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Botulinum Toxin Type-A Practice in Bruxism Cases

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Abstract
Bruxism is a parafunctional disease developing diurnal and/or nocturnally. Sleep bruxism has been related to craniomandibular disorders including headaches, temporomandibular joint discomfort and muscles aches, premature loss of teeth due to excessive attrition and mobility. Splint and muscle relaxants are used in the treatment of bruxism. In this study, we have used BTX-A type A (DYSPORT) as a new treatment approach in patients with bruxism. 12 individuals with sleep bruxism (SB) (7 female, 5 male; an average 27 years of age) were treated in this study. An average of 50 U of Dysport has been injected to the painful masseter muscles of individuals included in our study. A decrease has been detected in the existing pain scores in masseter muscles in cases with bruxism. It has also been observed that individuals have left their bruxism habits. As a result, we can conclude that BTX-A type injection would be a useful treatment method in cases with bruxism.

Introduction

Bruxism is an oral habit characterized by a rhythmic activity of the temporomandibular muscles, causing a forced contact between dental surfaces during sleep. It is accompanied by tooth-by-tooth clenching or grinding. Sleep bruxism has been related to craniomandibular disorders, including headaches, temporomandibular joint discomfort and muscles aches, and premature loss of teeth due to excessive attrition and mobility [1,2,3].

The majority of these patients had diurnal symptoms, though some had both diurnal and nocturnal symptoms. These symptoms appear to be different than those subjects with nocturnal grinding frequently reported in the dental literature [4].

Various treatment modalities have been reported to be useful for bruxism, but there is no general agreement as to what is the best therapeutic option is. To improve on systemic muscles relaxants, a useful therapeutic agent would have to possess excellent specificity as well as a toreable side effect profile. One such agent is the toxin produced by the gram-positive anaerobic spore-forming bacterium clastridium botulinum [3,5].

This study aims to assess the pain results in the Month 1 and Month 3 masseter muscle following the practice of BTX-A treatment in cases with nocturnal bruxism that have not previously responded to splint and/or medication treatment.

Key words:
Bruxism, BTX-A botulinum toxin-A, VAS visual analogue score, Masseter muscle

Botulinum Toxin

Botulinum toxins are among the most potent biologic toxins that affect humans. Botulinum is a neurotoxin produced by the gram–positive, spore-forming anaerobic bacterium Clastridium botulinum, as well as several other related species [6]. It is responsible for the clinical syndrome of botulism. This toxin occurs as seven antigenically distinct proteins, similar in structure and function [7]. With a few exceptions, each strain of Clostridium usually produces only

one type of toxin [8]. Types A, B, E and F are the principle serotypes that affect humans. Botulinum toxin type A was the first to be isolated and purified, and is the type most commonly used clinically. Today BTX-A is used in the management of a growing number of neuromuscular disorders, most notably essential blepharospasm, hemifacial spasm, myokymia, spasctic dysphonia, and torticollis [9].

Material and Method

This study covers the cases that have applied to Cumhuriyet University Faculty of Dentistry due to bruxism disorder and who have not previously responded to splint and medication treatment. The individuals were between 18 and 35 years of age, with 5 males and 7 females. All cases were systemically, neurologically and psychiatrically treated. Individuals who were suitable for treatment have been selected. Complaint times of these patients ranged between 1 year and 6 years. All of our cases had nocturnal bruxism. Before starting this study, approval has been granted from these persons for BTX-A injection. We have treated two-sided masseter muscles of each of our cases in supine position with palpation, with the subjective assessment of existing pain degree. Subjective pain scores were assessed on a visual analogue scale (VAS), where 0 implies no pain and 10 'the worst muscle pain you have had'. After making such assessments, BTX-A type A (DYSPORT) intramascular injection has been administered for our cases in supine position on our cases under electromyographic control. Intramuscular injection was administered by means of a 1ml syringe and a 0.8 mm hypodermic needle of twelve patients undergoing treatment, and 3 points of masseter muscles were treated with an extraoral approach. An average of 50 U of Dysport has been injected to the muscles. To distribute the toxin as evenly as possible in the affected muscles, injections were made both in the region of the zygomatic arch and on the mandibular angle. The front-edge and deeper-lying parts of the masseter muscle were left out because of the location of the facial nerve and parotid gland. After the initial injection and a follow-up period of 1 and 3 months, the same member of the investigative team has assessed the subjects at the same time of day at each follow up. The treating clinician did not participate in the assessments.

