

Botox & Dermal Fillers: Advancing In Dentistry

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Abstract:

The horizons of treatment options are broadening rapidly in esthetic dentistry of using botox and dermal fillers in present days. In this scenario, applications of unconventional treatment options like use of botulinum toxin (BT) and dermal filler are gaining momentum. This review article describes the uses of Botox and dermal filler related use in dentistry and particular in Prosthodontics.

Key Words: Botox, Dermal fillers, Esthetics, Prosthodontics

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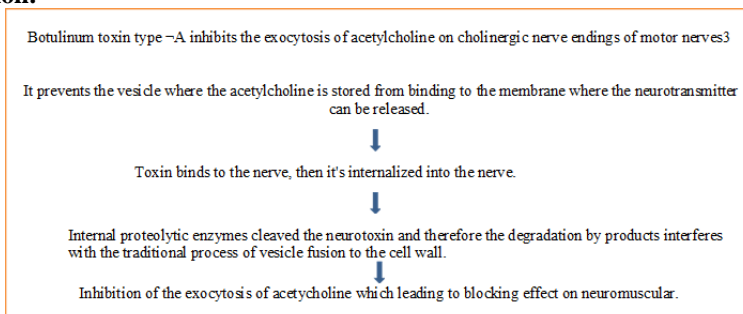
I. Introduction:

The periopthalmic area is one of the first regions of the body to show signs of aging, which include static and dynamic rhytids as well as subcutaneous volume loss. BTX and dermal fillers has used recently and its result of this the rejuvenated and enhancing aesthetic. Botox and dermal filler the first choice to treat wrinkles, forehead creases, frown lines and crow's feet at the corner of the eyes. In the facial esthetics, Botox and dermal fillers are recognized by the dentists and introduced into clinical dentistry as well as in prosthodontics.¹ This review article describes the uses of Botox and dermal filler related use in dentistry and in prosthodontics.

II. History:

The possible therapeutic use for botulinum toxin was first developed by the German physician Justinus Kerner (1786 1862).² Scott et al. proved this fact by experiment done on the monkey to administering the Type A strain. This was approved by the US Food and Drug Administration (FDA) in 1989 under the market name Botox (Allergan, Inc., Irvine, Calif) for treating strabismus, blepharospasm, and hemi facial spasm in patients younger than 12yearold. In the treatment of wry neck botox was approved in 2000 and after 2 years follow up temporary improvement in case of moderate to severe frown line between the glabellar lines. Serotype B has been FDA approved for treating wry neck, and serotype F is under investigation in patients who are resistant or allergy to serotypes A and B.

Mechanism Of Action:



Preparation Of Botox And Dermal Fillers:^{2,4}

In the laboratory Clostridium botulinus is fermented within the form of Botox, which lyses and liberates the toxin into the culture. Then it's collected, purified, crystallized with ammonium sulfate and is mixed with human albumin, lyophilized, bottled in vials & sealed.

Each vial contains 100U of Botox, but the human lethal dose is approximately 3000U. Botox has pH of 4.26.8 and it's stored at or below 5°C. Intraperitoneally when the toxin is injected it having the ability to kill 50% group of 18 to 22g swiss webster mice becomes the one unit. Before use, easily denature via bubbling or agitation therefore diluents with 15ml of saline to the preparation because Botox can should be slowly injected into the inside wall of the vial. This product doesn't require reconstitution and should be stored for 21 months within the refrigerator.

Most injectable dermal fillers are available in disposable plastic syringe and LuerLok fitting, copackage with a sterilized needle gauge appropriate for the filler viscosity. Most commonly deeper the defect, the more viscous the fillers are used, so the depth of the defect determines the depth of injection.

