Review Article

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Botox: New Voice of Dentistry

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Abstract

Many medical and dental conditions have no complete treatment modalities in conventional ways. The An alternative treatment is usage of botulinum toxin through chemo denervation. One of effective way of preventing damage to dental hard tissues, restorations and to increase the effect of treatment is to ''de-programme'' the muscles responsible for excessive destructive forces. Minimally invasive procedure at low cost with limited recovery time is provided by them. For rejuvenative and cosmetic procedures, bothbotox and derma fillers both go hand in hand. The mechanism of action and various uses of botox and derma fillers in the maxillofacial areas along with its future implications in the dentistryare focussed in this article.

Keywords: Botulinum Toxin; Dental Conditions; Derma Fillers; Cosmetics; Dentistry; Maxillofacial.

Introduction

A new option for symptom relief in patients in whom conventional treatments are not effective [1] is botulinum toxin used in dentistry for the treatment conditions, such as trismus, parafunctional clenching, extracapsular myogenic temporomandibular disorder, and the associated headaches. The masticatory function is affected by number of diseases including the pathology of the temporomandibular joint and masticatory muscle dysfunction. The damage caused bydental trauma and excessive biting forces is usually treated with occlusal adjustments, sophisticated dental restorations, intraoral appliances, and/or surgery which are outstanding treatment options, but they are not applicable for all patients [2]. Neuromuscular rehabilitation of the occlusion and orthognathic surgery and are irreversible, invasive, and expensive, while orthodontic treatments are irreversible and expensive for a majority of the patients. Appliances impede their normal functions like eating and speaking. The continued use of narcotics, analgesics, steroids and anti-inflammatory drugs are not beneficial to health. The popularity of each, BTX and dermal fillers has matured quickly in recent years as they provide the rejuvenative and enhancing aesthetic enhancements with no recovery time and at lower value.

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History

German physician JustinusKerner (1786-1862) first developed the idea for a possible therapeutic use for botulinum toxin. In 1897, the producer of the botulin toxin was discovered by Emile van ermengem, which was a bacterium, which he named clostridium botulinum [3]. In 1928, P. Tessmer snipe and Hermann sommer for the first time purified the toxin [4]. Scott et al. proved this fact by experimentally administering the Type A strain in monkeys. This strain was approved by the US Food and Drug Administration (FDA) in 1989 under the trade name Botox (Allergan, Inc, Irvine, Calif) for treating blepharospasm, strabismus, and hemifacial spasm in patients younger than 12-year-old. In 2002, Allergan's botox cosmetic for the purpose of temporarily erasing facial lines [6] was approved by FDA. The injections clearly reduce the severity of motor contraction–induced abnormal head position and accompanying neck pain. Also in 2000, the FDA approved BoNT/B for the treatment of cervical

dystonia in patients who developed BoNT/A resistance.

Mechanism of Action

The release of acetylcholine at the neuromuscular junction is inhibited by Botulinum toxin serotype A. The toxin after binding to cholinergic nerve terminals, where it is released into the cytoplasm of the neuron. A complex is formed with neuronal proteins and causes the proteolysis of SNAP-25a synapto-somal-associated protein utilized in synaptic vesicle fusion with the nerve terminal membrane. Subsequently, the inhibition of its exocytosis occurs due to decrease in the frequency of acetylcholine released at the synaptic cleft. As a result, there is a loss of acetylcholine receptors at the motor end plate, that causes loss of neuronal activity in the organ and muscular denervation [5]. According to recent data the neurotoxin also plays a role in reducing the release of inflammatory mediators substance P, glutamate, calcitonin gene-related peptide (CGRP) etc. that cause pain. Atemporary muscle paralysis is caused due to interruption in the contraction process of a skeletal muscle by neurotoxin. Eventually, formation of new acetylcholine receptors is initiated by muscles. There is a gradual return to full muscle function, usually with minimal side effects, as the axon terminal begins to sprout with the growth of branches to form new synaptic contacts.

Preparation of Injection Site

Botox/A is kept frozen (2–4_c) in a vial till it is ready to use. 100 U of Botox is there in each vial. 50% of a group of 18 to 22 g Swiss Webster mice is killed by one unit when injected intraperitoneally. Following manufacturer's guidelines the drug is put into solution, by adding normal saline (preservative-free 0.9% saline solution). It should be used within 4 hours once prepared. A calibrated 1.0-ml tuberculin syringe is preferred and the needle between 26 and 30 gauge is selected for injection. Alcohol wipes and dry sterile gauze sponges are required for skin preparation. Before injection aspiration is recommended. Usually, by the diagnosis and reason for use of the toxin, size of the muscle, and medical conditions, dosing is established. The final dilution and dosage used is left to the clinical experience and discretion of the practitioner until studies narrow down all specifics. By the size of the muscle, the number of injection sites usually is determined. Theoretically,using more injection sites facilitate a wider distribution of Botox/A to nerve terminals. So it may be appropriate to inject more sites with smaller doses.

