Journal of Clinical Implants and Surgery

Journal of Clinical Implants and Surgery
São Paulo, v. 1, n. 2 (2024).

ISSN: XXXX-XXXX

Management of the symptomatic bruxism with botulinum toxin application

Manejo do bruxismo sintomático com a aplicação de toxina botulínica

Manejo del bruxismo sintomático con aplicación de toxina botulínica

Carlos Alberto CabrinI Junior[1]

Alexandre do Valle Wuo[2]

Thais Cordeschi[3]

João Marcelo Ferreira de Medeiros[4]

Irineu Gregnanin Pedron[5]

[1]Undergraduate student, Universidade Cruzeiro do Sul, São Paulo, Brazil.

[2]DDS, MSc, PhD. Professor, Department of Implant Dentistry and Oral Surgery, Universidade Braz Cubas, Mogi das Cruzes, Brazil.

[3]DDS, MSc, PhD, Professor, Department of Endodontics, Universidade Brasil, São Paulo, Brazil.

[4]DDS, MSc, PhD, Professor, Department of Pediatric Dentistry and Cariology, Universidade Brasil, São Paulo, Brazil.

[5]DDS, MSc. Independent Researcher, Private Practice, São Paulo, Brazil.

Corresponding Author:

Irineu Gregnanin Pedron

Bottoxindent Institute, Rua Flores do Piauí, 508 - São Paulo, Brazil

E-mail: igpedron@alumni.usp.br

ABSTRACT

Parafunctional habits such as bruxism and clenching are frequently observed in the dental clinic. Bruxism can have several etiologies, which have not yet been definitively elucidated. Treatment is symptomatic and various types of approaches can be offered. Among them are the occlusal splint and the application of botulinum toxin. However, when painful symptoms recur even with the use of a occlusal splint,

the application of botulinum toxin is indicated. The purpose of this article is to present the case of a patient with recurrent symptomatic bruxism even after using a occlusal splint. The patient showed significant results in terms of reduced masticatory muscle strength and pain symptoms.

Keywords: botulinum toxin type A; bruxism; facial pain; Dentistry.

RESUMO

Hábitos parafuncionais, como o bruxismo e o apertamento, são frequentemente observados na clínica odontológica. O bruxismo pode apresentar diversas etiologias, ainda não elucidadas definitivamente. O tratamento é sintomático, e podem ser oferecidos diversos tipos de abordagens. Dentre elas destacam-se a placa miorrelaxante e a aplicação da toxina botulínica. Entretanto, quando a sintomatologia dolorosa é recorrente mesmo com o uso da placa miorrelaxante, a aplicação da toxina botulínica é indicada. O propósito deste trabalho é apresentar o caso de uma paciente com bruxismo sintomático recorrente mesmo após o uso da placa miorrelaxante. A paciente apresentou resultados significativos na redução da força dos músculos da mastigação e da sintomatologia dolorosa.

Palavras-chaves: toxinas botulínicas tipo A; bruxismo; dor facial; Odontologia.

RESUMEN

Los hábitos parafuncionales como el bruxismo y el apretamiento se observan con frecuencia en la clínica dental. El bruxismo puede tener diversas etiologías, que aún no se han dilucidado definitivamente. El tratamiento es sintomático y se pueden ofrecer varios tipos de enfoques. Entre ellos se encuentran la férula oclusal y la aplicación de toxina botulínica. Sin embargo, cuando los síntomas dolorosos reaparecen incluso con el uso de una férula oclusal, está indicada la aplicación de toxina botulínica. El objetivo de este trabajo es presentar el caso de un paciente con bruxismo sintomático recurrente incluso después de utilizar una férula oclusal. El paciente mostró resultados significativos en la reducción de la fuerza muscular masticatoria y de los síntomas dolorosos.

Palabras clave: toxina botulínica tipo A; bruxismo; dolor facial; Odontología.

INTRODUCTION

Bruxism is defined as parafunctional activity during the day or night consisting of involuntary or spasmodic rhythmic movements that include grinding and clenching of the teeth[1-9]. Its incidence varies from 5 to 96%[1-10] of the population, depending on the methodology of the population studies[8]. Bruxism can also affect children, ranging from 7 to 88% of the child population. It has been reported that only 5 to 20% of patients with bruxism are aware of the activity[1-4,6].

