

# Cosmetic Application of Botulinum in the Maxillofacial region

By Dr Mehvish Khan

Over the past decade, a growing number of dentists in Ireland have begun providing facial cosmetic procedures to their clients. Dentists are thoroughly trained in the anatomy of the face and neck, which make them ideal practitioners to provide injectable treatments as a useful adjunct to their maxillofacial dental treatments (Srivastava et al., 2015).

One of the most requested cosmetic injectable procedures is treatment with botulinum toxin type A (BoNTA) (Jaspers et al., 2011).



Credit: <https://www.tooth-doctor.com/benefits-receiving-botox-fillers-dentist/>

**BOTULINUM TOXIN (BTX)** is produced by the bacterium *Clostridium botulinum*. There are many forms of this neurotoxin, ranging from type A through G, with type A (BTX-A) being the most commonly used for therapeutic reasons (Srivastava et al., 2015).

Botulinum toxin A (BTA), AKA “Botox” works by inhibiting the release of acetylcholine at the neuromuscular junction. Normally, acetylcholine diffuses across the synaptic cleft at the neuromuscular junction to bind acetylcholine receptors on the motor end plate of the muscle cell. The binding of acetylcholine to its receptors initiates the opening of sodium and potassium ion channels causing depolarization of the motor end plate and, ultimately, resulting in a transient dose-

dependent weakening of muscle activity (Hoque and McAndrew, 2009).

However, the neuromuscular transmission is re-established by sprouting of new axonal terminals and, therefore, the blockade is temporary. Thus, treatment with botulinum is actually a palliative approach rather than a curative option (Srivastava et al., 2015).

Through the inhibition of this mechanism, BT offers a transient, reversible, relatively safe treatment option to many conditions of interest to a dental practitioner who wish to broaden the treatment options they offer to their client for otherwise refractory conditions or invasive protocols (Srivastava et al., 2015).

BT has found widespread applications even beyond the FDA accepted uses. Of interest to this article are applications of BTA in the head and neck region.

The uses of BTA in maxillofacial can be broadly divided into cosmetic and therapeutic applications and outlined below are the common cosmetic applications of BTA for the interest of dental practitioners.

## Cosmetic applications of BTA for the Maxillofacial region

### I. Facial wrinkles

BTA has been most commonly accepted for treating facial lines that are caused by overactive facial muscle activity.

Forehead rhytids are managed by injecting BTA into the Frontalis 2-3 cm above the orbital rim to reduce chances of brow ptosis. The pattern of injection, BT quantity per injection and the number of injection points greatly vary depending on the client. It is important to assess brow position, and eyelid laxity before

injecting as BT injections in the forehead will to some degree affect the ability to lift the eyebrows when it is performed without treating the Glabellar and the Obicularis Oculi.



Expression lines	Muscle	Action
Frown lines	Corrugator supercilii	Eyebrows drawn medially
	Procerus and depressor supercilii	Eyebrow depressors
Horizontal forehead lines	Frontalis	Eyebrow levator
Crow's feet	Lateral orbicularis oculi	Lateral eyebrow depressor
Eyebrow lift	Superior lateral orbicularis oculi	Superior lateral eyebrow depressor
Bunny lines	Nasalis	Nose drawn up and medially
Radial lip lines	Orbicularis oris	Lip puckering
Marionette lines and downturned smile	Depressor anguli oris	Corner of mouth depressor
Gummy smile and nasolabial fold	Levator labii superioris alaeque nasi	Central lip levator
Chin line and pebbly chin	Mentalis	Chin texture and lower lip levator

Key: orange = depressor muscles; purple = levator muscles; gray = sphincteric muscles.

Credit:

<https://www.pinterest.ie/pin/45669383704956947/?autologin=true>

Not everyone with forehead lines is a candidate for Botox, as it may cause brow ptosis and obstruct one's vision.

It is advised to use lower doses to begin with and inject as high above the brow as possible in correspondence to the forehead lines.

Glabellar lines (frown lines) are usually treated 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).

This treatment is paired nicely with the treatment of the frontalis, as when the muscles of the frown are relaxed, it helps to lift the medial eyebrow to counteract the inactivity of the frontalis.

