

THE USE OF BOTULINUM TOXIN AS AN ALTERNATIVE TREATMENT OF HEMIFACIAL SPASM: CLINICAL CASE

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Abstract: The use of botulinum toxin has been widely increased within the dental scenario, not only as a softener for hyperkinetic lines and other aesthetic purposes, but also as a therapeutic adjuvant. Dysfunctions with the ability to cause involuntary muscle contractions, such as hemifacial spasm, require injections of botulinum toxin type A (TXB-A) as a form of transient treatment, since the ability to denervate muscle fibers through the inhibition of acetylcholine-A uptake in the Synaptic cleft is the main characteristic and mechanism of action of botulinum toxin. Several studies have already been conducted to verify the feasibility of TXB-A functionality in the treatment of hemifacial spasm, most of which present excellent results with an improvement rate of an average of 70% of cases. Side effects are rare and reversible and do not represent much weight when compared to the benefits of the treatment. There are still doubts regarding the protocol for applying botulinum toxin, however, it is known that for a better result such applications must be bilateral, that is, they must also be done on the half of the face that is healthy (not affected by spasms).

Keywords: Hemifacial spasm. Botulinum toxin and dentistry. Botulinum toxin type A.

INTRODUCTION

Involuntary muscular dysfunctions such as hemifacial spasms (HE) and essential blepharospasms (BE) for many years were confused with ocular diseases and psychic disorders (Shapiro, Hatheway & Swerdlow, 1998).

Today, it is known that hemifacial spasm is caused by vascular compression of the facial nerve, and results in involuntary movements of the facial muscles (Jost & Kohl, 2001).

Even though most of these dysfunctions do not reduce the life expectancy of patients with them, due to the possibility of cosmetic and

functional sequelae, many of those affected suffer psychosocial consequences, such as greater difficulty in social interaction (Osaki & Belfort, 2004; Müller et al., 2002).

Type A botulinum toxin, in turn, is already known for its effectiveness due to its aesthetic use, in softening expression lines. However, it has become an excellent auxiliary means in the treatment of various dental imbalances, and can be used for therapeutic purposes, as an alternative for the treatment of hemifacial spasms (Pedron, 2014; Schellini et al., 2006; Anderson et al., 1998).

The use of botulinum toxin as an alternative treatment for hemifacial spasm is validated since its mechanism of action results in blocking the innervation of skeletal muscles, reducing contractility and dystonic movements, which is exactly the main symptom of this dysfunction (Dutton, 1996).

However, despite the numerous benefits of botulinum toxin applications, one must bear in mind how necessary anatomical knowledge of the face is prior to injections containing TXB-A, as well as judicious and specific doses for each point, as its effectiveness is reduced after multiple applications (Tamura, 2010; Dutton, 1996).

LITERATURE REVIEW

HEMIFACIAL SPASM

Hemifacial spasm (HE) is characterized by involuntary contraction – tonic and clonic – mostly unilateral, of the muscular system innervated by the seventh cranial nerve, the facial nerve. Tests such as MRI can show that HS is the result of compression of the facial nerve by an anomalous branch of the basilar or cerebellar artery (Osaki & Belfort, 2004; Tan, Chan & Tan, 2002; Barbosa *et al.*, 1994).

HE mainly affects the periorbital region and extends to the muscles of the face (zygomaticus major and minor, orbicularis

oris and mentalis). These spasms occur even during sleep, unlike essential blepharospasm (BE), whose diagnosis can be confused (Jost & Kohl, 2001; Ainsworth & Kraft, 1995).

Approximately one third of patients who have H.E. develop significant cosmetic or functional sequelae (such as oral incompetence, contractures, epiphora, dysesthesia, synkinesia and hemifacial spasm). Although most patients with H.E., they do not experience a reduction in life expectancy, many suffer from low self-esteem, depression and impaired social interaction (Osaki & Belfort, 2004; Müller et al., 2002; Valença, Valença & Lima 2001).

There are different types of treatments for hemifacial spasm, ranging from alternative therapies such as acupuncture, herbal medicine, psychotherapy to medications including benzodiazepines, anticholinergics and serotonergics. There is also the surgical technique of vascular decompression of the facial nerve. Injection of botulinum toxin type A (TXB-A) into the affected muscles is also an alternative as an effective treatment of choice for HE and has few side effects. Generally small doses are sufficient, and literature must always be consulted for injected quantities and injection sites (Tan, Chan & Tan, 2002; Jost & Kohl, 2001; Woog et al., 1994; Holds et al., 1991).

BOTULINUM TOXIN TYPE-A AND ITS USE IN DENTISTRY

Initially used to treat strabismus in the 1970s, botulinum toxin in dentistry is indicated for temporomandibular disorders, orofacial dystonia, bruxism, masseter hypertrophy, sialorrhea, facial asymmetries of muscular origin, gummy smile and lip asymmetries that can cause accentuated gum exposure. (Carvalho et al., 2014).

