-year-old, Caucasian female patient attended the private clinic complaining of gummy smile (Figure 1, 2). Clinically, the patient presented severe anatomic discrepancy between the length of the maxillary teeth, and prominent gingival display, with more than 4 mm, featuring gummy smile (Figure 3). Resective gingival surgery (gingivoplasty) was proposed. Depending on the presented results, the application of botulinum toxin can be suggested for the temporary correction of gummy smile, as an alternative to invasive procedures (for instance, miectomy and orthognathic surgery). However, the patient was counseled about the recurrence of the gummy smile after 6 months from the application. Before the surgical procedure, the patient was oriented about oral hygiene, in order to reduce gingival inflammation and prevent the possibility of gingival growth recurrence.

Under local infiltrative anesthesia, resective gingival surgery was performed, by the determination of the bleeding points with the aid of a millimeter probe and the union of these points with the scalpel (2,3). The length of the teeth was increased, characterizing the dental zenith.

Posteriorly, scraping was performed resembling the technique of external bevel, with the purpose of increasing tissue reparation. There was need for the use of surgical cement, since the process of wound healing occurs by first intention. The patient was oriented and analgesics were administered postoperatively. The surgical cement was removed at 7 days. After 30 days, satisfactory tissue reparation was observed (Figure 4) and the patient reported no changes nor complaints. In the same treatment session, botulinum toxin was applied. Prior to application of botulinum toxin, 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 (Dysport™, Ipsen Biopharm Ltd, Wrexham, UK) was diluted in 1.7 ml of saline solution, according to the manufacturer’s instructions, and 6 units were injected at the recommended site, i.e. laterally to each nostril. After application, the patient was advised to not lower her head and to refrain from physical activity during the first 4 hours following the procedure.

After 10 days, the patient was evaluated. She presented uniform dehiscence of the upper lip (Figures 5 and 6). No side effects nor complaints were reported.

Discussion
Botulinum toxin has become an excellent option in the treatment of several stomatological disorders. Beside being known for its cosmetic use in the reduction of hyperkinetic facial lines, it can also be used for therapeutic purposes in cases of bruxism, clenching, temporomandibular dysfunction, masseteric hypertrophy and marked gingival exposure (1,4-11). A gummy smile is conceptualized by the exposure of more than 3 mm of gingival tissue during the smile (1,5,7). However, Sucupira and Abramovitz...
considered the exposure of the gingival tissue greater than 2 mm as gummy smile, frequently found in women. The larger predominance of the female gender can be explained by the fact that male patients generally present a lower smile line (4, 5).

Several etiologies have been suggested for gummy smile, like the vertical excess of maxilla (1,4-6,8,9), delayed passive eruption (1,4,6,7,9), hyperfunction of the muscles involved in the smile (1,6,7,9) and reduced length of the clinical crown of teeth (1-3,7), which may occur singly or in combination, and determine the type of treatment to be applied.

When gummy smile is caused by muscle hyperfunction, botulinum toxin is indicated. It is the treatment of first choice for its easy and safe application, rapid effect, besides being a more conservative approach with respect to surgical procedures (myectomy or Le Fort I osteotomy) (1,4,11).

The smile activity is determined by several facial muscles, such as the levator labii superioris, the levator labii superioris alaeque nasi, the zygomaticus major and minor, the angle of the mouth, the orbicularis oris and the risorius (1,4-6,8-10). Among them, the first three play a greater role and determine the amount of lip elevation and should, therefore, be the muscles involved in the injection of the toxin.

The fibers of these muscles join in the same area, forming a triangle, suggesting that the appropriate point for selection includes the 3 muscles in a single injection. The toxin, when injected, can be spread in an area of about 10 to 30 mm, allowing the effective extension (4,5). The proposed site of the injection is laterally to the wing of the nose (1,4,8-10). After being injected into predetermined locations, the toxin decreases the contraction of muscles responsible for the elevation of the upper lip, reducing gingival exposure (4-11).

Each muscle involved in the elevation of the upper lip has a function during smile activity. The sites for the injections are determined by the contraction of specific muscle groups, which result in different areas of gingival exposure. Several classifications have been proposed to gummy smile: anterior, posterior, mixed and asymmetric, involving distinct muscle groups (4,10).

The anterior gummy smile should be treated with the conventional technique, with the applications laterally to the nose wing. In patients with posterior gummy smile, the application of the toxin must involve the zygomaticus major and minor muscles, injecting the toxin at two different points: the point of greatest contraction of the nasolabial fold during smile activity, and the second point, 2 cm laterally from the first, at the tragus line level. For patients who have mixed gummy smile, the application of the toxin should be performed at all the points mentioned above. However, the dose should be reduced by 50% at the lateral point of the nose wing (5). In cases of lip asymmetry that occur due to differences in the muscle activity (4), patients should receive injections with different doses on each side of the face (5,10).

The botulinum toxin type A is a sterile and stable hydrophilic powder, stored under vacuum (1,6,8). The reconstitution is achieved with the injection of the diluent (sodium chloride 0.9%) into the bottle, and then the solution is stored at 2 to 8°C, and used within 4 to 8 hours, in order to guarantee its effectiveness (9).

At the beginning of the treatment, extraoral photographs, including the smile close-up, are usually taken. Some authors mentioned the importance of taking the picture of the previous smile and subsequently the application of the toxin (6,10,11). According to Niamtu (11), the photo of the smile should be performed during electrical current stimulation of the muscles individually, in order to ensure control, precision and repeatability of muscle contraction, since the spontaneous smile is extremely difficult to be replicated.

Patients understand that treatment is performed to produce a different smile, and, from this perspective, unconsciously, tend to smile differently in photographs after the treatment.
Clinical effects are visible within 2-10 days after the injection, and the maximum visible effect occurs after 14 days of injection (1,4,6). This first effect, programmed to be progressive, is also reversible, lasting approximately 3-6 months (1,5,6,9). The injection of botulinum toxin, despite being a simple and safe procedure, can also have some complications such as haematoma, infection, edema, dysphonia, dysphagia, plosis or stretching of the upper lip and smile asymmetry. The dentist should be aware in relation to dosage, technique precision and location of the puncture (1,5,6,9,11).

In the present study, no complaints nor changes arising from the application were reported. Contraindications to the use of botulinum toxin include: pregnant and lactating women, patients with muscle and neurodegenerative (myasthenia gravis and Charcot’s disease) as well as autoimmune diseases, and concurrent use of aminoglycoside antibiotics that enhance the action of the toxin (1,9).

Conclusion
Botulinum toxin application, in comparison to surgical procedures, is less invasive, more rapid, safer, more effective and produces harmonious and pleasing results, provided it is applied to target muscles (levator labii superioris alaeque nasi and zygomaticus major and minor) and respecting the proper dose and the type of smile. However, the effect of botulinum toxin in correcting gummy smile is temporary. Therefore, it represent a useful adjunct in the esthetic smile improvement and enhances results when combined with resective gingival surgery.

References