

Not so gummy smile with botox

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Abstract

Botox is widely used in dentistry these days. The use of botox in enhancing the facial features and treating ailments is very popular among dentists. The use of botulinum toxin in treatment of gummy smile in adjunct with surgery and without surgery is reflected in the given article. The use of botox and adverse effects of the treatment has been discussed.

Keywords: Botox gummy smile treatment adverse effects.

Introduction

Dentistry has been a field of just more than cure to ailments since long now. It has extended the boundaries in the vicinity of prosthesis and cosmetics too besides maintaining oral health. Cosmetic dentistry is a flourishing side of the profession nowadays. Few of the procedures in limelight are composite bonding, dental veneers, teeth whitening, dental crowns, dental implants, botox, facelift, PRP and gummy smile. This article will reflect on the use of botox for treatment of gummy smiles.

What is botox

Botulinum toxin (BTX) is a neurotoxic protein produced by the bacterium *Clostridium botulinum* and related species.¹ German physician Dr Justinus Kerner (1786-1862) was the first to create and develop botox. Burgen (1949) was the first who discovered the ability of toxin to block neuromuscular transmission. There are seven types of BTX.² BTX-A is the most potent and commonly used obtained by fermentation of *Clostridium botulinum*.

Type A(botox, dysport, xeomin), type B(myobloc). Each vial contains: 100 units of clostridium botulinum type A neurotoxin complex, 0.5mg of human albumin, 0.9mg of NaCl in a sterile, vacuum dried form without a preservative.³

Mechanism

BTX-X blocks neuromuscular transmission by binding to the acceptor site on motor or sympathetic nerve terminals, thus inhibiting the release of acetylcholine. This blocks SNAP-25 (responsible for acetylcholine). In therapeutic dose partial chemical denervation of muscle results in decreased muscle activity.⁴

Uses in dentistry

Botox in dentistry has been put in use for the treatment of bruxism,⁵ sialorrhea, masseteric hypertrophy, temporomandibular disorder, hemifacial spasm, temporomandibular dislocation,⁶ facial pain cases including treating trigger points.

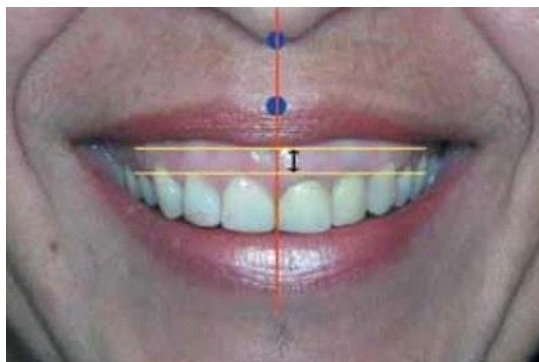
Gummy Smile



Smile is the most recognized expression, used to convey to our fellow human beings a sense of compassion and understanding. The smile may well be the cornerstone of social interaction.

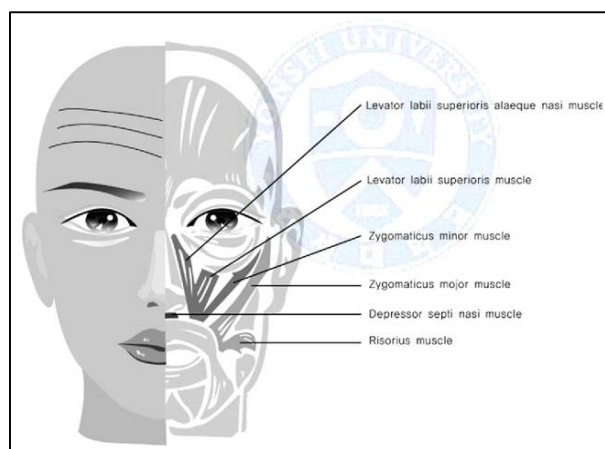
Goldstein classified the smile line (consisting of the lower edge of the upper lip during the smile) according to the degree of exposure of the teeth and gums into 3 types: high, medium and low. Gingival smile can be classified by etiology into soft tissue, dentoalveolar and skeletal types.⁷

Gingival display is defined as the difference between the lower margin of upper lip and superior margin of upper incisor.⁸



Muscles involved in smiling: levator labii superioris alaeque nasi, levator labii superioris, zygomaticus minor, zygomaticus major, risorius, depressor septi nasi. These muscles interact with orbicularis oris.⁹

Anatomy and function



Levator labii superioris alaeque nasi (LLSN)- originates in the frontal process of maxilla and divides into two fascicles that inserts into the cartilage and skin of the nasal ala and upper lip. It dilates the nostrils and raise the upper lip.¹⁰

Levator labii superioris (LLS)- is a three-part muscle useful for facial expression and dilation of the

mouth. It runs down alongside the lateral aspect of the nose. Its primary function is in raising the upper lip.

