Botulinum Toxin Type A for Treating Temporomandibular Joint Dysfunction

Tara D. Miller, MD; Isaac M. Neuhaus, MD; Christopher Zachary, MB

Temporomandibular joint (TMJ) dysfunction is a common disorder causing significant pain and morbidity. Treatment options are varied and often produce inconsistent symptom reduction. We describe the use of botulinum toxin type A (BTX-A) for treating TMJ dysfunction. A series of BTX-A injections were placed into the bilateral masseter muscles of a patient with refractory TMJ dysfunction. A significant reduction of pain and other symptoms was achieved lasting for approximately 20 weeks; subsequent BTX-A injections continued to improve the patient's symptoms. BTX-A injections can be effective in reducing the pain and morbidity associated with TMJ dysfunction.

Temporomandibular joint (TMJ) dysfunction is a common disorder with significant morbidity. It has a 10% incidence rate and causes almost a quarter of the population to seek professional care.[1] The most common symptom is pain, usually localized to the masticatory muscles and exacerbated by movement or palpation. Patients may have additional symptoms, including difficulty eating, sleeping, or speaking; chronic headaches or earaches; hearing impairment; or facial swelling.[2] Pain and tenderness are usually found over the temporalis, masseter, and medial pterygoid muscles. Current treatment options produce inconsistent symptom reduction. They include medications such as systemic narcotics, anti-inflammatory agents, and muscle relaxants; physical treatments such as orthotic appliances, physical or massage therapy, and acupuncture; and surgical interventions such as arthrocentesis, arthroscopy, and open arthrotomy.[3]

Although the pathophysiology of TMJ dysfunction is not completely understood, many symptoms of this disorder are believed to be from pathology originating in the TMJ musculature. This pathology manifests as pain and tenderness over the joint and masticatory muscles. We describe a case of TMJ dysfunction successfully treated with botulinum toxin type A (BTX-A) injections into the masseter muscles.

CASE REPORT

A 41-year-old woman presented with a long history of bruxism (nonspastic clenching of the teeth) and resultant TMJ dysfunction. She experienced significant shooting pain day and night that interfered with her daily functions and quality of life. Multiple treatment modalities, including physical therapy, night guard application, and surgical remodeling of the TMJ, were performed with limited success in reducing symptoms. Dental examination revealed that her teeth were ground down; radiographic

Dr. Miller is Fellow, University of California, San Francisco. Dr. Neuhaus is Assistant Professor, University of California, San Francisco, Dermatologic Surgery and Laser Center. Dr. Zachary is Professor, Department of Dermatology, University of California, Irvine.

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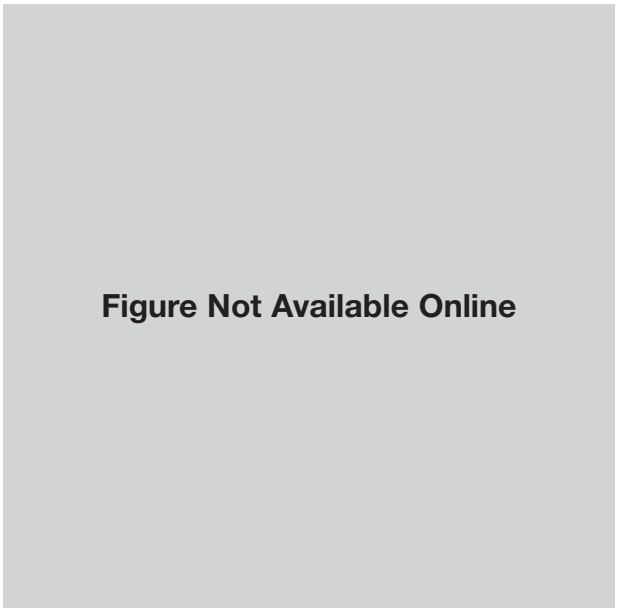

Site of botulinum toxin type A injections to treat temporomandibular joint dysfunction. Three injections in a vertical orientation were directed toward the belly of the masseter muscle.

evaluation revealed hypomobility of the bilateral TMJ. Initial treatment consisted of 6 U BTX-A in a series of 2 to 3 injections to each masseter muscle in a vertical orientation. The injections were targeted toward the center of the belly of the masseter muscles, with the patient's mouth open 75% of maximum to elongate the muscles (Figure). Electromyography was not used, given the easy clinical accessibility of the masseter muscles. The patient experienced symptom reduction (less pain and grinding) lasting approximately 4 weeks. The BTX-A dosage was slowly increased over subsequent visits to 16 U in a similar distribution. Symptom reduction lasted significantly longer (20 weeks) with the higher doses. No adverse events, such as facial asymmetry or muscle weakness, were noted with treatment. The patient has had a series of 7 treatment sessions, with continued efficacy of BTX-A in reducing symptoms.

