

Review Article

Botox in Dentistry: The Healing Side of a Poison

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Abstract

In this era of passion to look beautiful, various new technologies are emerging to enhance and improve the physical appearance of people. Botox is emerging as one such popular treatment to improve various facial anomalies. The aim of this paper is to elaborate the healing aspect of this dangerous toxin. There is no question that Botox and dermal fillers are well known for their esthetic results in terms of smooth skin and replacing lost volume in face, especially the oral and perioral areas. The botox is a minimal invasive technique and may prove out to be an attractive alternative to surgery in some cases.

Keywords: Botox, toxin, minimal invasive, esthetics, gummy smile.

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Introduction

We can't deny the fact that we all thrive to look young so called less than our age. And botox is one option which claims to give a younger and more esthetic look to people of advancing age groups. Today BOTOX is the name which is hottest in the field of cosmetic and esthetic industry. There is no question that BOTOX and dermal fillers are well known for their esthetic results in terms of smooth skin and replacing lost volume in face, especially the oral and perioral areas.¹ Introduced in 1989 by Allergan Inc (www.allergan.com), Irvine, Calif., Botox is a protein derived from *clostridium botulinum* bacteria.²

History

Botulinum toxin can cause botulism, a serious and life-threatening illness in humans and animals. Popularly known by one of its trade names, botox, it is used for various cosmetic and medical procedures. Botulinum can be absorbed from eyes, mucous membranes, respiratory tract or non-intact skin. It was Kerner, a physician, who first conceived a possible therapeutic use of botulinum toxin and coined the name botulism (from latin *botulus* meaning "sausage").³ In 1897, Emile van Ermengem found the producer of the botulin toxin was a bacterium, which he named *clostridium botulinum*.⁴ In 1928, P. Tsemmer and Hermann Sommer for the first time purified

the toxin.⁵ In 1949, Arnold burgen's group discovered, through an elegant experiment, that botulinum toxin blocks neuromuscular transmission through decreased acetylcholine release. Allergan's botox (botulinum toxin type A, has both therapeutic and cosmetic applications. Over the last two decades, botox has been approved by the food and drug administration (FDA) for therapeutic treatments of eye muscle problems (in 1989), neck problems (in 2000), and excessive sweating (in 2004). At present, it is being investigated for treating other medical conditions. In 2002, the FDA approved Allergan's botox cosmetic for the purpose of temporarily erasing facial lines. For many years, physicians also have used botox "off-label" (that is, without FDA approval) to treat other medical problems.⁶The 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. Since then, BoNT/A has been approved for the treatment of primary axillary hyperhidrosis (excessive sweating) and for the reduction of deep glabellar lines in the face. FDA approved

use specifications for BoNT/A and BoNT/B.⁷

Dentistry and Botox

Today is the age of minimal invasive dentistry, and botox is one such minimal invasive option for a number of dental conditions. It is commonly used to treat Temporomandibular disorder (TMD), Dental implants and surgery, Prominent gums, Masseteric hypertrophy, Mandibular spasm, Headache, migraine, and trigeminal neuralgia, Myofacial pain and neck pain, Bruxism and clenching cases, angular cheilitis and gummy smile, orthodontic relapse and depressed orthodontic appearance , for reducing muscle hyperactivity for retention of removable prosthodontics and many more conditions .⁸

Mechanism of Action

Botulinum toxin (Bont) inhibits the exocytosis of acetylcholine (Ach) on cholinergic nerve endings of motor nerves. Autonomic nerves also are affected by the inhibition of ach release at the neural junction in glands and smooth muscle. Bont achieves this effect by its endopeptidase activity against Snare proteins, which are 25-kd synaptosomal-associated proteins that are required for the docking of the Ach vesicle to the presynaptic membrane.

Summary of FDA-Approved Botulinum Toxin Products			
Trade Name*	NEW Drug Name	OLD Drug Name	Indication
Botox	OnabotulinumtoxinA	Botulinum toxin type A	Cervical dystonia, Severe primary axillary hyperhidrosis, Strabismus, Blepharospasm
Botox Cosmetic	OnabotulinumtoxinA	Botulinum toxin type A	Temporary improvement in the appearance of moderate to severe glabellar lines
Dysport	AbobotulinumtoxinA	Botulinum toxin type A	Cervical dystonia, Temporary improvement in the appearance to moderate to severe glabellar lines
Myobloc	RimabotulinumtoxinB	Botulinum toxin type B	Cervical dystonia

* The marketed trade names and the product formulations have not changed.

