GUMMY SMILE: BOTULINUM TOXIN AS A TREATMENT OPTION

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ABSTRACT

Nowadays, aesthetics has become one of the goals to be achieved during dental treatment, the smile in turn is among one of the most important elements of the face, for it to be considered harmonious there must be a correlation between lips, shape and color of the dental elements and gums. When the smile is characterized by an exaggerated exposure of the gums, it is considered unsightly and is called "Gummy Smile". Among its etiologies, we find hyperactivity of the upper lip, which occurs when the muscles responsible for smiling exert a force greater than normal; Botulinum toxin is considered a treatment option in these cases. Therefore, through a literature review, this study aims to discuss the gummy smile and the use of botulinum toxin as a therapeutic treatment option when it has the etiology of the hyperactivity of the upper lip. Google Scholar, Scielo, Pubmed, physical and virtual libraries were used as databases. In view of the research, it was possible to conclude that botulinum toxin is effective for the treatment of gummy smile, as it is a procedure that has ease and safety in application, fast action and low risk, but the correct diagnosis is essential to outline the treatment plan with satisfactory results, as it is also concluded that this treatment option will be effective only when the etiology is the hyperactivity of the upper lip.

Keywords: Smile. Hyperactivity. Toxin.

INTRODUCTION

The smile can be considered as one of the most important components of the face. It is capable of expressing countless sensations and is also a form of communication in society. Since ancient times, aesthetics and beauty standards have been of paramount importance to human beings, the smile in turn is considered one of the most prominent features on the face, making this an extremely relevant element in the search for a harmonious face, it is interconnected with self-esteem, beauty and well-being, Its characteristics can be noticed not only by the dental surgeon, but also by people considered laymen in the area.

According to the literature, for the smile to be considered aesthetic, there must be a correlation between lips, gums, color and shape of the dental remains. The gummy smile is diagnosed when during the act of smiling the patient exposes an excessive amount of maxillary gums and several times it is perceived by the patient himself, taking him to the dental surgeon who must have the knowledge to diagnose its etiology, thus being able to offer the appropriate treatment.

Scientific evidence reports that the relationship between the color and shape of the dental elements, the gums and the lips are important characteristics for the smile to be considered aesthetic, the functioning of the lip muscles is also interconnected because in this region there are several muscles that provide the mobility of the upper lip. There are several etiologies for gummy smile, and with that the dentist must be prepared when choosing the treatment plan that has the best prognosis. Among the etiologies, we find muscle hyperactivity of the upper lip, caused by the excess force exerted by the muscles involved during the act of smiling. Given this, when diagnosed with a gummy smile, can botulinum toxin be used as an effective treatment option?

This study aims to know the performance of botulinum toxin as an ally in the treatment of patients with gummy smile, and specifically, to describe the gummy smile and its relationship with upper lip hyperactivity, in addition to pointing out the performance of botulinum toxin mitigating and/or correcting this condition.

DEVELOPMENT

METHODOLOGY

The type of research carried out was a Literature Review, where books, dissertations and scientific articles selected through a search in the following databases were searched: *Google* Scholar, *Scielo*, *Pubmed*, physical and virtual library.

The period of the articles researched was the works published in the last 15 years, in the period from 2008 to 2023; The inclusion criteria were national works published in Portuguese; The exclusion criterion was temporal, i.e., articles prior to 2008 were not used. The keywords used in the search were: "Gummy smile", "Botulinum Toxin", "Treatment".

RESULTS AND DISCUSSION

Gengival Smile

Smiling is a dynamic process, we can say that it is not only related to the correct dental and skeletal positioning, but also has a direct relationship with the anatomy and functioning of the labial muscles (SEIXAS; COSTA-PINTO AND ARAÚJO, 2011). Facial aesthetic harmony is directly related to the smile, which is formed through the union of three components: The lips, gums and teeth (PEDRON, 2015).

Most dental professionals agree that, during the act of smiling, the upper lip should be positioned at the level of the gingival margin of the maxillary central incisors (SEIXAS; COSTA-PINTO AND ARAÚJO, 2011). During smiling, a characteristic for it to be considered aesthetic is an exposure of the total length of the upper anterior teeth to the premolars, upper teeth touching slightly or leaving a small space with the lower lip and incisal curve of the teeth parallel to the internal curvature of the lower lip (MARSON *et al.*, 2014).

In order for the smile to be considered ideal, the position of the lower edge of the upper lip must be in accordance with the gingival margin of the upper central incisor, leaving it all exposed (MARSON *et al.*, 2014). Their height can be influenced through the age and gender of the patient. Several findings are found that women may have a higher smile than men (SEIXAS; COSTA-PINTO AND ARAÚJO, 2011).