Several aetiological factors have been proposed, although the aetiopathological mechanism is still uncertain. Factors such as emotional stress - including attention deficit hyperactivity disorder, fear and anxiety - occlusal disorders, neurological disorders - such as Rett syndrome, mental retardation, anoxic

encephalopathy, cerebral palsy, cranio-cervical dystonia, comatose patients, brain damage and haemorrhage, Huntington's and Whipple's diseases - sleep disorders and the administration of certain drugs - such as selective serotonin reuptake inhibitors or antidepressants like venlafaxine - may be related to the onset of bruxism, which in some cases appears to have a multifactorial aetiology[1-10]. In comatose patients, the onset of bruxism is often observed at the return of the sleep/wake cycle[1-5,7-10]. Bruxism also occurs due to a lack of inhibition of the motor activity of the mandible during awakening from sleep[10].

Diagnosis is clinical, based on the patient's own report, associated with clinical signs of abnormal tooth wear, dentinal hypersensitivity, reduced crown height, causing occlusal changes and subsequently a reduction in the vertical dimension of occlusion (VOD). In addition, other associated manifestations can occur, such as: fracture of restorations, prostheses and dental implants, audible occlusal grinding sounds, hypertrophy of the masticatory muscles, headache, painful symptoms and discomfort in the temporomandibular joint (TMJ)[1-4,6,7,10].

There are several therapeutic modalities for treating bruxism. However, there is still no consensus on the best therapeutic option[8,10]. In order to prevent tooth wear, mouthguards and occlusal splints, stainless steel crowns, spasmolytic medication and relaxation therapy can be used. However, these interventions often have limited results, given the patients' inability to co-operate as a result of the severity of bruxism[5].

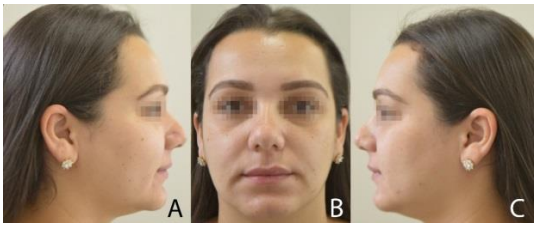
In cases where the signs and symptoms of bruxism are significant, the use of botulinum toxin can be considered[1-4,10]. The purpose of this article is to present the case of a patient with recurrent symptomatic bruxism even after using a occlusal splint. The patient showed significant results in terms of reduced masticatory muscle strength and pain symptoms.

CASE REPORT

Female patient, 36-years-old, attended the dental clinic complaining of orofacial pain.

The patient presented symptomatic bruxism in the region of the masseter muscles, bilaterally (Figure 1).

Figure 1 - Patient presenting symptomatic bruxism



Clinically, the patient presented wear and attrition on her anterior and posterior teeth (Figures 2 and 3).

Figure 2 - Intraoral clinical aspect of bruxism

Figure 3 - Wear and attrition on anterior and posterior teeth

The patient reported using a occlusal splint for a few months, but without reducing her pain symptoms.

No radiographic alterations were observed.

Application of botulinum toxin was recommended to prevent excessive contraction of the masticatory muscles. The patient agreed to the proposed treatment.

Prior to the application of botulinum toxin (T0), the Visual Analogue Scale (VAS) was used for pain and/or tension, and bite force was assessed quantitatively using the gnathodynamometer (Figure 4). Results are shown in Table 1.

Figure 4 - Gnathodynamometer recording the maximum bite force

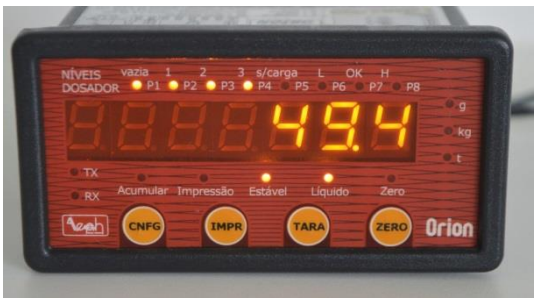


Table 1 - Evaluation of bite force at T0 (initial) and T1 (20 days after botulinum toxin application)

Bite force (KgF)	T0	T1	Reduction
Posterior teeth: right side	46.6	11.2	76%
Anterior teeth	27.8	13.2	52.6%
Posterior teeth: left side	49.4	12.7	74.3%
VAS (from 0 = no pain to 10 = worst pain experi-enced)	9	0	100%

The clinical examination, the patient's history and the main complaint demonstrated the need for application to the masseter muscles, which were identified by bilateral bidigital palpation. Safe area for botulinum toxin application was considered.