More recently, the prophylactic use of botulinum toxin has been described to reduce the muscle strength of the masseter and temporalis in some cases of implant dentistry in which immediate loading is performed (Rocha et al., 2011).



Figure 02 – Patient with masseter muscle hypertrophy (HMM) pre-injection (left) and post-TXB-A injection (right). Source: Burcu Baş, 2010.

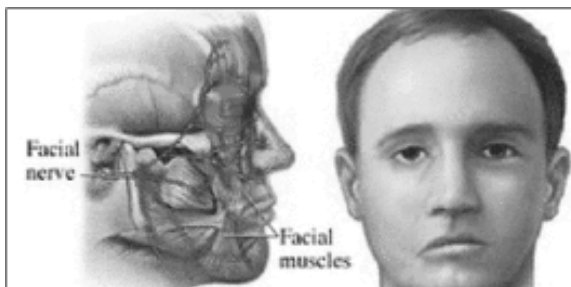


Figure 01 – Hemifacial spasm. Source: Nasser Allam Neurosciences.



Figure 03– intramuscular injection of TXB-A into the masseter, as a conservative treatment for HMM. Source: Burcu Baş, 2010.

The application of botulinum toxin by dental surgeons is recent, permitted in 2011 by the Federal Council of Dentistry (CFO) present in Art. 2. Its use in dentistry must only be carried out by professionals who have specific training (Delgado, 2015)

According to Marciano and collaborators (2014), in order to achieve successful treatment, it is essential that the dentist has mastery of anatomy, facial aesthetics and knowledge of the toxin, as this is the cause of the poisoning called botulism, which compromises the central nervous system and can lead to patient death.

HEMIFACIAL SPASM AND BOTULINUM TOXIN TYPE-A

There are seven serotypes of botulinum toxin (TXB) – A, B, C, D, E, F, G – produced by the anaerobic bacterium *Clostridium botulinum*. Botulinum toxins have a paralytic effect by inhibiting the exocytotic release of acetylcholine at the neuromuscular junction, leading to a decrease in muscle contraction. The extent of paralysis depends on the dose and volume applied, and the duration also depends on the serotype used, the most used being serotype A (Aoki, 2001; Brin, 1997; Wenzel, 2004).

The use of botulinum toxin as a medicine began around 1981, in the form of injections of BoNT/A into the eye muscles for the treatment of strabismus. It was only 19 years later, in 2000, that the FDA (*Food and Drugs Administration*) approved the therapeutic use of BOTOX® (Allergan Inc., Irvine, California, USA) and toxin B (Myobloc™, Elan Pharmaceuticals Inc., Morristown, NJ, USA) for dystonia and BOTOX® *Cosmetic* for hyperkinetic facial lines (Jankovic, 2004).

The use of TXB-A in cosmetic dermatology, as well as in dentistry, is very popular due to its effectiveness and relative safety of treatment (SAID et al., 2003).

The paralysis caused by TXB-A is due to selective denervation of muscle fibers at the neuromuscular junction. This paralysis is temporary and is believed to be mainly due to the recovery of synaptosomal proteins (SNAP)-25 already existing in the neuromuscular junction associated with the formation of new ones. This explains why TXB-A injection is only effective for a few months (Davis, 1993; Kao et al., 1976).

Blepharospasm and hemifacial spasm generally affect elderly people of both sexes. Treatment with botulinum toxin is efficient, with a very low rate of complications

On average, 76 to 90% of patients with hemifacial spasm and essential blepharospasm benefit from TXB-A injections, and it is possible to see the beginning of muscle weakening two to seven days after the injection. Patients with H.E., they experience the effect of TXB-A injections for a longer period of time, around 4 to 6 months (Jost & Kohl, 2001; Cunha, Aguirre & Dias, 1998; Jankovic & Schwartz, 1993; Scott, Kennedy & Stubbs, 1985).

In the experiment conducted by Schellini et al. (2006) the effectiveness of the treatment was very high, the results obtained showed that botulinum toxin was effective for 91.3% of patients. For Anderson et al. (1998) this effective result was observed in 98% of patients. It must also be remembered that the chance of improvement with treatment is directly related to the type of problem the patient presents, being worse in dystonias

In the work conducted by Andrade et al. (1998) all patients with hemifacial spasm showed a marked (greater than 50%) or total improvement. In the literature there are percentages of improvement between 82 and 100%. The most frequent and transient complications were decreased eyelid strength, eyelid ptosis and weakness of the peri-oral muscles, sometimes with the appearance of

peripheral facial paralysis (Andrade et al., 1998).



