



The use of Botox to treat glabellar rhytids

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The benefits of Botox have been well-known to the otolaryngologist and facial plastic surgeon for many years. Botox has been used to temporarily treat vocal cord movement disorders, such as adductor and abductor spasmodic dysphonias. The use of Botox to treat facial rhytids has been used for several years, which provides the physician with a nonsurgical option [1–4]. On April 15, 2002, the U.S. Food and Drug Administration (FDA) approved the glabellar region for Botox use and it remains the only site approved for cosmetic application. This allowed the manufacturer to further disseminate the information to the public by creating a great deal of media attention, which has caused Botox to take the cosmetic industry by storm. Botox is an attractive option for physicians and patients because of the quick and natural improvement with little risk. The safety and convenience of chemical denervation, combined with the fee for service income that is generated, has caused many physicians to incorporate Botox into their practice. One of the most popular areas for which patients request treatment is the wrinkled, glabellar region [5]. Botox is used in combination with other treatment modalities to improve results [6]. Caution needs to be advised to the inexperienced physician, however. Botox injections are not technically difficult to master, but there are essential prerequisites that need to be learned before expecting consistently acceptable results. Important issues include a complete understanding of Botox effects, evaluation of a patient's underlying anatomy, and developing a proper diagnosis.

Anatomy of the glabellar region

The vertical creases that are located between the eyebrows may give the false impression of anger or an aggressive demeanor. The glabella is one of the first areas of the face to reveal early aging. The paired corrugator supercilii muscles or Coiter's muscles, are primarily responsible for causing these furrows (Fig. 1). The corrugator supercilii muscle is a small, narrow, pyramidal muscle at the inner extremity of the eyebrow. The origin is the nasal prominence and the orbicularis oculi and the fibers pass upwards and laterally to insert into the deep surface of the skin. The insertion into the skin is variable and must be considered when planning Botox injections. Lack of a proper understanding of this variability can lead to inadequate muscle denervation. The innervation is from the seventh cranial nerve. The corrugator supercilii draws the eyebrows downward and inward, which produces vertical wrinkles in the glabellar region.

The glabellar region also contains structures that can produce horizontal rhytids. The main structure known to cause this is the procerus muscle (Fig. 2). The pyramidalis nasi, or procerus muscle, is a thin sheath of muscle that is located over the nasal bone between the eyes. Its origin is with the fascia that covers the lower part of the nasal bone and the insertion is into the frontalis portion of the occipitofrontalis muscle and the skin over the lower part of the forehead between the two eyebrows. It is innervated by branches of the facial nerve. The muscle draws the eyebrows down and together causing wrinkles across the bridge of the nose. It is used when expressing anger or pain or when frowning or concentrating. When treating the glabellar region, it is important that this muscle is treated as well to produce a maximum effect.

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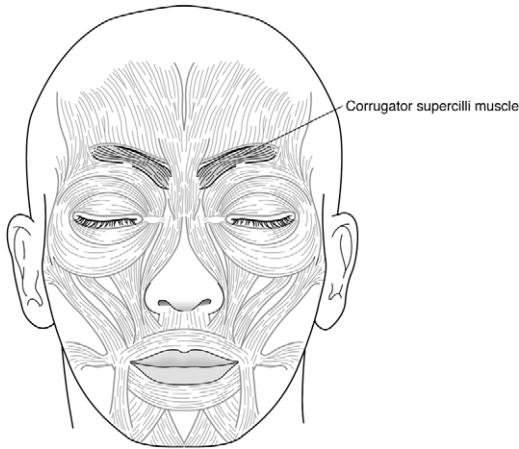


Fig. 1. Drawing depicting the corrugator supercillii muscles.

Three to five days following a Botox treatment in this area, most patients report a natural improvement in their appearance. They feel as if they look more pleasant, rested, and amiable. They note that acquaintances and friends mention an improvement in their appearance, but are puzzled about the reason.

Pretreatment evaluation and diagnosis

The glabellar creases are best evaluated with the patient at rest followed by frowning or “squeezing their eyebrows together” (Figs. 3, 4). The corrugator

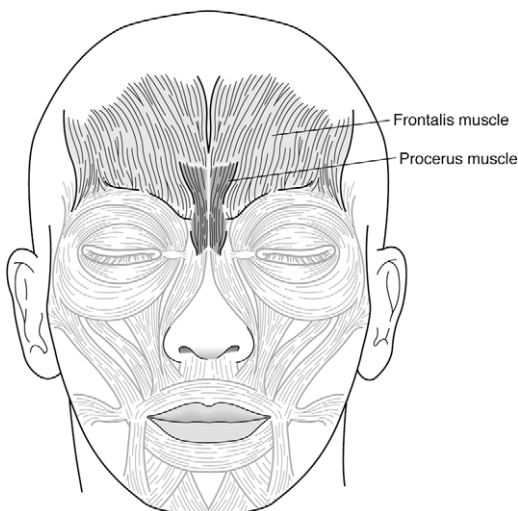


Fig. 2. Drawing depicting the procerus and inferior aspect of the frontalis muscles.



