Botulinum Toxin A for bruxism: a systematic review

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ABSTRACT

Objective: To systematize the scientific evidence on the efficacy of botulinum toxin type A in the treatment of bruxism. Method: A bibliographical search was made by researching the PubMed Central Journals and Allergan Products Literature (APL) - botulinum toxin within the last 10 years, with the following descriptors: “bruxism,” “botulinum toxin,” and “treatment”. The methodological quality of the studies was evaluated by the Jadad Scale. Results: Two studies of double blind randomized clinical trials were selected. The two clinical studies showed that the application of botulinum toxin could diminish levels of pain, lower the frequency of occurrences of bruxism, and satisfy the patients in terms of efficacy of the botulinum toxin in this pathology, in addition to having no important adverse effects. Thus, the treatment with botulinum toxin type A could present itself as one possible treatment for patients with bruxism. Conclusion: More studies are needed that follow the quality criteria to reach a definitive conclusion about efficacy and safety.

Keywords: Botulinum Toxins, Type A, Bruxism, Pain, Rehabilitation
INTRODUCTION

Bruxism is characterized by the parafunc-
tional masticatory muscle activity1 that pro-
vokes an involuntary and unconscious move-
ment disorder, typified by excessive compres-
sion and/or grinding of the teeth, which can
occur sleeping or waking.2 It is one of the most
difficult challenges in odontology.

Approximately 85 to 90% of the general
population reports bruxism to some degree,
during some period of life. The prevalence of
bruxism varies between 20 and 25% in chil-
dren, 5 and 8% in adults, and 3% in the el-
derly.3 No differences in incidence are found
between males and females.4

Studies about bruxism are controversial,
accomplishing association with anxiety, stress,
depression, types of personality, nutritional
deficiencies (magnesium, calcium, iodine, and
vitamin complexes), bad dental occlusion, ina-
dequate dental manipulation, central nervous
system dysfunction and/or disorders, use of
drugs with neurochemical action, deficient
oral proprioception, and genetic factors.1 In
recent years, a tendency to view bruxism in a
much wider context has appeared: its effec-
ts may reach the neck and shoulder muscles
and it is possible that they influence even the
entire body posture, causing postural and/or
skeletal dysfunctions.1

Bruxism can also produce an increase in
dental wear and temporomandibular dysfunc-
tion. Delaying treatment, in some cases, may
result in luxation and degenerative arthritis of
the temporomandibular joint.3

In order to prevent these complications,
the early diagnosis, as well as the appropriate
treatment, are very important.5 The current
therapies for this dysfunction are not totally
effective. Seeking to present an alternative to
this problem, botulinum toxin type A (BTX-A)
is being studied as a therapeutic method for
patients that suffer from this pathology.

OBJECTIVE

To systematize the scientific evidence on
the use of botulinum toxin type A in the treat-
ment of bruxism.

METHOD

In May of 2013, a systematic review tech-
nique was used in order to select the publi-
cations and identify randomized and control-
led clinical trials on the use of botulinum toxin
for bruxism. The bibliographical search was
made through the PubMed Central Journals
and Allergan Product Literature (APL) - botu-
linum toxin databases encompassing the last
10 years, with the keywords bruxism, botu-
linum toxin, and treatment. Two researchers
made the search independently and subse-
quently confronted the results.

The articles were selected by their abstrac-
tests and, to be included in this study, they
had to be randomized clinical trials, published
in Portuguese, English, or Spanish. Studies
were excluded if they obtained scores lower
than 3 according to the Jadad quality scale.5

RESULTS

The bibliographic search resulted in 228
articles (57 from the PubMed Central Journals
and 171 from the Allergan Product Literature
botulinum toxin). After excluding the repea-
ted articles, those that did not discuss clinical
studies in patients, and those that did not
discuss only bruxism as the main pathology,
there were six articles left. After a complete
evaluation of the six articles mentioned, only
two had reached scores equal or higher than 3
according to the Jadad quality scale (Chart 1).

