

Know your botox

Roopali Sharma¹, Krishna Kumar Gupta^{2,*}, Himani Sharma³, Akash Rajput⁴

¹Intern, ²HOD, ³Private Practitioner, ⁴Junior Resident, ¹Dept. of Dental Science, ²Dept. of Periodontics & Implantology, ³Dept. of Periodontology, ⁴Dept. of Oral and Maxillofacial Surgery, ¹King George's Medical University, Lucknow, Uttar Pradesh, ²Vyas Dental College & Hospital, Jodhpur, Rajasthan, ⁴Subharti Dental College, Meerut, Uttar Pradesh, India

***Corresponding Author:**

Email: drkkgupta26@gmail.com

Abstract

Botox is no less than a magical wand in the cosmetic field today. It has become very popular among people in various countries. Produced by the anaerobic bacterium *Clostridium botulinum*, it exerts a paralytic effect by inhibiting acetylcholine release at the neuromuscular junction. The bacteria produces 7 antigenically distinct toxins. BoNT-A has been approved in more than 70 countries. There are five sources of BoNT-A available worldwide. Although public interest in Botox stems mainly from its cosmetic use but it has been used in treatment of various other disorders especially neurological. Some localized and generalized adverse effects are also noticed associated with the treatment. Botox use has been contraindicated in pregnancy and lactation. Use of botox and fillers in combination gives longevity of the results. Use of botox brings about change in soft and hard tissues. Though botox has gained a lot of fame it has some limitations and disadvantages as well. Botox has brought about a great advancement in the world of dentistry.

Introduction

Botox had developed a special space in the medical field since last few years. It has become very popular among people in various countries. Patients have shown increasing interest not only in enhancement of their dental esthetics but also in their facial esthetics. Dynamic wrinkles (caused by muscle hyperfunction) in perioral, glabellar and forehead regions can cause a patient's expression to be misinterpreted but botox treatment has provided an opportunity to avoid such misinterpretations by restoring their previous contour. Botulinum (botox) is such an option to address such matters.¹

Botulinum Toxin (BTX) and its mechanism

The most potent biological neurotoxin is a safe and effective treatment of various forms of neurological disorders. Produced by the anaerobic bacterium *Clostridium botulinum*, it exerts a paralytic effect by inhibiting acetylcholine release at the neuromuscular junction. After strongly binding to presynaptic cholinergic nerve terminals, it is internalized, decreasing the frequency of acetylcholine release and ultimately inhibiting exocytosis. This results in a loss of acetylcholine receptors causing muscular denervation.

The onset is usually delayed by 2 to 4 days, due to release of acetylcholine from the presynaptic storage vesicle. Within days of exposure the new axons begin to form and proliferate forming new synaptic contacts. The typical duration of actions ranges from 2 to 4 months, with a gradual return to full muscular function thereafter.²

BoNT-A: The bacteria (*Clostridium botulinum*) produces 7 antigenically distinct toxins that are lettered A through G. Toxin A, however, has been the most extensively studied.⁸

BoNT-A toxicity is approved for use in more than 70 countries.³

There are five sources of BoNT-A available worldwide:

1. Onabotulinumtoxin A: Botox/Botox Cosmetic in the United States, Latin America Allergan, Inc, Irvine, (A) also known as Vistabel in Italy.
2. Abobotulinumtoxin A: Dysport (Ipsen Ltd, Berkshire ,UK) in United States ,Europe and Latin America and Azzalure in Europe
3. BoNTA Prosigne (Lanzhou, China) in Asia and Latin America and Bocouture in Europe and Latin America
4. BoNTA Neuronox (Medy-Tox. Inc, South Korea)
5. Incobotulinumtoxin A: Xeomin,(Merz Pharma, Frankfurt in Canada, Germany ,United States (for therapeutic use), an Latin Americas and Bocouture in Europe and Latin America.⁴

Botulinum toxicity is extraordinary. Just 1 microgram of it if injected in adult human can kill them but in 1970s, the American Scientist Alan Scott experimented with minute doses of BoNT/A in primates and become convinced that controlled injection of this toxin in an overstimulated muscles can lead to local relaxation lasting months without systemic side effects.⁵

Clinical resistance to botulinum toxin type A has been estimated as high as 6.5% and botulinum toxin type B continues to be actively investigated as an alternative therapeutic agent. Clinical resistance to botulinum toxin results from the formulation of neutralizing antibodies but attention to handling and dosing procedures may reduce the development of resistance.⁹

Botulinum toxin A has been use for the treatment of sialorrhea in children:

Sialorrhea is defined as the involuntary passive pooling and spillage of saliva from the mouth due to

inability to process oral secretion. Although it is common in children who have not developed oral neuromuscular control (age < 24 months) drooling in individual 4years or older is considered abnormal.