COMMENT

Since BTX-A was introduced as a therapeutic agent in 1977, it has been used in many ways. In addition to cosmetic applications, it has been used for muscle contraction disorders, such as blepharospasm, torticollis, and cerebral palsy–related spasticity, as well as tremors and tics. In addition, BTX-A has been used for treating migraine and tension headaches, chronic facial pain syndromes such as trigeminal neuralgia, and autonomic dysfunctions such as hyperhidrosis and sialorrhea.[4,5] Our patient's response to BTX-A in reducing her symptoms of TMJ dysfunction was consistent with earlier reports in otolaryngologic and pain literature.[2,3,5-11]

TMJ dysfunction is believed to have both a myofascial (masticatory myalgia) and an orthopedic (recurrent dislocations) component. Current treatment options focus mainly on the orthopedic component, whereas BTX-A injections concentrate on the muscular component. The most plausible mechanism of action for the efficacy of BTX-A is that by blocking alpha motor neurons, the injections reduce the contractile force of jaw closure and bite strength, thus decreasing the load of the TMJ. Gamma motor neuron blockade would also decrease the resting tone of the muscles, helping to reduce overall tension and teeth clenching.

Various muscles are involved with TMJ dysfunction; they include the temporalis, bilateral masseters, and medial and lateral pterygoids. In treating TMJ dysfunction, the injection route may be either intraoral or transcutaneous, depending on the anatomic position of the targeted muscle. The superficial muscles, masseter and temporalis, may be palpated and injected externally according to anatomic landmarks. The masseter muscles lie in an easily accessible position, extending from the zygomatic arch down to the lower border of the mandible and from the mid cheek posteriorly to the border of the mandibular ramus. The temporalis are broad muscles arising from the temporal fossa and the deep surface of the temporal fascia and extending deep to the zygomatic arch into the coronoid process of the mandible.

In contrast, deeper pterygoid muscles are best reached intraorally under electromyographic guidance.[2] The pterygoid muscles are surrounded by the pterygoid venous plexus and are located near the infratemporal fossa containing branches of the external carotid artery and trigeminal nerve. Although most clinicians report using this intraoral method, some have described using a transcutaneous route for the lateral pterygoids. They recommend injecting directly below the anterior zygomatic process approximately 1 cm in front of the condylar process with the patient's mouth slightly opened.[6] Given the increased technical difficulty with pterygoid injections and the finding that adequate relaxation may be achieved with masseter and temporalis BTX-A injections, with our patient we limited injections to the more easily accessible masseter muscles and still achieved significant symptom reduction.

Current literature presents a wide dosing range of BTX-A for treating TMJ dysfunction. Von Lindern et al[8] performed a randomized, blinded, placebo-controlled study demonstrating significant reduction in chronic facial pain by using 35 U BTX-A injected into the masticatory muscles on each side. Symptom reduction lasted approximately 2 months. Adverse events (swallowing difficulties and temporary paralysis of facial expression) occurred in only 1 patient. Freund and Schwartz[3]

injected 50 U BTX-A into each masseter muscle and 25 U into each temporalis muscle. Although the patients experienced significant pain reduction and improved orofacial function and mouth opening, they also experienced decreased bite strength that returned to normal over 8 weeks. The clinical benefit lasted approximately 6 weeks. With our patient, we started with much smaller doses of BTX-A and slowly increased the dosage as needed to obtain clinical benefit. The duration of symptom reduction was similar to that achieved in studies using higher doses, thus validating the concept of using the lowest dose needed to achieve clinical benefit.

Adverse events are rare in treating TMJ dysfunction with BTX-A. They include swallowing or speech difficulties and facial asymmetry. For example, injection of the masseter muscles may cause diffusion of toxin into the nearby zygomaticus major, resulting in an asymmetric smile from the inability to raise the corner of the mouth. This is an uncommon adverse event but has been reported with higher doses of BTX-A. An open-label study of 41 patients treated for TMJ dysfunction with an average of 200 U BTX-A on each side reported reversible swallowing and speech difficulties in 1 patient.[10] Velopharyngeal incompetence causing the nasal escape of liquids for 2 weeks was reported after a single injection of 50 U BTX-A into the pterygoid muscle to treat recurrent TMJ dislocation.[6] There are no reports in the current literature of systemic adverse events of BTX-A in treating TMJ dysfunction.

SUMMARY

We describe the use of BTX-A for treating chronic TMJ dysfunction. To our knowledge, this is the first report of BTX-A for treating TMJ dysfunction in the dermatology literature. In our patient, the procedure was well tolerated and provided significant reduction of pain and discomfort associated with this condition. This case report demonstrates an additional therapeutic application for BTX-A.

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