III. Indication And Contraindication

Indication of botox⁵

- Crow's feet and Wrinkle on nose
- Temporomandibular disorders (TMD) cases
- Bruxism and clenching cases
- Facial pain cases including treating trigger points
- Treatment of angular cheilitis
- Gummy smiles
- Orthodontic relapse and depressed orthodontic appearance
- Reducing muscle hyperactivity for retention of removable prosthodontics
- Sialorrhea, oromandibular dystonia, TN
- Peppy chin, Turkey neck and Upper lip ryditis

Contraindication of botox:

- Psychologically unpredictable patients unstable and unrealistic expectation
- Patients who's dependent on intact facial movements and expressions for their livelihood.
- Patients taking medications like aminoglycosides, penicillamine, quinine and calcium blockers.
- Any allergy to any components of Botox Type A or Type B.
- Neuromuscular disorder.
- Pregnant or lactating mothers.

Indication of dermal filler:

- Depressed scars like following surgery or trauma scars.
- Wrinkles on the face and Marionette Lines (Increased Nasolabial fold lines) thanks to aging.
- Lip augmentation.
- Dermal atrophy occurs due various causes e.g. Morphea.
- AIDS Lipoatrophy.

Contraindication of dermal filler:

- When Patients is history with Systemic Lupus erythematosus Collagen based fillers are contraindicated.
- Patients with any previous history with streptococcal disease Hyaluronic acid based fillers are contraindicated because they are derived from Streptococcus species.

Classification:

Types of botox⁶

	OnabotulinumtoxinA	AbobotulinumtoxinA	IncobotulinumtoxinA	RimabotulinumtoxinB
Commercial names	Botox®	Dysport®	Xeomin®	Neurobloc®/Myobloc®
Company	Allergan Inc.	Ipsen	Merz Pharmaceuticals	Solstice Neurosciences Inc.
Units/vial	100/200	300/500	50/100	2500/5000/10,000
Strength (Botulinum toxin A:product)	1:1	1.2-1.4:1	1:1	1.50-1:100
Storage before dilution (in °C)	2-8	2-8	2-8	2-8
Storage after dilution (at 2-8 °C)	24 h	4 h	24 h	4 h
indications	Blepharospasm, cervical dystonia, glabellar lines, hyperhidrosis, urinary incontinence, chronic migraine	Blepharospasm, cervical dystonia, glabellar lines	Blepharospasm, cervical dystonia, glabellar lines	Cervical dystonia

Types of dermal fillers⁷

Dermal fillers		Examples	
Based on origin			
Natural	Zyderm, Fibrel, Restylane.		
Synthetic	Expanded Poly Tetra Fluoro ethylene(EPTFE), Silikon 1000.SIL skin, Bioplastique, Pro fill		
Source			
Autograft	Fat, Dermal graft		
Allograft	Fascian (cadaver), Allo Derm		
Xenograft	Fibroquel (Bovine)		

Based on content	
Collagen	Zyderm, Zyplast, Fibroquel
Fat	Autologous Fat, Frozen Fat, Lipocytic Dermal Augmentation
Hyaluronic acid	Hylaform gel, Hylan, Restylane
Silicone	silikon 1000, Biocell ultra vital, Bio plastique
Peptides	Fibrel

Based on longevity of dermal fillers:

Temporary (Biodegradable) < 1 Year	Semi-Permanent (Biodegradable) 1-2 Years	Permanent (Non-Biodegradable) >2Years
Collagen	CaHA, Calcium Hydroxyapatite	PMMA, Polymethylmethacrylate
Collagen-Human	DEAE-Sephadex(Dextran)	PAAG, Polyacrylamide Gel
Collagen-Porcine	PLLA Poly-L-Lactic acid	Polyalkylimide
Hyaluronic acid-avian	PVA Poly Vinyl Alcohol	LIS-Silicon (Polydimethylsiloxane oil)
Hyaluronic acid-Bacterial	Chitosan HEMA Hydroxyethylmethacrylate Cultured Human fibroblasts	

FDA approved dermal fillers:

