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Review Article

Botulinum Toxin in Oral and Maxillofacial Surgery: A Review Article

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ABSTRACT:

Botulinum toxin is a toxin which is neurotoxic in nature. It is produced by clostridium botulinum and related species. When it gets infected it causes disease botulism. It usually stops the neurotransmitter called acetylcholine from end terminals of axon in the neuromuscular junction. Usually it causes flaccid paralysis. Clostridium botulinum is a gram negative bacteria. Botulinum toxin evolved in using medical field and wide arena of application. Especially in oral surgery application has endowed with different intricate uses. This article whole at large elaborate review about practical application from varied preposition. Wide application has postulated in field of oral surgery with intriguing stance.

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INTRODUCTION

Botulinum toxin (Botox) is a neurotoxic protein produced by the bacterium Clostridium botulinum and related species. There are seven types of botulinum toxin, named type A–G. Types A and B are capable of causing disease in humans, and are also used commercially and medically. Types C–G are less common; types E and F can cause disease in humans, while the other types cause disease in other animals. Botulinum toxin types A and B are used in medicine to treat various muscle spasms and diseases characterized by overactive muscle. Commercial forms are marketed under the brand names Botox. Botulinum toxin is the most acutely lethal toxin

known. Intoxication can occur naturally as a result of either wound or intestinal infection or by ingesting preformed toxin in food. Weaponized botulinum toxin can be inhaled and absorbed by the lungs.

CLINICAL APPLICATIONS

Botulinum toxins now play a very significant role in the management of a wide variety of medical conditions, especially strabismus and focal dystonias, hemifacial spasm, and various spastic movement disorders. Besides these, encouraging clinical reports have appeared for other uses such as headaches, hypersalivation, hyperhidrosis, and some chronic conditions that respond only partially to medical

treatment. Sometimes it can be used as an alternative to surgical intervention. Autonomic disorders resulting in hypersecretion of glands like ptialism or gustatory sweating, which often occur after surgery to the parotid gland, respond well to botulinum toxin. Surprisingly, the response seems to last much longer than in conditions caused by overactivity of striated or smooth muscles. The list of possible new indications is rapidly expanding.

DERMATO-COSMETOLOGICAL APPLICATIONS

Cosmetic use of BTX has skyrocketed in recent years, especially since the approval of BTX-A for treatment of glabellar lines. Until recently, Botox use was mainly confined to correct muscles of facial expression over the upper one-third of the face. Presently it's application ranges from correction of lines, creases and wrinkling all over the face, chin, neck, and chest, depressor anguli oris, nasolabial folds, mentalis, medial and lateral brow lifts, to lessen shadows on one's face and maintain a smooth outline of the jaw and cheeks from all directions, to dermatological applications such as localized axillary or palmar hyperhidrosis that is nonresponsive to topical or systemic treatment

THERAPEUTIC USES

Temporomandibular joint disorders (TMD), which are closely related to abnormalities in the masticatory muscles, are also treated by applying BTA. Furthermore, successful resultorted with this treatment strategy not only in basic experimental studies but also in the treatment of salivary gland secretory disorders such as sialorrhea and Frey syndrome with BTA. Moreover, BTA is used in the treatment of facial pain and paralysis. TMD is known to be closely associated with pain in the masticatory muscles adjacent to the temporomandibular joint (TMJ). BTA application in this condition has relieved the pain caused by hyperactivity in TMD as well as that in the masticatory muscles and has been successful in the treatment of TMJ dislocation. Patients with TMD are usually administered BTA into the adjacent masticatory muscles such as the masseter and temporalis muscles. This strategy has successfully improved parafunction such as clenching as well as bruxism and TMD symptoms. Patients with TMD often experience mouth-opening limitation, and BTA therapy can relax the adjacent masticatory muscles and, thereby, improve the muscle inflammation, leading to improved mouth opening. In addition, it has been reported that BTA injection into the masticatory muscles including the lateral pterygoid muscles has a favorable therapeutic effect.

FACIAL NERVE PALSY

Although most studies are case series, attempts have been made to treat facial paralysis with BTA. Inducing ptosis by temporarily paralyzing the muscle

by injecting BTA in the levator palpebrae superioris can prevent drying of the cornea when the eyes cannot be closed normally because of facial nerve palsy. A method for treating patients with facial paralysis using BTA has been suggested, which induces facial symmetry by causing facial paralysis following the injection of BTA into the normal side of the patient's face

THERAPEUTIC FAILURE

Some patients do not respond to injections and, having never previously responded, are designated as primary nonresponders. Many reasons may lead to a lack of response. Patients with rhytidis that are not dynamic in origin (eg, photodamage, age-related changes) do not respond. Improper injection technique or the denatured toxin may also result into therapeutic failure. Some patients may have neutralizing antibodies from prior subclinical exposure, or individual variations in docking proteins may exist. Secondary nonresponders respond initially but lose the response on subsequent injections. Most of these patients may have developed neutralizing antibodies.