Results

Considering the VAS scale scores obtained from individuals in our study, the difference has been found to be meaningful ($p<0.05$ Table 1) upon comparison of values obtained pre-treatment and in Month 1 and Month 3, with statistically meaningful difference among the VAS scale scores of Month 1 and Month 3 scores ($p<0.05$ Table 1).

However, all of the individuals have reported that bruxism has decreased following BTX-A injection. No post-injection local and systemic effects have been observed in our cases.

Discussion

Sleep bruxism has been linked to craniomandibular disorders including headaches, temporomandibular joint discomfort and muscles aches, and premature loss of teeth due to excessive attrition and mobility [1].

It was Scott et al who have first used BTX-A in 1973 for therapeutic purposes. Today, it is known that BTX-A is being used in many diseases (such as blepharospasm, strabismus, hemifacial spas spasmodic torticollis, oromandibular dystonia, headache) for treatment purposes [10,11,12, 13,14,15]. In our study, we have applied BTX-A (Dysfort) to 12 bruxism cases with pain and tenderness in the masseter muscle that have not previously responded to splint and medication treatment.

Meaningful differences have been reported compared to pre BTX-A injection treatment in assessments such as tenderness, mouth opening in studies made in individuals with TMJ dysfunction syndrome in VAS scale injection after BTX-A injection [16,17].

We, in our study, have detected a correction in the two-sided masseter muscle in the pain and palpation-tenderness values compared to pre-treatment in our post-treatment evaluations after 1 and 3 months.

Systemic effect of BTX-A is being rarely reported and such effects are reported to be transient weakness, nausea and pruritis [18]. It has also been reported that they caused inadvertent inhibition as a result of local diffusion into toxin adjacent muscle structures [17].

In their study, Daelen et al report that no systemic and local effects were observed after BTX-A injection [19]. Although the long-term results of botulinum toxin treatment are not completely clear, many effects obtained from clinical observations have been reported. Such effects might be acute or chronic. It has been reported that although a majority of such effects occurred around the injection region, few of them had systemic effects. It has been reported that in many cases the prevalence and magnitude of effects was closely related to the injected dose [2,3]. No local and systemic effects have been observed in our cases after BTX-A injection.

The overall reduction in muscle activity could also be indirectly responsible for peripherally altering the release of neuropeptides on modulators of local inflammation in such a way as to reduce the stimulation of the central wide dynamic range neurons and nociceptive-specific neurons [20].

In their study in individuals with severe bruxism, Eng-King Tan and Joseph Jankovic have applied BTX-A in different doses between 25-100 MU. In this study, it has been reported that bruxism halted 1 month later, that the existing pains in the patient's muscles have decreased, and that the patient has performed its swallowing and speech functions free from any problems after the BTX-A injection [2]. Our

Table 1: Comparison of Vas scale values obtained in Masseter muscles. (= $p<0.05$)*

	VAS pain scale scores		
Masseter Muscle	Pre-Treatment	Month 1	Month 3
Right Masseter	7.50 ± 0.84*	4.20 ± 0.91*	1.80 ± 1.31*
Left Masseter	6.90 ± 0.73*	3.50 ± 0.70*	1.50 ± 0.71*

study has also obtained responses showing parallelism with such outcomes.

BTX-A's effect on the pain mechanism is still a disputed issue. However, there are two views on the decreasing of pain through BTX-A application: causing a decrease in the maximum contraction of injected muscles as a result of the inhibition of α motor neurons, and causing a decrease in the resting electromyographic activity as a result of the inhibition of γ efferents [21]. In our subjective assessment, decrease in bruxism as a result of BTX-A application may be correlated with post-injection decrease in the contractions of masseter muscles.

BTX-A treatment is a form of treatment, with rather limited systemic and local effects, and is an expensive method of treatment. In cases with bruxism, studies relating to BTX-A treatment should be increased in a multi-disciplinary understanding.

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