Material	Site of Placement	Longevity	Injection Techniques
Artefill	Reticular Dermis	2 Years	Layered, Tunneling technique
Zyderm I X II Zyplast	Dermis	2-4 Months	Serial Puncture, Threading
Hyaluronic acid			
Restylane	Mid Dermis	6-8 Months	Threading
Perlane	Deep Dermis	6-8 Months	Threading and Serial Puncture
Hylaform/ Hylaform Plus	Mid Dermis	4 Months	Serial Puncture, Threading
Captique	Mid Dermis	4 Months	Serial Puncture, Threading
Autografts			
Autologous Fat	subcutis	>1 year	Serial Puncture, Cross Hatching
Autologous Collagen	Mid Dermis Upper Dermis	>18 Months	Threading
Synthetic Materials			
Polytetrafluoroethylene	Subcutis	Permanent	Threading
Silicone	Deep Dermis and Subcutis	Permanent	Threading
Sculptra	Deep Dermis	1-2 Years	Threading

Dermal fillers:

1. Absorbable (Temporary)
2. Non- absorbable (Permenant)

Absorbable (Temporary) dermal filler:

1. **Collagen:** Type of protein that is a major part of skin and other tissues in the body. It is purified collagen. Made from cow (bovine) or human cells. The effects remaining for 3-4 months. This are shortest lasting filler materials. Used in soft tissue fillers.

2. **Hyaluronic acid:** Restylane was the first take approval by the FDA (in December 2003) for the correction of moderate to severe facial wrinkles and folds, such as nasolabial folds. The effect is remained for 6-12 months.
3. **Calcium hydroxyapatite:** Type of mineral. Commonly found in human teeth and bones. Calcium hydroxyapatite particles available in a gel-like solution and then injected into the wrinkle in the face. The effects of this material remain for 18 months.
4. **Poly L- lactic acid (PLLA):** Sculptra provides a **semi-permanent correction**. FDA was approved in 2004 for use in **HIV facial lipoatrophy**. The PLLA particles are suspended in a **sodium oxymethylcellulose carrier**. PLLA is a **biodegradable, biocompatible synthetic polymer**. PLLA is given in a series of injections over a period of several months because of this is a **long-lasting filler material**. The effects may remain up **to 2 years**

Non- absorbable (Permanent)

1. **Polymethylmethacrylate bead (PMMA microspheres):** PMMA is a non-biodegradable, biocompatible, synthetic polymer. PMMA beads are tiny, round, smooth particles. PMMA are not absorbed by the body. PMMA beads are imposed in a gel-like solution. PMMA made up of cow (bovine) collagen and injected into the face.

Injection Techniques⁸

Four injection technique are described:

1. Serial puncture,
2. Linear threading,
3. Fanning and
4. Cross-hatching

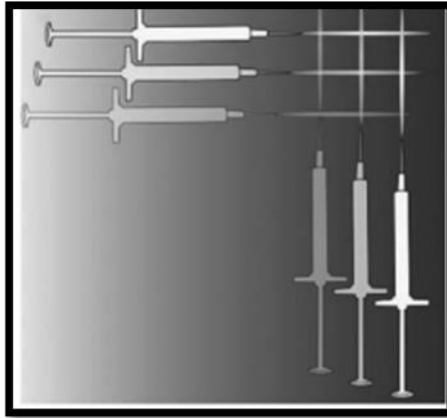
1. **Serial puncture:** Also known as the droplet, serial, multi-puncture technique. Involves the injection of sever small droplets of filler into deeper layers of the outer skin. Serial puncture technique **is** useful for acne scarring, shallow forehead rhytids, the glabella, philtrum enhancement and nonsurgical rhinoplasty.



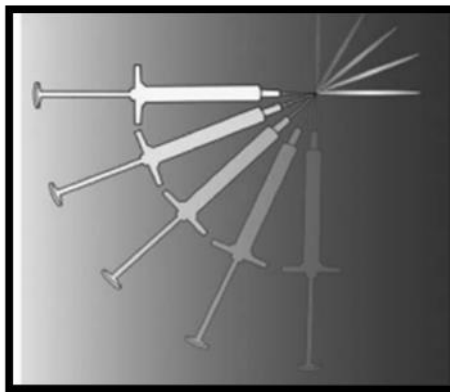
2. **Linear threading:** Vermiliocutaneous borders and nasolabial folds are ideal sites. Inserting the full length of the needle into the middle of the fold and make a channel and then filling with dermal fillers. Needle withdrawn in retrograde position. In liner threading, a tunnel of filler is formed because the needle is withdrawn during injected to efface the wrinkle. Commonly used. Most commonly used for nasolabial folds or marionette lines.



