Botulinum Toxin for Frontline TMJ Syndrome and Dental Therapeutic Treatment

A Peer-Reviewed Publication
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At the completion of this course, attendees will be able to:
1. List the most important and potentially useful concepts in the use of botulinum toxin in the treatment of TMJ and myofascial pain.
2. Identify whether a patient may be a good candidate for the different treatment options for the use of botulinum toxin for myofascial pain.
3. Describe current concepts in the use of botulinum toxin in the oral and maxillofacial areas.

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Author Disclosure
Dr. Malcmacher is president of the American Academy of Facial Esthetics.

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Abstract
This article will demonstrate how the use of botulinum toxin is integrated into daily dental treatment in a number of disciplines. Non-surgical, minimally invasive treatment of the muscles of the head and neck is essential for frontline TMJ and myofascial pain therapy as well as treatment of bruxism, removable prosthodontics, orthodontics, periodontics, and implant therapy.

The use of botulinum toxin, otherwise known as BoNT-A (Botox®, Dysport®, Xeomin®), is now routinely used by dentists for treatment of their patients for both dental esthetic, dental therapeutic, and frontline TMJ syndrome and facial pain in the oral and maxillofacial areas. It has been estimated that up to 25% of North American dentists now use BoNT-A in their practices for dental esthetic and therapeutic uses. The American Academy of Facial Esthetics (AAFE) has reported having trained nearly 7000 dental professionals over the last 3 years in the use of BoNT-A for dental esthetic and therapeutic purposes. While the use of BoNT-A for esthetic purposes has received a lot of attention in a number of dental journal articles, BoNT-A pharmaceuticals are excellent agents for dental therapeutic uses in a number of areas.

The use of BoNT-A in the oral and maxillofacial areas is really nothing new and one can even find literature dating back almost two decades in this arena. As dentists are now accepting and treating patients with these products for soft tissue cosmetic use to enhance the dental esthetics, BoNT-A neurotoxins are getting much more attention in dentistry than ever before. Certainly, if dentists are going to use these therapies, training is absolutely essential and required both ethically and by state dental boards. Research has certainly shown that BoNT-A is a viable treatment for many facial, TMD, and oral dysfunctions, when they are based in the musculature.

BoNT-A products are a conservative, minimally invasive, and relatively painless therapeutic approach to dental, facial, and head and neck areas that have frustrated many dentists over the past 30 years. The safety of these products is well known because of their temporary nature and they are totally reversible over time with generally no lasting effects. Another advantage is that it gives the patient and the dental practitioner the option to stop a therapy at any time and return to the previous state with no ill effects.

How BoNT-A works
Acetylcholine, as you well may remember, depolarizes the motor end plate of the muscle and will cause a muscle contraction. BoNT-A works by inhibiting the release of acetylcholine at the neuromuscular junction. By inhibiting the release of acetylcholine, BoNT-A effectively will either reduce the intensity of the contraction of the muscle or will eliminate the contraction altogether, depending on the dosage used. Essentially, BoNT-A neurotoxin interrupts the contraction process of the muscles and causes a temporary muscle paralysis. This can last up to three months as the muscle initiates new acetylcholine receptors and the growth of branches from the neurons to form new synaptic contacts. Gradually the muscle returns to its full function and with no side effects whatsoever.

When one learns how to use BoNT-A neurotoxin properly, it can be used for a number of dental therapeutic procedures. It can relieve TMJ syndrome and facial pain and can retrain muscles which can certainly enhance dental treatment plans as well as help certain facial pain disorders that have been frustrating to the dental practitioner for many years.

Temporomandibular joint disorder (TMD)
It almost seems as if temporomandibular joint disorder is some kind of fad in dentistry that has gone in and out of style. We have been told that 80% of patients have some sort of TMD and need treatment, then it is something that you just don’t hear about for awhile. Often, TMD is just a clinical label for any pain of the jaw and facial muscles, which can be associated with headaches, earaches, cervical spine disorders, and general facial pain.

Treatments that have been used for frontline TMD disorders over the years include doing nothing, psychological therapy, maxillary or mandibular repositioning, orthotic devices, neuromuscular therapy, drug treatments such as anti-inflammatory agents, non-narcotic and narcotic pain medications, spray and stretch, muscle relaxants, chiropractic therapy, massage, acupuncture, and even antidepresants, all with varying levels of success.

The use of BoNT-A therapy for TMD symptoms has been in use for many years. Along with the introduction of BoNT-A into dentistry, and greater education on trigger points and other minimally invasive treatments, dental clinicians can now offer reversible, successful treatment for TMD patients, providing long term relief.