Figure 04 – Standardized application points of TXB-A for the treatment of hemifacial spasm, avoiding iatrogenic asymmetry.

Source: Salles et al., 2001.

MUSCLE GROUP	Average dose Affected	Medium dose Contralateral
Pretarsal	3,6	0,0
Orbicularis oculi (lateral)	6,1	4,3
Front	2,6	2,6
Corrugators	1,2	1,0
Lower lip depressors	2,1	1,9
Upper lip lifts	1,8	1,8
Zygomatic	4,0	3,2
Risorium	3,3	2,8
Orbicularis oris	2,8	1,3

Table 01– Average dose of TXB-A IU used per application, per submuscular group on each side of the face, affected by hemifacial and contralateral spasm, healthy. Source: Salles et al., 2001.

According to what is found in the literature, unilateral use of the toxin is observed by most authors (Vogt et al., 2008; Ortisi et al., 2006; Park et al., 2006; Defazio et al., 2002; Clark & Berris, 1989) with the exception of Borodic et al. and Colakoglu et al., both with a small

number of patients. In other words, there is no protocol in the literature standardizing the bilateral application of botulinum toxin in patients with hemifacial spasm.

The study by Salles *et al.* (2015) is innovative, as through the analysis of 66 bilateral applications, including muscles from the upper, middle and lower thirds of the face, it defines a bilateral TXB-A application protocol. This same study also reiterates that the pretarsal region must always be treated only on the side affected by the spasm.



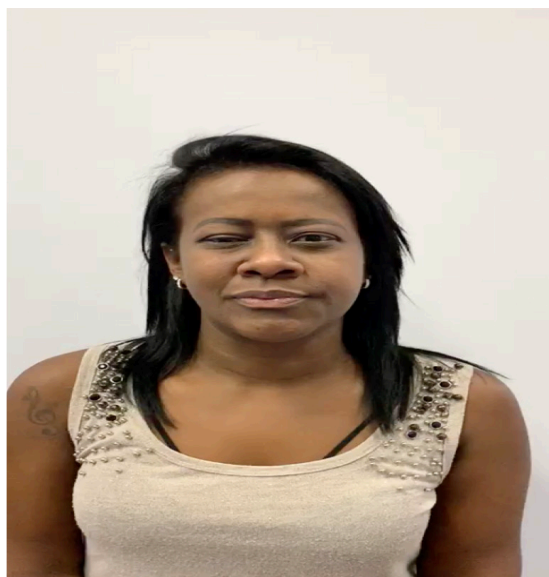
Figure 05: Botulinum toxin application protocol for hemifacial spasm according to Salles *et al.* (2015). Source: Salles *et al.*, 2001

OBJECTIVE

Report a case of Hemifacial Spasm and the therapy used for this dysfunction.

CASE REPORT

Female patient, 36 years old, black, diagnosed with hemifacial spasms associated with hemifacial Bell's palsy. Botulinum Toxin was injected only on the side affected by the spasms, so that the eyes would open wider, as with the hyperactivity of the orbicularis oculi muscle, their eye opening was being compromised. The spasms, being constant, for 24 hours a day, also caused discomfort to the patient when sleeping.



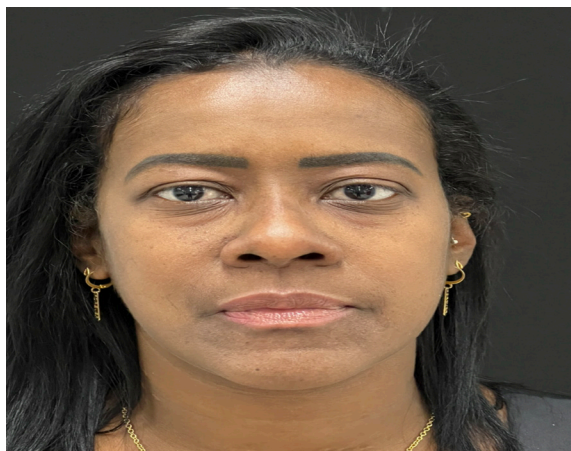
BEFORE TREATMENT



BEFORE



AFTER



AFTER TREATMENT

CONCLUSION

Botulinum toxin as a therapeutic adjuvant in orofacial disorders has tangible value within the dental setting. Its ability to inhibit muscle contraction through the uptake of acetylcholine-A in the synaptic cleft has satisfactory effects in the treatment of temporomandibular disorders, hypertrophy of the masseter muscle and also in cases of hemifacial spasms.

The effects of TXB-A are transient and there is still no protocol in the literature covering all application points. However, more recent studies show that when applied bilaterally to the patient, that is, also to the healthy face, it generates more harmonious and satisfactory results.

It is essential that the treatment is designed to bring psychosocial gains, as it is known that this is a decisive factor in the patient's health and, consequently, quality of life.

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