Fig. 3. Patient at rest. (See also [Color Plate 1](#).)

muscle bellies are palpated as the patient is in motion. This will help to determine the location, size, and power of the muscles, in addition, to what extent they are contributing to the vertical creases. It is important to evaluate the superior-medial orbicularis muscles, which may contribute to the deep creases (Fig. 5). The procerus muscle is palpated and examined at rest and in motion. Contraction of the procerus contributes to the horizontal creases that are located over the root of the nose (Fig. 6).

Proper evaluation of the brow position is imperative to obtaining an acceptable outcome in the upper one third of the face. The generally recognized ideal brow position in a female is a high-arched brow above the superior orbital rim. The apex of the arch is located on a vertical tangent above the lateral limbus. Additionally, the tail of the brow should lie on a horizontal plane 1 mm to 2 mm above the medial brow head. In the male patient, the brow is more laterally directed with less of an apex. It is positioned lower on the forehead approximately at the level of the superior orbital rim [7].

The upper eyelids are also evaluated for asymmetry or ptosis. This may need to be demonstrated to the unaware patient. The position and symmetry of the



Fig. 4. Patient frowning, revealing glabellar rhytids. (See also [Color Plate 2](#).)



Fig. 5. Patient showing additional muscle activity that can lead to rhytids. (See also [Color Plate 3](#).)

brows and eyelids will affect the technique that is used during the treatment of the glabellar creases.

Procedure, risks, and complications of treating glabellar creases

To effectively treat the glabellar creases, Botox must be taken up by the muscles that are responsible for the rhytids. The recommended dose of five to ten units is placed into each corrugator and three units into the procerus muscle. Women with prominent corrugator activity, as well as men, tend to require a higher dose to achieve a comparable result.

Patients who are noted to have an appropriate brow position during pretreatment assessment also receive three units 1 cm above the orbital rim in the midpupillary line. The underlying orbicularis muscle's contribution to the glabellar crease can be clearly defined when the patient "squeezes their eyebrows together."



Fig. 6. Example of the horizontal crease located at the root of the nose. (See also [Color Plate 4](#).)

Care is taken when injecting to remain at least 1 cm above the brow, lateral to the midpupillary line. Injection closer to the brow may increase the risk for Botox migration into the orbit and denervation of the levator palpebral muscle which can cause undesirable eyelid ptosis. Additionally, if a patient has low set brows, the injections may lead to mild brow ptosis and a flat, unattractive brow appearance. Generally, males start out with a lower, more flattened brow position than females, and to prevent an aggressive appearance, conservative doses above the brow are used. To achieve a complete reduction in the glabellar creases often requires an amount and placement of Botox that will also result in a drop in the brow position. Therefore, men and women who have low set brows are treated above the brow cautiously. They are counseled that if complete reduction of the glabellar creases is the goal, it may result in a slight brow ptosis. Some are agreeable to this result, preferring a smooth glabellar region.

Eyelid ptosis is the most feared and discussed complication of Botox injections. According to the manufacturer's insert, the risk of eyelid ptosis is about 3% although this has not been our experience [8]. Eyelid ptosis should be rare with proper technique and diagnosis. By avoiding the area just above the brow at midpupillary line, ptosis of the eyelid is unlikely (Fig. 7) [9].

If eyelid ptosis occurs, it presents within 2 to 3 days of the treatment. Often a patient may become concerned when they notice a slight eyelid asymmetry within the first week after the treatment. The condition usually resolves over the first week as the Botox takes effect. A true eyelid ptosis may take from 2 weeks to 3 months for resolution. The patient's face will appear asymmetric and s/he will most likely be disappointed

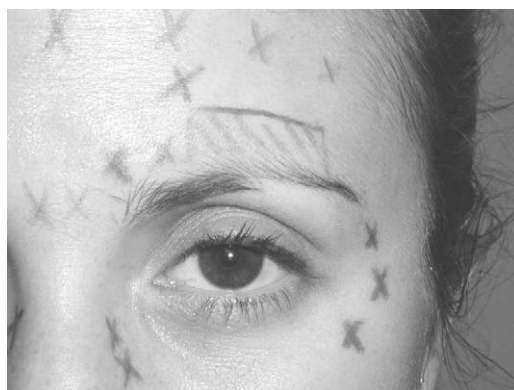


Fig. 7. Patient with the "danger zone" marked above the brow. (See also [Color Plate 5](#).)

with the outcome. Continued reassurance that the ptosis will completely resolve is necessary. If the patient cannot resume their lifestyle or is insistent on a treatment plan, options are available. Topical alpha adermegics such as aproclonidine (Iopidine by Alcon, Fortworth, TX) and naphazoloine (Naphcon by Alcon) will directly stimulate Mueller's muscle (a sympatommimetic muscle of the upper eyelid) and provide approximately 2 mm elevation of the eyelid. Unfortunately, this may not be cosmetically significant.

Summary

Many areas of the face benefit from Botox. The deep vertical and horizontal creases between the eyebrows or glabellar area are the best known to cosmetically improve with Botox injections. As with almost any cosmetic procedure, adequate evaluation and preoperative assessment can lead to a good outcome and a satisfied patient.

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