Applications of Botox in Dentistry

BOTOX can be Used in the Following Dental Disorders

- Temporomandibular disorder (TMD).
- Mandibular spasm
- Dental implants and surgery.
- Myofacial pain and neck pain
- Masseteric hypertrophy.
- Prominent gums
- Headache, migraine, and trigeminal neuralgia.

Bruxism

Muscles can be affected by bruxism solely and lead to the formation of TMD causing joint damage. Bruxism may lead to headaches, tooth wear, TMJ disorders, periodontal disease in many patients [6]. Intraoral appliances has sometimes been reported to be hazardous for children. Behavioral modification techniques have been included in other treatments to reduce stress. The cases with a history of severe bruxism who were chosen for long term open label trial study. In these cases botulinum toxin Type A injections were given into the masseters (mean dose: 61.7 U/side; range 25 U to 100 U), which shows results in 19 weeks [7].

Chronic Migraine

In the treatment of headache and migraine standard medications causes a number of side effects, such as weight gain, stomach upset and drowsiness. Though such side effects for BOTOX treatment are comparatively rare. Headache can be relieved by injecting BOTOX 25-75 U into pericranial muscles which relaxes overactive muscles by blocking nerve impulses that trigger contractions. Lawrence Robbins, says that BOTOX decreases the inflammatory (neuronal/brain) effects of W (Calcitonin gene-related peptide) and thus acts as an anti inflammatory substance [8].

Lip and Chin Smile Enhancements

We can treat lip lines,gummy smiles, and creases, upside-down smiles, puckered chinsby targeting specific muscles around the mouth with botulinum A injections. In this, the excessive muscle function that contributes to the condition is limited. The

corners of the mouth can turn up instead of down, upper lip no longer over retracts and the chin muscle is relaxed instead of puckered. Like all the other treatments, these last for a period of 3 to 5 months before the muscles will begin to return to their previous function. By breaking the cycle of habitual muscle function one can retrain those muscles to function differently over time in some patients. Regular treatment with botulinum A can renew the self-esteem and confidence of patient.

Dental Implants and Surgery

In patients with para-functional habits, when multiple implants are placed, osseo-integration can be impeded by excessive functional forces. The implant structures better osseo-integrated by relaxing muscles with prophylactic use of BOTOX injections to the masticatory. Theprophylactic use of BOTOX injections to the masticatory muscles causes muscular relaxation and allow healing of fracture in a more stable environment [9]. Similar benefits of adjunct BOTOX treatment for surgical reduction of mandibular condylar bone fractures has been found by Kayikvioglu group [9].

Trigeminal Neuralgia

It is a neurological disorder affecting orofacial musclesunilaterally that leads to acute severe pain.The severity of the pain can be reduced in patients by using Botox as an adjunctive treatment modalitywhich acts on nerve endings.

Salivary Fistula

Blockage of the parotid secretion occurs by injecting Botox in the proximity of the parotid glands. The salivary flow decreases leading to glandular atrophy, eventually allowing the salivary fistula to heal [10].

Enhancing Facial Esthetics

Botox can treat facial wrinkles.First the pathogenesis of wrinkles should be known first. The use of Botox for the upper face and the use of fillers in the lower facethe use of Botox for the upper face are advised. Botox can be extremely effective treatment in the lower face when rhytid is primarily caused by muscular action deforming the overlying skin.

Blepharospasm

Spasms of the orbicularis oculi causes blepharospasm which further leads to tearing, blinking, and dry eyes. Conservative treatments, such as oral anticholinergics medications, sunglasses often fail [11]. Botox injections are given superficial to the orbicularis oculi in four locations in the periphery of each eye. It can also be given intramuscularly in the procerusand corrugator muscles. Relief for 12 to 16 weeks is providedwith Botox.

Contraindications

Pregnancy, neuromuscular diseases (Eton-lambert syndrome, myasthenia gravis), lactation, motor-neuron diseases, concurrent usage of amino glycosides and sensitivity to toxin are relative contraindications. Botulinum toxin's potential adverse effects in Oromandibular disorders include flu-like symptoms, facial nerve palsy, dysphagia, pain at the injection site, hematoma and non-targeted muscle weakness. These complications are resolved within a couple of weeks. The best way to find outis to talk with your doctor to find out if botulinum A could help with a medical or dental condition you are concerned about.

Limitation of Botox

Masticatory function is temporarily inhibited by therapeutic approach using BOTOX. These masticatory forces will return to previous levels once the effect of the drug has subsided.

Side Effects of Botox Therapy [12]

- Muscles injected can be sore for a few days.
- Atrophy of the muscles can occur.
- Temporary partial weakening of the muscles.
- There have been reports of temporary side effects such as sensations, flu-like symptoms, nausea, tingling. They go away within 1-2 days.

Conclusion

BTX and derma fillers in recent years have made their way into dentistry in both dental esthetic and dental therapeutic uses in the oral and maxillofacial areas. They provide patients with most aesthetic, significant, minimally invasive, predictable, and therapeutic outcomes available for everyday clinical situations. The use of this therapy should be in a controlled way rather than using it radically.

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