What leads the smile to be considered harmonious is when its gingival exposure is not greater than 2 mm, since above this measure, it can be considered that there is an aesthetic loss in the patient, considering him with a gummy smile (PAULO, OLIVEIRA AND FREITAS, 2018). It can be caused by several reasons, including: Vertical maxillary excess, increased interlabial space at rest, greater muscular ability to raise the upper lip when smiling, overbite and increased overjets. The short upper lip and short clinical crown may also contribute to gingival exposure (DUTRA, 2011).

When it comes to the etiological factors of the gummy smile, some aspects must be considered in the clinical evaluation of patients: the interlabial distance at rest, the exposure of the maxillary incisors at rest and during speech, the arch of the smile, the width/length of the maxillary incisors and the morphofunctional characteristics of the upper lip. For patients who have a gummy smile and normal facial proportions, lip length within the middle limits,

marginal gingiva located close to the JCE and teeth with a normal width/length ratio, the etiology may be related to the hyperactivity of the muscles that move the upper lip during the act of smiling. When not hyperactive, the upper lip moves between 6 and 8 mm from the resting position to the wide smile, however, when hyperactive, this distance can be between 1.5 and 2 times greater (SEIXAS; COSTA-PINTO AND ARAÚJO, 2011).

Upper lip muscle hyperactivity

The lips play an important role in facial expression, especially in the act of smiling, where there are numerous variations in the lip morphofunctional characteristics such as: Thickness and insertion, length and the direction and contraction of the muscle fibers of the muscles related to it. In addition to the orbicularis oris muscle, which internally contours the lips, there are other muscles that influence the mobility of the upper lip, they are: zygomaticus major, zygomaticus minor, levator lip superior, levator lip superioris and wing of the nose, levator corner of the mouth and depressor septum nasal (SEIXAS; COSTA-PINTO AND ARAÚJO, 2011).

The smile during its formation can present two stages: The first, called voluntary smile, which will raise the upper lip in the direction of the nasolabial fold through the muscle contraction of the levator muscles that originate in this groove and are inserted into the lip. The medial muscle bundles have the function of elevating the upper lip in the region of the anterior teeth and the lateral ones in the region of the posterior teeth until it meets a resistance of the adipose tissue that the cheeks have. In the second stage, called spontaneous smile, it begins with a greater elevation of both the upper lip and the nasolabial fold, through the action of three muscle groups: The zygomaticus major muscle, the upper fibers of the buccinator muscle and the levator labii superior muscle, originating in the infraorbital region (SEIXAS; COSTA-PINTO AND ARAÚJO, 2011).

Hyperactivity of the upper lip is characterized by excess strength of the muscles: levator labrum superior and depressor septum nasal (SENISE *et al*., 2015). The fact that these muscles are hyperactive will cause an excessive elevation of the upper lip, leaving the gums more exposed, this mobility is a consequence of the muscle contraction of the muscles involved in the act of smiling. Thinner lips may be more tense and have a more intense response during the moment of contraction (SEIXAS; COSTA-PINTO AND ARAÚJO, 2011). Despite finding that some muscles have a greater influence to cause hyperactivity of the upper lip, all the muscles that are involved in the smile will influence the elevation of the upper lip (MAZZUCO *et al*., 2010 apud PINTO, 2016).

Botulinum toxin

Until recently, botulinum toxin was not allowed for dental use. However, due to the amendment of CFO resolution 112/2011, the dental surgeon was able to apply botulinum toxin for therapeutic purposes (SENISE *et al.*, 2015). It should be remembered that the dental surgeon is authorized to use botulinum toxin in the orofacial region in Resolution 198/2019 by the Federal Council of Dentistry (CFO) (CHEN *et al.,* 2019 apud GALDINO AND BRITO, 2021).

Botulinum toxin is synthesized by the anaerobic Gram-positive bacterium Clostridium botulinum, its action inhibits the release of acetylcholine at the neuromuscular junction, preventing muscle contraction from occurring. There are 7 different serotypes of the toxin (A, B, C1, D, E, F, and G). However, type A is the subtype most frequently used in the clinic and the most effective (PEDRON, 2014). It can be considered as the treatment of first choice when it comes to gummy smile whose main etiology is muscle hyperfunction, due to its ease and safety of applications, no need for the use of large doses, fast effect, less invasive method, high tolerability by the patient and low complication rate, when compared to surgical procedures (REGO; SANTOS AND PEDRON, 2015).