3. **Cross-hatching:** Especially effective for filling the oral commissures. This technique the cross-thread lines should be carefully marked. This technique same like linear threading injection technique. Used in large area corrections are required.



4. Fanning: This technique is similar to linear injection technique immediately before the needle is withdrawn, its direction is changed and a new line is injected. Best for deep malar injections.



Used In Dentistry⁹

- 1. Facial Aesthetics:** Botox used with dermal fillers injection to enhance facial aesthetics by increasing the volume around the mouth. Used with nasolabial folds, marionette lines, creating smile lines and lip-line.
- 2. Correction of lip deformity:** Botox along with dermal fillers are also used to correct lip deformities where there is sagging of the lip on one side.
- 3. Oral Surgery:** in the treatment of zygomatic fracture fixation surgery injected 100 U of botulinum toxin Type A.
- 4. Toothache:** muscle pain from anterior temporalis is referred to the teeth. Botox toxin Type A can be used to differentiate to if the toothache is from the pulpal or muscular origin, so use of Botox is both diagnostic as well as prophylactic
- 5. Orthodontic considerations of Botox:** in case of relapse of orthodontic treatment in patients due to stronger mentalis muscle activity Botox can used for prevent of this. Botox also used for reduces the intensity of the muscle post treatment and facilitating the muscle training to a more physiologic movement.
- 6. Sialorrhea:** Botox Type A blocks the cholinergic parasympathetic secretomotor fibers of the salivary gland. It is also used in the treatment of acute post parotidectomy salivary fistula, Frey syndrome and achalasia, mucocoeles and Ranula. Most commonly Type A botox injection is used.
- 7. Trigeminal Neuralgia:** blocks the nerve impulses that trigger contractions and relax the overactive muscles further relieving the pain which are due TN, Botox injected into the pericranial muscles. 25-75 U of botox is used.

Prosthetic Applications:

- 1. Removable prosthodontics:** to help stabilize the dentures use numbers of implant placement but all patients are not always affording implant therapy or some are not suitable candidates for the therapy. Some patients having hyperactive muscles, making it difficult to retain and stabilized their dentures in their mouths. With the use of BTX in these cases, botox reduce the activity of muscle.
- 2. Treatment of Black Triangles:** to increase the tissue volume by puffing up the tissue and close the black triangles dermal fillers are injected into the interdental papilla between the teeth or implant.

3. **Facial Aesthetics:** to enhance facial aesthetics by increasing the volume around the mouth such as the nasolabial folds, marionette lines, creating smile lines and lip-line Botox injection along with dermal fillers are used.
4. **Dental Implants:** increased pressure or loading on the muscles of mastication, did interfere with the Osseo integration around the dental implants. Without any interferes in dental implants osseointegration injecting Botox Type A to the masticatory muscles to reducing the activity of muscle.
5. **Bruxism:** Van Zandijcke and Marchau (1990) injected 100 U of a botulinum toxin Type A injection into the masseter and temporalis muscle after which severe bruxism symptoms were reduced. Ivanhoe et al (1997) injected 200 U of botox injection into the masseter muscle and appreciated a therapeutic response after 19 weeks.
6. **Prosthetic considerations:** Botox is used in cases of long history of edentulousness and a decreased vertical dimension.
7. **Oromandibular Dystonia:** on injecting Botox A into the masseter and submental complex reported the improvement of OMD, chewing and swallowing function which Studies done by Brin, Hermanowicz, Jankovic Tan and Laskawi.

IV. Conclusion:

Botox and dermal filler have important clinical uses as an adjunct therapy in clinical esthetic dentistry as well as in prosthodontics therapy. Botox is also used to complement aesthetic as a minimally invasive alternative to surgically treating high lip line cases for complete denture patients who have trouble adjusting to new dentures, gummy smiles, lip augmentation and also retraining of facial muscles. Botulinum toxin has no doubt broadened the horizon of prosthodontics and is persuading dentists all over the world to bring it into their clinical practices.

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