Three application points were determined on each masseter muscle (Figure 5), followed by the application of a dermatological topical anaesthetic (Emla™, Astra, São Paulo, Brazil), which was left on for 15 minutes. Each masseter muscle received 30 units (Figure 6), totalling 60 units (Botox™, Allergan Pharmaceuticals, Westport, Ireland).

Figure 5 - Points of application on each masseter muscle

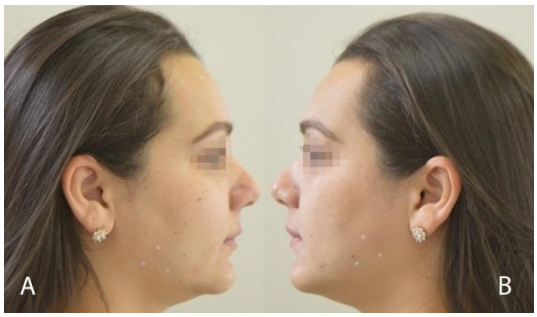
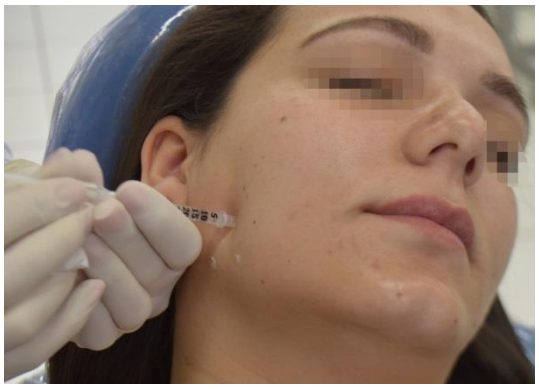


Figure 6 - Application of the botulinum toxin



After 20 days, the patient reported no pain symptoms and improved chewing, with no functional impairment (Figure 7). The patient was reassessed using the VAS (T1), resulting in a score of 0. Bite force was assessed again using the gnathodynamometer (Figure 8), and the results are shown in Table 1. Repeat applications were recommended every 6 months, according to the patient's complaint.

Figure 7 - Extraoral aspect after application of botulinum toxin on masseter muscle

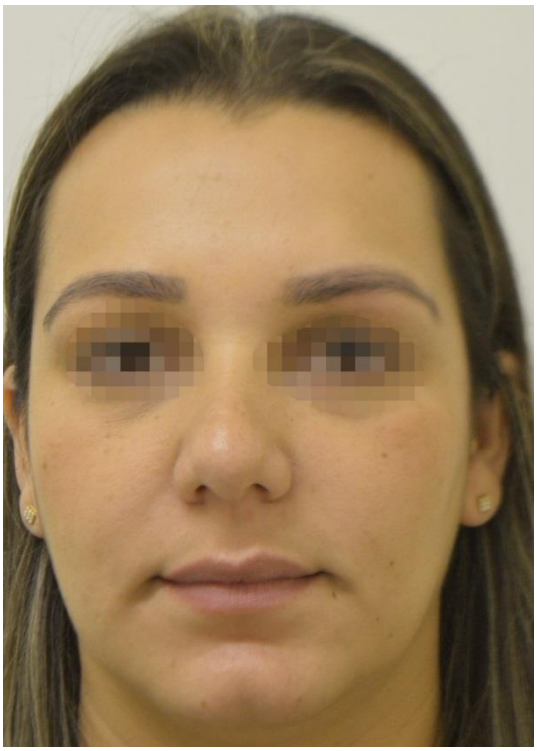
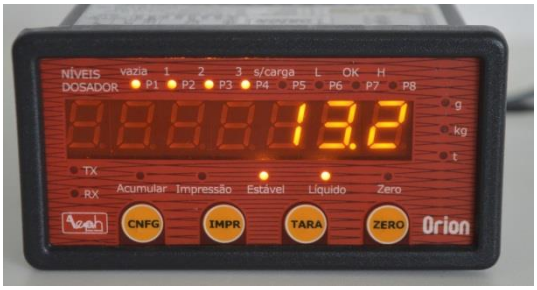