In children diagnosed as having cerebral palsy, it is estimated that 10% to 37% have sialorrhea.

Botulinum toxin A has emerged as one of the primary interventional tools used in the treatment of sialorrhea. Its application for treating excessive drooling was first reported by Bushara in 1997, who administered BTX-A into the salivary glands of an adult amyotrophic lateral sclerosis. Since this initial report, BTX-A has been applied to a variety of patient populations (from pediatric to geriatric) with various neurological disorders that causes sialorrhea.

Botox is injected into salivary glands, including the parotid and submaxillary glands, to inhibit the stimulation of the cholinergic receptors. This results in a reduction in saliva produced and secreted. Patient continues to maintain a basal rate of secretion, thus avoiding significant dry mouth and the subsequent risk of dental caries and oral infections. Typically the resolution lasts from one and one half to six months.⁹

Though some of the complications were experienced by the patients which are classified under two categories:

Early	Late
1. Loss of voice	1. Vomitting
2. Dry mouth	2. Pain
3. Postanesthetic nausea	3. Increased drooling
4. Speech impairment	

Difficulty in swallowing⁶

Uses: Although public interest in BOTOX stems mainly from its cosmetic use but it has been used in treatment of various other disorders too especially neurological. It has been indicated in the treatment of prominent gums, headaches, migraines, trigeminal neuralgia, myofunctional pain and neck pain.¹ In recent years, there have been reports describing the use of botulinum toxin for the temporomandibular disorders such as bruxism, clenching, masseteric hypertrophy, recurrent dislocation of the temporomandibular joint, oromandibular dystonias and chronic myogenous orofacial pain.⁷ As far as it's use in cosmetic field is concerned, we can say it is synonymous to anti-aging.

Dosing and adverse effects: Transient, nondestructive and largely limited to the area of administration, characteristics that add to its appeal both as a safe therapeutic agent and as a useful diagnostic tool. The effect of botox may vary from patient to patient as well.

Localized Effects: You should know

1. Tenderness/ bruising at the site of injection.
2. Mild skin reaction at injection site.
3. Itching at injection site.

Eyebrow ptosis, diplopia, paralysis of lateral rectus oculi muscle, dry eyes.

Generalized Effects: You should know

1. Diffusion to neighbouring tissue.
2. Headache
3. Flu like symptoms
4. Generalized toxicity.⁸

Contraindications: You should know

1. Pregnancy
2. Lactation
3. Neuromuscular diseases such as myasthenia gravis, lambert syndrome.
4. Motor neuron diseases
5. Concurrent usage of amino glycosides and sensitive to toxins.

Limitations: You should know

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.

Disadvantage: You should know

The effects of treatment are for short duration usually six months.

It should be noted that:

1. The injection of botox should not be given before the effect of earlier treatment has worn off completely as this can result in building up of antibodies to botox that will dilute the effect of further treatment.¹⁰
2. The patient should not massage the area after injection, to prevent unwanted diffusion, otherwise patient may resume normal activities immediately.¹¹

Combination of botox and fillers: Commonly in 30s, wrinkles and fine lines develop around the eyes and mouth and upper and lower eyelids begin to sag. Volume loss and muscular hyperactivity are two major components in the aging process that together contribute to the formation of wrinkles.¹² Compared with the middle third and lower third, the upper face experiences less volume loss over time, and many of the telltale signs of aging are related to the development of rhytides. As a result treatment with botulinum toxin in this area generally yields good results.¹³

The treatment of wrinkles and muscular hyperactivity produces a more natural and refined outcome, with dermal fillers volume is restored with botox muscle movement is decreased. Thus the combination of both is a highly effective dual-step approach in reshaping and contouring the face.

Dermal and subcutaneous filler substances like collagen and hyaluronic acid products are used to create a more rounded youthful appearing face. The only contraindication for use of hyaluronidase is in patient with known sensitivity to the medication or any of its

stabilizing components which may be present as a result of compounding of the product.¹⁴

Clinical areas of common combination of botox and fillers treatment

1. Resting glabella folds
2. Brow height adjustment
3. Horizontal forehead lines
4. Resetting facial contours: zygomatic region
5. Resetting facial contours: perioral region
6. Cervical region

Treatment with both modalities together gives an enhanced esthetic benefit for increased longevity of the result.¹²

Soft and hard tissue changes

Soft and hard tissue changes in the mandibular angle was seen after the administration of BoNT-A. The induction of localized masticatory muscle atrophy by BoNT-A injection is known to alter craniofacial growth and development. According to a study evaluation of the effect of BoNT-A on muscular and bony changes in the mandibular angle area in healthy adult human by using 3D CBCT images the pre and post treatment images as well as the groups receiving either single or repeated injection of BoNT-A was done.