The application of Botulinum Toxin in the treatment of gummy smile will lead to a reduction in the contraction of the levator lip superior muscle (nasal portion), the muscle responsible for lifting the upper lip. When this muscle is hyperactive, it leads to an excessive elevation of the upper lip, leading to gum exposure (SILVA, 2012). The mechanism of action of botulinum toxin can be divided into 2 phases, where in the first phase neuromuscular communication will be blocked and in the second phase this communication is reestablished (SENISE *et al.,* 2015)

In the first phase, botulinum toxin will block the transmission of overactive nerve impulses from the target muscles, selectively preventing the release of acetylcholine at the neuromuscular junction, temporarily preventing contraction, with this, the nerve impulses responsible for controlling muscle contractions are blocked, reducing muscle activity. As botox has a temporary effect, in the second phase neuromuscular communication is restored. Its time of action will depend on each patient and the type of treatment (SENISE *et al.,* 2015).

In the case of puncture points, the markings can be made with the pointed demographic pencil. To perform the application, the muscles must be at rest. For people with 3 to 5 mm of gingival exposure, the recommended dose is 2U to 3U per point. The contents should be applied in an oblique direction by a 4 mm needle on the surface of the skin. According to the literature, injections should be made delicately, with light pressure on

the plunger (BARBOSA CMR and BARBOSA JRA, 2017 apud AQUINO *et al.,* 2019). However, the location of the point and the dosage are factors dependent on the size of the gummy smile exposure (GUPTA & KOHLI, 2019 apud GALDINO AND BRITO, 2021).

Botulinum toxin is a simple, practical and effective method in the aesthetic correction of the gummy smile, other factors that can consider the toxin as a first-line therapy are: Ease and safety during application; use of reduced amount; fast action; low risk; and reversible effect (MAZZUCO AND HEXSEL, 2010 apud SENISE *et al*., 2015). It stands out because it is a quick, less invasive and reversible procedure that is effective in solving the patient's muscle problem, without harming the tissues. This becomes a positive point, as patients who are afraid of the final result will be safe in receiving a minimally invasive procedure (DE PAULO; DE OLIVEIRA AND FREITAS, 2018).

Using botulinum toxin is an alternative form of treatment for gummy smile, but this form will guarantee only temporary benefits, since its effect over time is lost (SENISE *et al.,* 2015). Resistance to botulinum toxin is considered rare, the literature shows that the patient can produce antibodies that inhibit the effects of the toxin. This occurs through a high dose over a short period of time, increasing the risk of developing neutralizing antibodies against the applied product (BRITO *et al.,* 2016 apud GALDINO AND BRITO, 2021).

The injection of botulinum toxin is a simple and safe procedure, but it can be associated with some adverse events, such as pain at the injection site, bruising, infection, edema, ptosis or elongation of the upper lip and asymmetry of the smile. The dental surgeon must be aware of the dosage, the precision of the technique and the location of the puncture (PEDRON, 2015). The use of Botox is contraindicated during pregnancy or while breastfeeding; in cases of allergy to Botox toxin or human albumin; presence of inflammation/infection at the injection site; muscular neuropathy, muscle disorder such as amyotrophic lateral sclerosis (ALS), muscular dystrophy, Lambert Eaton syndrome, Multiple Sclerosis; and people who use calcium channel blockers and aminoglycosides (SENISE *et al*., 2015).

CONCLUSION

Through this literature review, it was possible to discuss how the smile is an extremely important item because it deals with one of the most noted facial features in the human being, being possible through it to transmit sensations that are directly linked to the feelings that occur during daily life. Although the gummy smile is often perceived by the patient himself, knowing the correct anatomy of a harmonic smile is essential when giving

your diagnosis, only after knowing the characteristics of both will it be possible to conclude the diagnosis.

Faced with the diagnosis of gummy smile, it is up to the dental surgeon to have the knowledge to identify its etiology, and through this choose the treatment plan that will be more effective and with more satisfactory results. The etiology known as hyperactivity of the upper lip occurs when the muscles responsible for smiling act in a hyperactive way, that is, an excess of force is exerted by them, causing a greater elevation of the upper lip.

Currently, when it comes to the above etiology, dentistry uses botulinum toxin type A as a treatment option for gummy smile, and it has been showing excellent results because it is a simple, conservative, practical and effective method in correcting the gummy smile, it is safe during application, fast action and low risk. Its effect is reversible, and this can trigger two reactions in the patient, it can be considered a positive point for patients who are not looking for a definitive solution, since a few months after its application neuromuscular transmission is reestablished; However, it can be considered a negative point, since to maintain the result it is necessary to apply it from time to time.

Through the results found in this research, it is possible to conclude that the objectives of knowing the link between gummy smile and upper lip hyperactivity were achieved, based on the literary findings it can also be noted that the correct diagnosis is crucial for the use of botulinum toxin type A to be effective, because in the case of another etiology besides upper lip hyperactivity, there are still no studies that prove its effectiveness. This study can serve as a range for future research, mainly because it is a new area where new relevant discoveries can still be made, when compared to other areas of dentistry.

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