Zygomaticus minor(zm)-originates from lower surface of zygomatic bone and inserts into the lateral part of upper lip.

Zygomaticus major(ZM) -originates from the upper lateral surface of zygomatic bone and inserts into the skin at the angle of the corner of the mouth.

ZM and zm contraction causes elevation and lateralization of lateral portion of upper lip. This has a crucial role in smile, speech and chewing.

Others include risorius, depressor septi nasi. These muscles interact with orbicularis oris.

Rubin classification of smile:¹¹

MonaLisa smile- labial commissures are displayed upwards through the action of zygomatic major muscle.

Canine smile- upper lip elevated in uniform fashion.

Complex smile- lower lip moves inferiorly exposing the lower incisors.

Etiology of gummy smile

Gummy smile can result by:

Contractibility or excessive muscle contraction, hyperfunctional upper lip elevator muscle.¹²

Diminished vertical dimension or length of the upper lip along it's midline portion (philtrum).

Delayed passive dental eruption or gingival hypertrophy.

Diagnosis

When the gingival display during smiling is more than 2-3mm the smile is considered gummy smile. Following are the factors to be considered in diagnosis of gummy smile:¹³

Interlabial distance at rest- There is no direct relationship between gummy smile and amount of interlabial space at rest. Though believed that patient with normal upper lip and reduced interlabial space can be present with excessive gingival display on smiling. When interlabial space at rest is normal (1-3mm), gingival smile is considered to be of muscular origin.¹⁴

Upper incisor exposure during rest and speech- When lips at rest amounts of exposure of upper incisor is approximately 2 to 4.5mm in women and 1 to 3mm in men. This is directly related to youthful appearance on smiling.

Smile arc- It should be parallel to superior margin of lower lip. Women's smile feature follow a sharper curvature, whilst in men curvature is more flat.

Width/length ratio of maxillary incisor- "gold standard" determines that the width of maxillary incisor should be approximately 80 percent of it's length with variations between 65 percent and 85 percent. Where as for upper lateral incisor the ratio should be 70 percent.

Morphofunctional characteristics of the upper lip Include length, thickness and insertion direction and contraction of various lip related muscle fibers. Average value for men's upper lip is 24mm and for women 20mm.

Probing depth- Gingival margin to the base of gingival sulcus.¹⁵

Frenal attachment, overjet, overbite, space of teeth, vertical limit of smile are other considerations.

Radiographic- Bone level, anterior protrusion of maxilla, excessive vertical maxilla are to be focused at.

Treatment

Extraoral¹⁶ etiology of gummy smile can include vertical maxillary excess¹⁷ (long face syndrome), hypermobile upper lip or short upper lip.

Surgical procedures to be considered for the treatment of gummy smile-Lefort osteotomy, crown lengthening, maxillary incisor intrusion, microimplants, headgears, self curing silicone implant, injection at anterior nasal spine with mycetomy. Since there is no decrease in hyperactivity of muscles and hence non surgical treatment is desirable.

A) Technique

Incision at the mucogingival junction.

Exposure of submucosa after epithelial discard

Excised mucosal strip

Stability with sutures

Botox after 2 weeks intramuscularly.¹⁸ (Males have larger muscle volume and require more unit of botox to achieve the same result as female patient).



Contraindication to mucosal repositioning flap - Presence of minimal zone of attached gingiva which can create difficulties in flap design, stabilization, suturing and severe vertical maxillary excess.¹⁹

Mucosal repositioned flap aims to reduce gingival display by shortening the vestibular depth and botox aims to the neuromuscular correction and slight relapse of surgical procedures.

B). Ellenbogen reported that resection of the levator labii superioris is short lived with gummy smile returning within 6 months. He advocated placing a spacer, either nasal cartilage or prosthetic material, between the stumps to prevent the muscles from being reunited and again elevating the lips.²⁰

Miskinyar pointed out possible disadvantage with spacer technique- migration of the spacer to an undesired site and the muscle ends reuniting rejection of a foreign body (in case of prosthetic spacer) and need for a second surgical procedure if nasal cartilage is used.

Rees and Latrenta suggested camouflage procedure through the columella, whereby a subperiosteal dissection of the upper lip elevation was performed.

Botulinum toxic A is used frequently for the temporary correction of perioral rhytids, care to be taken when injecting the anatomical areas in patient with hypotonic, flaccid lips to avoid further muscle weakening and an unaesthetic smile cause of excessive soft tissue covering the smile line.