Figure 8: - Gnathodynamometer recording the reduction of maximum bite force



DISCUSSION

Botulinum toxin acts on the muscle, inhibiting the release of acetylcholine in the motor plate and subsequently reducing the muscular contraction. Its action lasts between three and six months, depending on the dose, until the muscle regenerates neurologically[1-4,8,10]. The application of botulinum toxin has a positive effect on reducing muscle

contraction and subsequently occlusal strength, preserving teeth and prostheses[1-4,11]. However, the use of a occlusal splint is recommended to mitigate the possible deleterious effects of bruxism, such as tooth wear, as well as protecting the teeth present and prostheses already in place[1-4,10].

The injections should be bilateral and carried out in the main muscles responsible for mastication, particularly the masseter and temporal muscles[1-4,9,12], given that they are the main muscles involved in the grinding and clenching movements in bruxism[1-4,13].

The literature suggests several application protocols. A *priori*, the muscle to be applied should be identified clinically according to the patient's complaint and, a *posteriori*, by palpation. The masseter muscle should be localised by careful palpation at the site of its insertion (angle and body of the mandible)[1-4,8,13,14]. After reconstituting the toxin, the skin should be cleaned and disinfected with alcohol[1-4,13].

The safety region for applying the toxin should be considered, determined by the trapezoid limited by an imaginary upper line between the ear lobe and the labial commissure, the lower border corresponds to the lower margin of the mandible, the anterior border can be felt on palpation when the muscle contracts (asking the patient to squeeze it), and the posterior border corresponds to the posterior margin of the ramus of the mandible[1-4].

Three applications are made, projecting a triangle with a lower base, parallel to the base of the mandible, with a distance of 15mm between each vertex[1-4,11]. A dermatological topical anaesthetic should be used prior to application and should remain in place for 10 to 15 minutes[1-4]. Complementary applications have also been suggested at two other points 5 mm anterior and posterior to the upper point of the triangle[7]. However, depending on the patient's anatomy and morphology, there is no physical space for this complementary application[1-4]. Depending on the patient's complaint, bilateral application to the temporal muscle may be necessary. It has been recommended that the patient should be in the supine position[8,13,14]. However, we suggest sitting down for better definition of the points (forming the triangle).

The recommended dose varies depending on the size and intensity of the muscle contraction[1-4,8]. The amount usually ranges from 30 to 100 units, covering the masseter and temporal muscles[1-4,9,11-14]. Each application point can receive between 5 and 10 units, starting with the smallest amount and being adjusted according to the results obtained[1-4,13,14]. The onset of the toxin's action is between 7 and 10 days and the duration of the effect of botulinum toxin lasts between 4 and 6 months[1-4,8,9,13], most often requiring more than one application of the toxin[1-4,13,14].

The injection of botulinum toxin can cause some transient complications such as pain, haematoma, oedema, headache, muscle weakness and hypotrophy (due to multiple injections), and paresthesia or paralysis in areas adjacent to the injection site[1-5,8,10,13,15]. Side effects are rare 9. Some factors such as the dose, the size and identification of the muscles involved and the severity of bruxism can affect the clinical response after botulinum toxin injection[1-5,13].

Contraindications to the use of botulinum toxin are pregnancy, lactation, hypersensitivity (allergy) to the botulinum protein itself, lactose and albumin, muscular and neurodegenerative diseases (myasthenia gravis, amyotrophic lateral sclerosis, Charcot's disease and Eaton-Lambert syndrome), and the simultaneous use of aminoglycoside antibiotics, which can potentiate the toxin's action[1-4,14].

It is worth pointing out that due to its multifactorial aetiology, bruxism requires multi-professional assistance, involving dental treatment, physiotherapy, medical, pharmacological and psychological therapy. In addition, patients with bruxism who have a large loss of tooth structure require extensive rehabilitation, necessitating a correct diagnosis and adequate planning to re-establish the vertical dimension of occlusion[1-4,6].

As an adjunctive treatment for bruxism, a occlusal splint can be made, preferably before the application of botulinum toxin, with the aim of reducing symptoms and promoting protection for pre-existing teeth and prostheses. The thickness should be as small as possible, offering resistance without altering the vertical dimension and the free functional space. It should be mounted in centric relation and have a smooth appearance to allow the antagonist teeth to slide and promote patient comfort. The time of use varies according to the complexity of the case, with nightly use recommended for 45 days with periodic maintenance. After this period, discontinuous use is recommended, with six-monthly reviews to assess signs and symptoms[6].