Muscle trigger point therapy
Often, with TMD cases, there may be one or multiple trigger points in muscles that a patient points to. Palpating these
areas immediately sends a cascading pain along muscle or neuronal tracks that radiate from the trigger point outward. Many agents have been used and injected directly into these trigger points to treat these areas, including sterile saline and local anesthetic. The theory of trigger point injections is that the disruption of the trigger point may be enough to bring some relief, either short term or long term. The success of these treatments have been limited, primarily because the effect of sterile saline or local anesthetic lasts from a few minutes to only a few days. With BoNT-A as the pharmaceutical of choice, trigger point therapy for TMJ syndrome and facial pain is now much more effective as well as predictable.

For trigger point injections, the use of BoNT-A pharmaceuticals has been highly effective because the effects will last for three months and you are actually helping reduce the intensity of the contraction of the muscle, which is usually in spasm. As dental professionals we may have developed tunnel vision and believe that fixing the dentition will solve all of the other problems. There are many schools of thought in dentistry that an orthognathic approach will work the best with occlusal equilibrations and full mouth reconstructions, which may relieve facial pain. This approach has frustrated many dental clinicians and patients as they will finish the case with the occlusal philosophy they have learned and then the patient may still have mild to severe facial pain. The muscles themselves may be in need of relief in order to achieve the right occlusal equilibration and end-point for our full mouth reconstruction. In other words, let’s treat the muscle pathology symptoms first and then build our occlusion to the relieved muscles so that the facial pain will be eliminated. Studies clearly show the relief of painful symptoms in facial muscles with BoNT-A for up to 90% of patients who had not responded to traditional treatments. 

BoNT-A products can be used to help patients with bruxism. Proper training in the use of BoNT-A neurotoxins is essential. Some clinicians typically treat bruxism and TMD patients with bilateral injections of BoNT-A into the masseter and temporalis muscles. Using the right amount of BoNT-A will reduce the intensity of contractions of these muscles of mastication as well as give your patient full competence for chewing, eating properly, and speaking. The relief afforded to patients by BoNT-A neurotoxins can help eliminate facial pain, significantly reduce their TMD symptoms and potentially improve periodontal treatment outcomes by removing the bruxism element.

As an example of BoNT-A treatment for both TMJ and bruxism, figure 1 shows a patient who has experienced facial pain and has significant bruxism. The bruxism caused considerable restoration breakage, necessitating replacement. You can see just be looking at this patient that her masseter muscles are in spasm even at rest giving her a square facial appearance. This is not skeletal but is purely a result of masseter hypertrophy. Figure 2 is a close up view of the masseter muscle in spasm. You can see the result of BoNT-A therapy two weeks later in figure 3 - the masseter muscles are no longer in spasm and the patient’s face is much more rounded at the corners of the mandible. Her facial pain had disappeared and she subsequently has had successful long term dental treatment with BoNT-A injections repeated approximately every 4-6 months to maintain her comfort.

**Figure 1.** Upon observation, bilateral masseter hypertrophy is readily apparent on this facial pain patient.

**Bruxism**

Bruxism is the general term that refers to both clenching and grinding of the teeth. There have been numerous theories as to why this occurs and most bruxism will manifest itself nocturnally. Certainly, there are components of psychological stress that may cause it. Regardless of the causes of bruxism, there is no question that it leads to the destruction of otherwise healthy dentition, exacerbates periodontal dis-
Masseteric Hypertrophy

Masseteric hypertrophy literally means enlargement of the masseter muscles. Most often, this is associated with clenching and bruxism, even when it is mild to moderate.

A common treatment for masseteric hypertrophy is BoNT-A injections into the belly of the masseter muscle. This will cause a slenderizing of the face in addition to reducing the intensity of contractions of the masseter muscles and like all other BoNT-A treatments, repeated injections are required every few months. This esthetic effect will happen automatically when BoNT-A is used for TMJ syndrome and bruxism as described above.

Orthodontic therapy

While the role of the facial muscles in determining placement of the teeth is fairly well known, at times dental practitioners may forget about the muscles once the teeth are set after orthodontic therapy has taken place. Relapse has been a continual problem for many general and orthodontic dental practitioners and there are a number of theories as to why this happens. It is readily apparent that some patients have a hyperactive mentalis muscle that may be disrupting the alignment of the teeth. Other muscles in spasm can usually be observed as well with proper training.

BoNT-a neurotoxins can reduce muscle contraction intensity and over time it is quite possible that muscles can be trained to work normally. This idea could revolutionize how we deal with orthodontic relapse as dental practitioners become more familiar with the use of BoNT-A neurotoxins.
Removable prosthodontics
The same idea described in the previous paragraph can be applied to those patients who have trouble getting used to removable prosthodontics. While it is true that more and more patients everyday are receiving implant treatment to help stabilize dentures, there will always be patients who cannot afford implant therapy or because of underlying challenges such as medical history or bone resorption, are not candidates for implant therapy. If you study the facial muscles carefully in patients, you will often times see a hypertrophic masseter and can even feel strong lateral and medial pterygoid muscles that cause the difficulty in adjusting to removable prosthodontics. Muscle training via BoNT-A neurotoxins may someday provide relief as dentists become more familiar with their use.