Gingival display as minimal as 1mm which were uncomfortable for the patient has been successfully treated.²¹

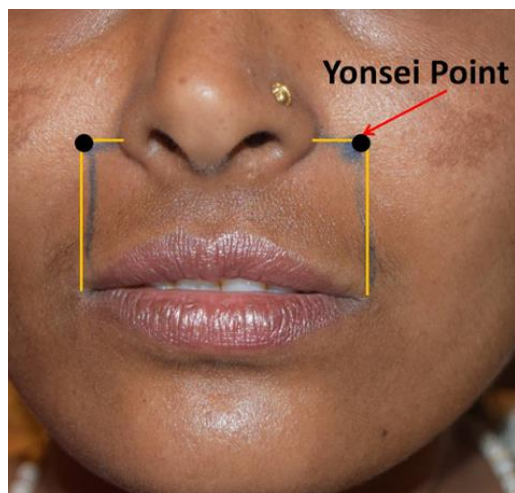
Role of botox



In 2002 FDA approved Allergan's botox cosmetic for the purpose of temporarily erasing facial lines.²²

Anatomical points for botox injection may include:

Yonse point- Approximate and effective point of intramuscular botox injection where elevator lip muscle passes by is called yonse point (The center of triangle formed by LLSN, LLS, zm)²³



Lateral portion of ala²⁴ midpoint of nasal labial fold between ala and commissure maxillary point locate at arc quarter distance between ala and tragus soft tissue subnasale commissures soft tissue pogonion lateral chin point located 2cm loacted to pogonion (right and left).

Type A (botox, dysport, xeomin, prosigine)²⁵ and Type B(monobloc, neuroblock) are mostly used in dentistry.²⁶ Different efficacies of type A botulinum toxin have been reported with a resultant conversion ratio of 1:2.5 to 4 between botox (allergan) and dysport (Beaufour Ipsen Biotech). Dysport showed greater efficacy and longer duration of effect but with an increased possibility of side effect.

Approach taken for the treatment of anterior, posterior and mixed gingival smile.²⁷ Prepare the area by using topical anaesthesia cream- lidocaine +

prilocaine.

Needle- 0.3ml syringe, 31 gauge, 8mm needle

Site- subcutaneous tissue.

For anterior gummy smile- Botox injection on each side of nasolabial fold, 1cm lateral and below the nasal ala to relax LLSAN muscles.

For posterior gummy smile- Injection in malar region, following a lateral and superior path (coressponding to the path of zm and ZM). The first point located in nasolabial folad at the greatest lateral contraction during the smile and other point at the level of tragus. 2.5IU of abobotulinumtoxin A.

For mixed gummy smile- Treatment of (anterior + posterior) gummy smile. Though in nasal ala region the quantity of toxin inected will be reduced to 50 percent.

Contraindication

Pregnant or lactating women, neuromuscular patients, patients on calcium channel blockers, cyclosporine, aminoglycosides, hypersensitivity history to botox.²⁸

Durability



Factors such as proper injection of the toxin into the muscle, solution concentration,²⁹ individual susceptibility and metabolic variations may influence the longevity of BTX-A effects. Patients with oily skin and acne may not achieve considerable results and may require more aggressive treatment. Patient with age more than 65 years of age show reduce treatment response.³⁰ The treatment in general lasts for 4-6 months (from 1 - 2 weeks). Several injection can prolong the effect. Though prolonged muscle atrophy and permanent decrease in contraction ability, even after disappearance of toxin effect may be seen. It is important to not give injection before it's effect has completely faded to avoid

the formation of antibody against the toxins, leading to disappointing results later on.³¹ There is decrease gum exposure even after the effect of botox has declined. This fact is explained by the decrease in muscle strength that is likely to occur after several consecutive application of botox for any indication, which produces long term muscle relaxation.

Precaution Advised

Patients are asked not to lie down, do exercise or massage the injected area during first four hours of procedures.³²

Adverse Effect

Improper injection technique can lead to asymmetrical appearance of a smile. Difficulty in speech, chewing or drinking. Over administration can lead to drooping or ptosis of lips below gingival margin causing obstruction of visible teeth or full smile.³³

Adverse effects common at the site of injection include dry mouth, dysphonia, transient muscle paralysis, headache, urticaria and nausea.³⁴

Conclusion

In April 2009 Dr. Michael Lewis an experimental psychologist at Cardiff University Wales found that patient who have their frown lines treated with botox tend to be happier. It would appear that our emotions are reinforced.³⁵ Perhaps even driven by our corresponding facial expressions and that decreasing our ability to scowl or frown results in a more positive mood. Stress and depression can reduce the immune system and facilitate chronic inflammation, mediated through the hypothalamic-pituitary-adrenal axis (cortisol). Botox influence on depression may affect the health of periodontium.

Botox does not only give promising results therapeutically but also leads to increase in self esteem by improving appearance.

Source of Funding

None.

Conflict of Interest

None.

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