In the end, two double-blind randomi-
zed studies were included in this systematic
review. Details of both studies are shown in
Chart 2.

The age of the participants in the studies
varied from 20 to 45 years and the size of the
sample varied from 12 participants3 to 20 par-
ticipants.8 Both studies used saline solution
as a placebo.1,8 Lee et al.1 compared the effica-
cy of botulinum toxin with the placebo in reduc-
ing the frequency of bruxism events after the applica-
tion (4, 8, and 12 weeks after the application)
in 12 patients with bruxism. Those authors
injected 80UI of botulinum toxin A (Dysport®)
at three points in both masseter muscles in six
patients, comparing them with the other
six patients who received applications of sa-
line solution. They observed that the patients
received the botulinum toxin showed a signifi-
cant reduction of the masseter muscle electromy-
ographic activity and clinical improvement of
bruxism, while the temporalis muscle activi-
ty was not altered. Through electromyography
(EMG) it was detected that the bruxism was
significantly less frequent in the group that re-
ceived the botulinum toxin A than in the group
that receive the placebo. Their results suggest
that the botulinum toxin reduces the number
of bruxism events by reducing muscle activity,
concluding that it is an effective treatment for
nocturnal bruxism.

Guarda-Nardini et al.8 compared the effi-
cacy of botulinum toxin with the saline solu-
tion in the reduction of pain in 20 patients
with bruxism and myofascial pain in the mas-
ticatory muscles. The pain levels at rest and in
mastication were evaluated through the visual
analog scale (VAS) in the interval of 0-10,
before and after the application with botuli-
num toxin. The authors injected 300UI of botu-
linum toxin type A (BOTOX®, Allergan) at three
points in the masseter muscles and 200UI at
two points in the anterior temporals muscles
of 10 patients with myofascial pain associated
with bruxism, and they used saline solution
on the remaining selected patients. They ob-
served that the degree of pain reduction in
mastication, over the course of six months of
follow-up, was significantly greater in the botu-
linum toxin group than in the placebo group.
Both studies reported different objectives
for the treatment of bruxism with botulinum
toxin. Therefore, they differ in the standards
used to evaluate efficacy: Lee et al.1 employed,
in addition to electromyographic evaluation, a
questionnaire on bruxism, while Guarda-Nar-
dini et al.8 used the VAS to monitor the pain
symptoms. Thus, their results should be ana-
yzed separately.

Lee et al.1 reported that the subjective
evaluation of botulinum toxin efficacy did not
differ between the groups 4, 8, and 12 weeks

<table>
<thead>
<tr>
<th>Description of losses and exclusion</th>
<th>Jadad Score</th>
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<tbody>
<tr>
<td>Lee et al.1</td>
<td>3</td>
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<tr>
<td>Alonso-Navarro et al.7</td>
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<tr>
<td>Guarda-Nardini et al.8</td>
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<tr>
<td>Readelli et al.6</td>
<td>0</td>
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<td>Sener et al.12</td>
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<tr>
<td>Bolayır et al.11</td>
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Chart 1. Quality evaluation of the clinical studies previously selected, according to the Jadad scale
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After the applications, Guarda-Nardini et al.8 reported that the subjective evaluation of botulinum toxin efficacy did not differ between the groups one week and one month after the injection, but it was significantly greater in the botulinum toxin group than in the placebo group six months after the application. Of the two studies included, one6 did not report on the adverse effects of the botulinum toxin applications and the other8 reported no adverse effects to the application.