In the study two groups were formed:

Group 1: 10 people receiving one injection of BoNTA

Group 2: 10 people receiving two sets of injections of BoNTA with second injection being administered 4 months after the first one.

Exclusion:

1. Noticeable facial asymmetry
2. Severe malocclusion
3. Pregnancy
4. History of any serious medical illness or TMD, and drug allergy.

3D measurements were taken: masseter muscle thickness and cross sectional area were studied.

Width of mandibular angle area and volume to the mandible angle area were focused on.

Results

Soft tissue changes: Masseter muscle thickness and cross sectional area differed statistically significantly before BoNT-A injection and 6 months after injection in both the groups. At all sec levels, group 2 exhibited a more substantial mean decrease than did group 2.

Hard tissue changes: Width and volume of the mandible angle are no statistically significant differences in the width of the mandible. Angle area was observed within either group or between two groups. However, the volume of the mandible angle area decreases statistically significantly after BoNT-A injection in group 2.

Hence if multiple injection the BoNTA into the masseter muscle are planned. The above should be considered.¹⁵

Conclusion

Botox has been highlighted in the field of dentistry since many years. Its popularity among females is very well know but from a long time interest of male patient is also seen. Microdermabrasion and botox treatment are also popular among men whereas fillers substances, liposuction, eyelid surgery, hair transplantation and breast reduction round out the top 10 procedures for male patients.¹⁶ Botox has gained alot of fame and has made its place in cosmetic as well therapeutic fields. Researches are expected to bring about more advancement in the field of dentistry with botox.

References

1. Sarosh F. Dastoor, Carl E. Misch. Botulinum Toxin (BOTOX) To Enhance Facial Macroesthetics: A literature review. *J Oral Implantol* 2007;33(3):164-171.
2. Philip G. Monroy, Dr Marco A.da Fonseca. The use of Botulinum Toxin -A in the treatment of Severe Bruxism in a patient with autism: a case report. *Spec. Care Dentist* 2006;26(1):37-9.
3. Debraj shome, FRCS(GLASGOW). Botulinum Toxin A: Is it really that fragile a molecule? *Dermatol Surg* 2010;36(supp 4):2106-10.
4. Adar. Trindade De Almedia, Leticia cardoso secco. Handling Botulinum Toxins:An updated literature review. *Dermatol Surg* 2011;37(11):1553-65.
5. Bazbek Davlevtov, Mark Bajohrs.Beyond botox:advantages and limitationns of individual botulinum neurotoxins. *Trends in Neurosci* 2005;28(8).
6. Waqas Ullah Khan, Paolo Campisi. Botulinum Toxin A for treatment of Sialorrhea in children. *Arch Otolaryngol Head Neck Surg* 2011;137(4):339-44.
7. C. Sunil Dutt, Pooja Ramnani. Botulinum Toxin in the treatment of muscle specific oro facial pain. A literature review. *J Maxillofac Oral Surg* Publishe online:04 september 2014.
8. Afreen Hoque, Maureen Mc Andrew. Use of Botulinum Toxin In Dentistry. *The New York States Dental Journal*. November 2009.
9. Stefan K. A Indle, Vitomir S. Konstantinovic. The therapeutic use of botulinum toxin in cervical and maxillofacial conditions: an evidence-based review.
10. Mini Jain, Abhishek Bansal. Botox in dentistry: The healing side of a poison. *J Adv Med Dent Sci* 2014;2(1):95-9.
11. Reza Kordestani, Kevin H. Small.Advancements and ferinement in facial neuromodulators. *Plast Reconstr Surg* 2016;138(4):803-06.
12. Kiersten R. Coleman, Jean Carruthers. Combination therapy with Botox and fillers: the new rejuvenation psradigm. *Dermatol Therapy* 19(6):177-88.
13. Michael S.Gart, Karol A. Gutowski. Overview of Botulinum Toxin for Aeshetic Uses. *Clin Plast Surg* 2016;43(3):459-71.
14. Jeanine Harrison, Oriol Rhodes. Hyalurodinase: Understanding its properties and clinical application for cosmetic injection adverse events. *Plast Surg Nurs*. 217;37(3):19-111.
15. Hwa-Jin Lee, Sung-Jin Kim. Repeated injections of botulinum toxin into the masseter muscle induce bony

changes in human adults: A longitudinal study. *Korean J Orthod* 2007;47(4):222-28.

16. Joel schlessinger. Advanced skin research center, Omaha, Nebraska.. Skin care for men and its marketing. *Dermatol Therapy* 2007;20:452-56.