The application of botulinum toxin is a useful and less invasive therapeutic option for functional disorders such as bruxism, and is effective in improving the quality of life of these patients[1-4,12]. Care must be taken with regard to anatomy and pharmacology, and botulinum toxin administration must be carried out by trained and qualified professionals. Experience and skill in injection techniques minimise the risk of complications[8]. However, the application of botulinum toxin is an expensive treatment and should only be considered as a therapeutic option for those patients who have bruxism to a higher degree, or who are uncooperative and refractory to medical and dental therapy[8], as presented in this case.

In this report, the use of the VAS and the gnathodynamometer were essential in assessing the patient's improvement (subjectively and objectively, respectively). The VAS showed a reduction from 9 (T0) to 0 (T1). The use of the gnathodynamometer determined the patient's objective response, with a reduction varying from 52.6% (in the anterior teeth) to 76% (in the right-side posterior teeth).

CONCLUSIONS

The application of botulinum toxin is an important therapeutic option when it is impossible to perform other types of treatment for symptomatic bruxism, or in refractory cases. Even though it has a temporary effect, the application of botulinum toxin can be used by dental surgeon to suppress the painful symptoms caused by bruxism, as seen in this case.

REFERENCES

1. Pedron IG. Toxina botulínica: aplicações em odontologia. Florianópolis: Ed. Ponto. 2016. 195.

2. Sousa FA, Sá LVG, Pedron IG. Redução da dor em paciente ortodôntico com bruxismo pela aplicação da toxina botulínica tipo A. Rev Maxillaris Portugal 2018;14(95):44-51.

3. Santos AF, Santos MAT, Varoli FP, Shitsuka C, Pedron IG. How to get better outcomes in the management of symptomatic bruxism: association between occlusal splint and botulinum toxin. SAODS 2020;3(7):31-36.

4. Santos EL, Francesco ERS, Maltarollo TH, Risemberg RIS, Shitsuka C, Pedron IG. Management of stomatological signs and symptoms due to stress during the COVID-19 pandemic: Case Report. SVOA Dentistry 2022;3(4):172-177.

5. El Maaytah M, Jerjes W, Upile T, Swinson B, Hopper C, Ayliffe P. Bruxism secondary to brain injury treated with botulinum toxin-A: a case report. Head Face Med 2006;2:41.

6. Oliveira GAS, Beatrice LCS, Leão SFS. Reabilitação oral em pacientes com bruxismo: o papel da odontologia restauradora. Int J Dent 2007;6(4):117-23.

7. Lee SJ, McCall Jr WD, Kim YK, Chung SC, Chung JW. Effect of botulinum toxin injection on nocturnal bruxism. A randomized controlled trial. Am J Phys Med Rehabil 2010;89(1):16-23.

8. Tan EK, Jankovic J. Treating severe bruxism with botulinum toxin. J Am Dent Assoc 2000;131(2):211-6.

9. Van Zandijcke M, Marchau MMB. Treatment of bruxism with botulinum toxin injections. J Neurol Neurosurg Psychiatr 1999;53(6):530.

10. Clark GT, Ram S. Four oral motor disorders: bruxism, dystonia, dyskinesia and drug-induced dystonic extrapyramidal reactions. Dent Clin N Am 2007;51(1):225-43.

11. Pihut M, Wisniewska G, Majewski P, Gronkiewicz K, Majewski S. Measurement of occlusal forces in the therapy of functional disorders with the use of botulinum toxin type A. J Physiol Pharmacol 2009;60(Suppl 8):113-6.

12. Laskawi R. The use of botulinum toxin in head and face medicine: an interdisciplinary field. Head Face Med 2008;4:5.

13. Pidcock FS, Wise JM, Christensen JR. Treatment of severe post-traumatic bruxism with botulinum toxin-A: case report. J Oral Maxillofac Surg 2002;60(1):115-7.

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

15. Laskin DM. Botulinum toxin A in the treatment of myofascial pain and dysfunction: the case against its use. J Oral Maxillofac Surg 2012;70(5):1240-2.