**DISCUSSION**

Due to different taxonomies and diagnostic aspects, there is some difficulty in determining an acceptable standardization of diagnosis for bruxism.22 The American Academy of Sleep Medicine defines bruxism as a stereotyped oral and motor sleep disorder characterized by the teeth grinding and tightening, while the American Academy for Orofacial Pain extends the definition to the same movements that occur in the waking state.13

Intramuscular applications of BTX-A are an effective treatment for a variety of movement afflictions.14 They inhibit the exocytotic release of acetylcholine in the motor nerve terminals leading to reduced muscle contraction. This property makes it useful both clinically and therapeutically for a series of conditions where there is an excess of muscle contraction.15

Recent advances show that bruxism is caused by high levels of motor activity in the centrally situated mandible musculature, indicating that the reduction in muscle activity induced by the use of BTX-A could be beneficial in these cases.16

This suggests that the application of botulinum toxin type A reduces the number of bruxism events, probably due to the diminishing of peripheral muscle activity,19,11 without presenting an action on the central nervous system.13 The adverse effects of this treatment are irrelevant or nonexistent.2,7,9,11 The most common side effects are dry mouth and smile alteration. The BTX-A effect is related to the location of the application and the dosage.17 In the application of botulinum toxin type A, the maximum therapeutic action is observed between the 7th and 14th days and the effects may last as long as six months (average of 3 to 4 months).18 Problems may be found related to the lack of efficacy in muscle relaxation due to the use of improper dosage, technical error in the application of the product, resistance to BTX-A, or alterations in the product or inappropriate storage conditions of BTX-A.17

The use of botulinum toxin in pathologies that are accompanied by movement disorders showed benefits in other clinical aspects such as relief of the concomitant painful conditions. The studies by Bolayır et al.11 and Sener et al.10 also reported the efficacy of the botulinum toxin in improving sensitivity in the masticatory musculature of the participating patients. It is seen that therapies with dry needling, when performed correctly and with due care, are among the most effective options to treat myofascial pain, the result presented by Guarda-Nardini et al.8 could be due to the needling itself and not to the botulinum toxin. There are, however, works reporting that the application of botulinum toxin could be more efficient than dry needling in some cases.19

The two works included in this review show the efficacy of botulinum toxin to treat bruxism in applications to the masseter and temporalis muscles both,6 or to only the masseter.5

As for the points of application, the BTX-A was applied at three different points in the masseter6 and at two points in the anterior temporalis.8 Through the literature, one observes the efficacy in the application of BTX-A in application only to the masseter, suggesting that maybe it is not necessary to apply it as well to the temporalis muscle to treat bruxism.

Sener et al.10 showed a controlled study of two phases with 13 patients. In the first phase, the patients used intraoral plates (two months) and after a period without the plate (two months), they received 60UI of botulinum toxin type A (BOTOX®, Allergan) in the masseter muscle on both sides. Those authors affirmed that the intraoral plate and the BTX-A were equally efficacious treatments for bruxism. However, the BTX-A could be a more efficacious alternative for patients with bruxism and, many times, more effective, since there is no need for the patient to cooperate in using it every day, as is the case with the intraoral plate.

Other authors also report good results with the use of botulinum toxin for bruxism,7,8,10,11 showing it to be an alternative treatment to be better studied as a treatment for these patients.

**CONCLUSION**

Bruxism presents a broad etiology, the gravity of damage tends to vary with each individual, and the more the patient is aware of this habit, the better the prognosis and more motivated the patient will be. Therefore, it is necessary that the health professional clarify the patient on the relationship between the parafunctional habit and its triggering factors.

Both clinical studies show that applications of botulinum toxin can reduce the levels of pain, the frequency of bruxism events, and satisfy the patients in regard to the efficacy of botulinum toxin in this pathology, and without provoking important adverse effects. The muscles to be injected are the masseter and the temporalis anterior (Figure 1).

Thus, according to the two studies discussed above, 30UI of BOTOX® or 80UI of Dysport® in each masseter and 20UI of Botox in each temporalis is the recommended dosage. The patient should be evaluated 15 days after the application and return for control after three or four months after the application for a new evaluation and another application, if needed. In this way, the treatment of bruxism with botulinum toxin type A can present itself as a possible treatment for bruxism patients. More studies are needed that follow the quality criteria to reach a definitive conclusion on safety and efficacy.
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