COSMETIC APPLICATIONS

Facial wrinkles

BTA has been most widely accepted for its use to temporarily treat hyperfunctional facial lines. Forehead rhytids are managed by injecting 10–20 U of BTA injected at least 1 cm above the orbital rim with a general rule of avoiding injecting frontalis without injecting glabella to reduce the chances of brow ptosis. The injection site and pattern of injections vary depending on the desired brow position. It is preferred to inject lower doses away from the brow so as to avoid the frozen look. Glabellar lines (frown lines) are generally managed by 20–40 U of BTA divided over five injection sites. The five injection sites correspond to the area of the procerus (between the eyebrows above the nasal bridge), paired injection sites that correspond to the corrugator muscles (10 mm above the orbital rim on an imaginary vertical line running through the medial canthus) and a paired injection site for superior medial orbicularis (10 mm above the orbital rim approximately in the midpupillary line). Lateral canthal lines known as “crow's feet” (due to lateral orbicularis oculi) are generally managed by superficial injections of 8–16 U of BTA into the lateral orbicularis oculi about 10–15 mm away from the orbital rim so as to avoid diffusion into extraocular muscles. Eyebrow lift by BTA injections can be managed by either injecting the glabella alone or injecting the vertical fibers of lateral orbicularis oculi in a dose of 20–40 U or 7–10 U respectively. Perioral lines, wrinkles around the lips commonly called the “smokers wrinkles” are injected superficially at or above the vermilion border and sparing the corners of the mouth so as to avoid drooping of the corners. A

side effect of these injections is difficult in pronouncing “b” and “p” and therefore, these injections are avoided in public speakers and singers. Doses are kept low so as to achieve esthetic results while maintaining function. Typical dose ranges in 5–6 U; however, doses as low as 1–2 U per injection point are advised. Wrinkles on neck (due to platysma muscle) can be managed by injecting 2–4 u

Implantology

BT has been postulated to be therapeutically beneficial by allowing unimpeded osseointegration of implants. Stress due to any excessive functional force or any parafunctional habit may cause implant failure. Thus, injecting BTA relaxes the masticatory muscles, sparing the implant leading to unimpeded osseointegration. However, the body of literature supporting the use of BT in implantology is scarce and warrants further research.

Oral and maxillofacial trauma

The use of BT in treating injuries affecting the bones in the maxillofacial region including maxilla, mandible, zygoma, nasal bone, and orbital bone has shown astonishing results. In a study done by Kayikçioğlu et al., temporary paralysis of masseter muscles allowed for fewer mini plates/microplates in the treatment of zygomatic fractures. Use of BTA in the management of condylar fracture has been strongly recommended in various reports. Higher doses of BTA may potentially be used as a pharmaceutical splint during management of fractured facial bone. BTA injections in anterior belly digastric have been used successfully in the correction of post traumatic anterior open bite. BTA has also been proposed in the management of ranula as a minimally invasive therapy.

Cancer and palliative care

The application of BTA can improve movement disorders like synkinesis following reconstructive surgery in patients with cancers of the parotid gland and as antispasticity agent in palliative care for severe pain. The application of BTA is a minimally invasive treatment option in various functional disorders, thus improving the quality of life in patients with head and neck cancers of different etiologies with minimal side effects.

CONTRAINDICATIONS

In any known hypersensitive reaction to any of the botulinum preparations. Allergy to any of the constituents of BTX-A or BTX-B. Presence of active infection at the proposed injection site. Pregnancy and lactation. Patients receiving treatment with aminoglycosides, anticholinergic drugs. Other agents interfering with neuromuscular transmission or muscle relaxants should be observed closely because the effect of Botox® may be potentiated. Patients suffering from peripheral motor neuropathic diseases,

sclerosis, or any neuromuscular junction disorders like myasthenia gravis are at increased risk for clinically significant adverse reactions and should be closely monitored and also Psychologically unstable patients.

FUTURE PERSPECTIVE

Although plenty of reports on the use of botulinum in maxillofacial region are published, quality literature is scarce. Most of the published reports are case reports of series and actual randomized control trials are lacking. While dental surgeons are well placed by their virtue of knowledge of facial anatomy, further skill enhancement training is warranted to prepare them to administer botulinum toxin for therapeutic uses. Many regulatory bodies in the United States have already started additional licensure procedures for practicing Botox® in dentistry. The interest among dental practitioners to practice botulinum is growing, mostly for esthetic dental reason; however, a majority still reject the idea due to lack of knowledge and experience. Still, intricacies of wide application explores the new era of profound possibility.

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