Trigeminal neuralgia
Trigeminal neuralgia has frustrated dental clinicians for years and is defined as a unilateral facial pain disorder that has recurrent brief, sharp, lancinating pains that are generally limited to the distribution of one or more divisions of the trigeminal nerve. Trigeminal neuralgia is frequently confused with dental pain and needs to be considered more often as a possible diagnosis when all other dental and muscle pathologies have been eliminated as the source of dental and facial pain.

BoNT-A use is increasing for trigeminal neuralgia cases and while the mechanism of action has not been well established, it has been a useful adjunct to treating these patients as primary or secondary treatment. The incidence of trigeminal neuralgia is approximately 1 in 25,000. Adding BoNT-A to the treatment plan may result in significant relief of this disorder.

Continuing education a must
Because BoNT-A is an injectable pharmaceutical with many oral and maxillofacial therapeutic applications. A frontline TMJ syndrome and facial pain course with one on one mentored live patient training as well as the anatomy, physiology, pharmacology, adverse reactions, and potential complications is a must for every dental professional before using BoNT-A. Too often, dentists have been fearful of treating patients with TMJ syndrome and facial pain because of the lack of available treatment options. With muscle and trigger point therapy with BoNT-A and other minimally invasive treatments, every dental professional can learn how to successfully treat TMJ syndrome and facial pain with these frontline techniques.

References

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Questions

1. Botulinum toxin (Botox) can be used for:
   a. Therapeutic uses only
   b. Cosmetic and therapeutic uses
   c. Cosmetic uses only
   d. Has no use in dentistry at all

2. Botulinum toxin best treats:
   a. Dynamic wrinkles and pain associated with muscles in motion
   b. Static wrinkles
   c. Deep dermal scars
   d. Acne and herpetic lesions

3. Botulinum toxin can be used for:
   a. Orthodontic cases
   b. Removable prosthodontics
   c. Hearing loss
   d. A & B

4. TMD pain can be related to:
   a. Ear infections
   b. Masticatory or facial muscles in spasm
   c. Anatomic anomalies in the joint
   d. All of the above

5. Botulinum toxin’s effectiveness is because:
   a. It is a topical cream that smoothes the skin
   b. It is injected under the skin to add volume
   c. The toxin paralyzes the skin so it doesn’t move
   d. The toxin blocks the neurotransmission to the motor muscles which prevents the muscle from moving and allows the skin to smooth out

6. Botulinum toxin can be used as a treatment of:
   a. Dental caries
   b. Periodontal disease
   c. TMJ and bruxism
   d. All of the above

7. The use of botulinum toxin therapy for TMJ pain symptoms
   a. has been in use for many years
   b. has never been used
   c. should never be used
   d. has only been in use for 1 year

8. Treating patients for bruxism and muscle related TMJ pain includes injections of which muscles:
   a. Temporals and triceps
   b. Medial pterygoid and sphincter muscles
   c. Biceps and temporalis
   d. Masseter and temporalis

9. When pressed, a trigger point:
   a. Will do nothing
   b. Will send a cascading pain along muscle or neuronal tracks that radiate outward.
   c. Will send a tingling sensation without pain to adjacent muscles
   d. Will send a ticklish sensation down the arm

10. Acetylcholine depolarizes the motor end plate of the muscle and will cause:
    a. Muscle extension
    b. Muscle contraction
    c. The muscle to go to a neutral position
    d. Nothing to happen

11. Types of frontline TMJ/Orofacial pain treatments include:
    a. Therapeutic exercises
    b. Bruxism splints
    c. Spray and stretch
    d. All of the above

12. When injecting the masseter muscles for TMJ and facial pain:
    a. These muscles are always treated unilaterally
    b. These muscles are always treated bilaterally
    c. These muscles are never treated for TMJ and facial pain
    d. These muscles are always treated for TMJ and facial pain

13. When injecting the temporalis muscles for TMJ and facial pain:
    a. These muscles are always treated unilaterally
    b. These muscles are always treated bilaterally
    c. These muscles are never treated for TMJ and facial pain
    d. These muscles are always treated for TMJ and facial pain

14. Often, temporomandibular disorders (TMD) is often a clinical label:
    a. For any pain in the body
    b. For any dental pain
    c. For any pain of the jaw and facial muscles
    d. For any pain of the ear canal

15. TMD and myofascial pain cases:
    a. May have only one trigger point
    b. May have multiple trigger points
    c. May have no trigger points
    d. All of the above

Notes
Botulinum Toxin for Frontline TMJ Syndrome and Dental Therapeutic Treatment

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