Lateral canthal lines known as "crow's feet" (due to lateral orbicularis oculi) are simply treated by injecting BT into 3 sites of the lateral orbicularis oculi about 1cm away from the orbital rim. An extra site, below the lateral eyebrows and above the superior injection point for crow's feet treatment, can also be injected to counteract the drop of the lateral eyebrow due to BT treatment of the frontalis. Without treating the Frontalis, BT injections to these 4 points can result in an eyebrow lift.

Perioral lines, also known as the "smokers wrinkles" are injected superficially at 4-6 points above the vermillion border of the lips, sparing the corners of the mouth so as to avoid drooping of the corners. This Treatment is also termed the "Lip Flip" treatment as it also serves to evert the lips in those clients whose lips invert when they smile, giving more lip fullness.

A side effect of these injections is difficulty in creating a lip pout and pronouncing "b", "p",

“m” and therefore, these injections are avoided in public speakers, singers, teachers or someone who play a musical instrument with their mouth. The Dosage for these injections are very low in order to achieve a reduction in the muscle contraction whilst still maintain oral function.

Wrinkles on neck (due to platysma muscle) can be managed by injecting superficially into six injection points evenly distributed along the jawline.

Chin Dimpling due to a hyperactive mentalis muscle can be easily treated with BT injections into the pair of muscles. However, as a result, the muscles of the corners of the mouth (Depressor Angular Oris) can become hyperactive and cause a subsequent greater pull down of the corners of the mouth. Therefore, it is advised to treat these muscles as well with small amounts of Botox. This can be treated performed on its own for those who display a “Sad Mouth” and express that others always tell them that they look sad or they find in pictures that they look sad. This treatment is also great in combination with marionette lines filler to enhance results.

## II. The Gummy smile

More than 2mm of exposed gingiva is classed as a gummy smile and has many etiological factors, including altered passive eruption of teeth, dentoalveolar extrusion, or hyperactive upper lip muscles 4. The latter can be treated with BT injections into the “Yonsei point”, proposed by Woo-Sang Hwang. The point is located at the centre of the triangle formed by three lip elevator muscles; the Levator Labii Superioris, the Levator Labii Superioris alaeque nasi and the zygomaticus minor (Hwang et al., 2009).

Even though this treatment is temporary, it is life changing for the client as it can boost their self-esteem with an affordable and simple procedure without any downtime.

BT injections to the lip elevator muscles or the Lip Depressor muscles, can rectify an Asymmetric smile in a patient who presents with the concern. It is important to examine the patients smile closely to determine initially which muscles are responsible for the asymmetry and then strategically injecting the BT units as the right place otherwise the result may be a worsened asymmetry.

## III. Temporalis and masseter muscle hypertrophy

Chronic clenching of the jaws can result in hypertrophy of the temporalis and the masseter muscles. The jaws can appear swollen and misshapen ( Nayyar et al. 2014). Previous treatments have entailed surgical removal of the medial bulk of the muscle by an extraoral or intra-oral approach. Disadvantages of this treatment include risks associated with general anesthesia, postoperative haemorrhage, oedema, hematoma, infection, scarring and facial nerve damage (Hoque and McAndrew, 2009).

The results of BT use in these cases are safe and effective in treating chronic facial pain and headaches associated with masticatory hyperactivity. The Injection sites are recognised by palpation when the patient clenches their jaw muscles, and BT is injected into the bulk of the muscle at 3 points on either side (Srivastava et al., 2015).

The reduced activity of the masseter muscles over time, results in a reduction in the masseter size, making the face more aesthetically pleasing for the patient as well as therapeutic as this treatment can also be carried out to reduce the pain and teeth grinding associated with jaw clenching

(Nayyar et al. 2014).

Masseteric hypertrophy refers to the enlargement of the masseter muscles. There is a bilateral or unilateral painless swelling of these.



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## Conclusion

BT may serve as a valuable addition to a dental practitioners treatment portfolio. The training that dentists undertake and their knowledge encompasses all of the head and neck, making them proficient than other healthcare professionals for delivering Botulinum Toxin Injections to the Maxillofacial region. With the appropriate BT training, dentists can offer a simple, yet valuable treatment option that may complement their existing dental treatment portfolio and benefit their patients greatly.

## References

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