It was suggested that when Bont was used for the treatment of neuromuscular disorders particularly Focal dystonias and spastic conditions patients reported a marked analgesic benefit. Initially, this benefit was believed to be due to the direct muscle relaxation effect of Bont; however, various observations have suggested that Bont may exert an independent action on peripheral nociceptors by blocking exocytosis of such neurotransmitters as substance P, Glutamate, and Calcitonin gene-related peptide (cgrp). In addition, because Bont does not cross the Blood-Brain Barrier, and because it is inactivated during its retrograde axonal transport, the effect is believed to be in the first-order sensory nerve and not more centrally.⁹

Preparation of Injection Site

Bont/A is kept frozen (2-4_c) in a vial until it is ready to use. The drug is put into solution, following manufacturer's guidelines, by adding normal saline (preservative-free 0.9% saline solution). Once prepared it should be used within 4 hours. The preferred syringe is a calibrated 1.0-ml tuberculin syringe, and the needle selected for injection usually is between 26 and 30 gauge. Skin preparation involves alcohol wipes and dry sterile gauze sponges. Aspiration before injection is recommended. Usually, dosing is established by the diagnosis and reason for use of the toxin, size of the muscle, and medical conditions or medications. Until studies narrow down all specifics, the final dilution and dosage used is left to the clinical experience and discretion of the practitioner. The number of injection sites usually is determined by the size of the muscle. Theoretically, it may be appropriate to inject more sites with smaller doses, and using more injection sites should facilitate a wider distribution of Bont/A to nerve terminals; however, too many injection sites may cause local injection site

pain. The proper targeting of muscles is a crucial factor in achieving efficacy and reducing adverse effects from Bont/A injections. The therapeutic effects of Bont/A first appear in 1 to 3 days, peak in 1 to 4 weeks, and decline after 3 to 4 months.¹⁰

Injection Site for Gummy Smile: Yonsei Point

Hwang et al at Yonsei university college of dentistry, Seoul, Korea have proposed a injection point for botulinum toxin a and named it as Yonsei point.¹¹ A dose of 3U is recommended at each injection site. It is basically a point located at the centre of triangle formed by levator labii superioris , levator labii superioris alaeque nasi and zygomaticus minor . If applied in small, carefully titrated doses, these muscles can be proportionately weakened with botox, which will reduce exposure of the upper gums when smiling. Polo conducted a study in which five patients with excessive gingival display due to hyper-functional upper lip elevator muscles were treated with botox under electromyographic guidance. Patients received one 0.25 u injection per muscle bilaterally into the levator labii superioris, superioris labii alaeque nasi, and at the overlap areas of the levator labii superioris and zygomaticus minor muscles. All the patients were pleased with the results and the effective increase in upper lip length upon smiling averaged 124.2% and the duration of effect ranged from 3 to 6 months and no adverse effects were reported or observed.¹²

Contraindications

The relative contraindications include pregnancy, lactation, neuromuscular diseases (myasthenia gravis, Eaton-lambert syndrome), motor-neuron diseases, concurrent usage of amino glycosides and sensitivity to toxin. The potential adverse effects of botulinum toxin in Oromandibular

disorders include facial nerve palsy, pain at the injection site, flu-like symptoms, non-targeted muscle weakness, dysphagia, and hematoma. These complications are generally transient and resolve within a couple of weeks.

Limitations

The therapeutic approach using botox inhibits masticatory function temporarily and the masticatory forces will eventually return to previous levels once the effect of the drug has subsided.

Disadvantages

Treatment with botox is not a permanent option unlike other surgical alternatives. The effect of this treatment are for short term usually for six months and the patient has to get it redone after that. It is important to note here that injection of botox should not be given prematurely before the effect of earlier treatment has worn off completely as this can result in buildup of antibodies to botox that will dilute the effect of further treatments .moreover the treatment might sometime produce asymmetrical results due to injection at wrong site or by an inexperienced clinician and the cost is also high for such a treatment.¹³

Conclusion

Botox no doubt is emerging as an attractive treatment option in comparison to surgical alternatives. However is much more is still to be discovered to allow its routine use in dental clinics for various problems. There are still many dental conditions which require FDA approval to be treated by botulinum toxin. The use of botox is minimal invasive and will surely take dental profession to one step ahead in the field of progress.

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