Evaluation of the patient for cosmetic Botox injections

Steven H. Dayan, MD, FACS*, Benjamin A. Bassichis, MD

Department of Otolaryngology, Division of Facial Plastic Surgery, University of Illinois, 2913 Commonwealth Street, Suite 430, Chicago, IL 60657, USA

The benefits of Botox (Allergan, Irvine, CA) have been well known to the otolaryngologist and facial plastic surgeon for many years. Recently, because of a great deal of media attention, Botox has taken the cosmetic industry by storm. Botox is an attractive option for physicians and patients because of the quick and natural improvement with relatively little risk. The safety and convenience of chemical denervation combined with the fee-for-service income generated has caused many physicians to incorporate Botox into their practice; however, caution needs to be advised to the inexperienced physician. Botox injections are not technically difficult to master, but there are essential prerequisites which need to be learned before expecting consistently acceptable results. Important issues include a complete understanding of the effects of Botox, evaluation of a patient’s underlying anatomy, and developing a proper diagnosis.

Cosmetic indications for Botox

Botox indications vary from proven functional treatments, particularly in laryngology and ophthalmology, to the newer cosmetic applications. Initially, FDA approval was limited to treating hyperfunctional muscle activity, such as blepharospasm and cervical dystonia. Cosmetic indications first were realized in the late 1980s and expanded rapidly in the in the 1990s [1]. Studies have shown improvement in the appearance of existing fine lines and wrinkles of the face following Botox treatments [2–4]. Smoking or excessive sun exposure can also cause earlier signs of aging, which prompt women in their late 20s and early 30s to request Botox. Its use in younger patients might lessen the severity or prevent wrinkles from occurring. The theory is that if repeated motions are restricted, the responsible muscles either become atrophied or weakened and unable to create the cosmetically apparent wrinkles.

Contraindications to Botox use

Botox is a benign agent that is almost universally acceptable. There are, however a few contraindications, and—other than an allergy or hypersensitivity to known ingredients in the formulation—most are relative. Given the risk of prolonged effects, Botox is not recommended in patients with neurological disorders such as myasthenia gravis, amyotrophic lateral sclerosis, and Eaton Lambert syndrome [5]. Patients taking an aminoglycoside antibiotic, which might potentiate the Botox effects, are also cautioned against injection. Although there is no evidence of teratogenic effects in humans, treatment of pregnant women and nursing mothers is not advised.

Glabellar creases

There are many areas of the face that benefit from Botox. The most common—and the best known to cosmetically improve with Botox injections—are the deep vertical creases between the eyebrows or glabellar area [6]. On April 15, 2002, the glabellar region received FDA approval for Botox use, and it remains the only site that has been approved for cosmetic application. The vertical creases located between the eyebrows might give the false impression of anger or
an aggressive demeanor. It also is one of the first areas of the face to reveal early aging. The paired corrugator supercilii muscles are primarily responsible for causing these furrows. Additionally, the frontalis, orbicularis, and procerus muscles might also contribute to these wrinkles. 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 will mention an improvement in their appearance, but are puzzled as to the precise 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. 1, 2). The corrugator muscle bellies are palpated as the patient is in motion. This technique will help determine the location, size, and power of the muscles, and to what extent they are contributing to the vertical creases. It is important to evaluate the superior–medial orbicularis muscles, which might contribute to the deep creases (Fig. 3). The procerus muscle is palpated and examined at rest and in motion. Contraction of the procerus contributes to the horizontal creases located over the root of the nose.

Proper evaluation of the brow position is imperative to obtaining an acceptable outcome in the upper 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 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, which might need to be demonstrated to the unaware patient. The position and symmetry of the brows and eyelids will affect the technique employed during the treatment of the glabellar creases.

Procedure, risks, and complications of treating glabellar creases

To effectively treat 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 are placed into the procerus muscle. Women with prominent corrugator activity and 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 mid-pupillary line. The contribution of the underlying orbicularis muscle to the glabellar crease can be clearly defined when the patient “squeezes their eyebrows together.” Care is taken when injecting to remain at least 1 cm above the brow if or at lateral to the
midpupillary line. Injection closer to the brow might increase the risk for Botox migration into the orbit and denervation of the levator palpebral muscle, causing undesirable eyelid ptosis. Additionally, if a patient has low-set brows, the injections might lead to mild brow ptosis and a flat, unattractive brow appearance. Generally, men start out with a lower, more flattened brow position than women, and to prevent an aggressive appearance, conservative doses above the brow are used. Achievement of 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. Men and women with low-set brows should therefore be treated above the brow cautiously and counseled that if complete reduction of the glabellar creases is the goal, it might result in a slight brow ptosis. Some patients 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%; however, this has not been the authors’ experience [8]. Eyelid ptosis should be preventable with proper technique and diagnosis. By avoiding the area just above the brow at midpupillary line, ptosis of the eyelid is unlikely (Fig. 4) [9].

If eyelid ptosis occurs, it presents within 2 to 3 days of the treatment. Often, a patient might 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; however, a true eyelid ptosis might take from 2 weeks to 3 months for resolution. The patient will appear asymmetric and will most likely be disappointed 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, there are available options. Topical α adrenergics such as aproclonidine (Iopidine, Alcon, Alcon Lab, Fort Worth, TX) and naphazoline (Naphcon, Alcon, Alcon Lab, Fort Worth, TX) will directly stimulate Mueller’s muscle (a sympatomimetic muscle of the upper eyelid) and provide approximately 2 mm elevation of the eyelid. Unfortunately, this might not be cosmetically significant.

**Forehead**

The forehead is best treated in individuals who have heavy horizontal forehead creases. When these creases are reduced, the patient will have an open, relaxed, and friendly look. Newer indications might exist for patients who have not yet developed these deep creases, but are quite impressed with the smoother

![Fig. 4. Marked patient at rest showing area to avoid to help prevent brow or eyelid ptosis.](image)

![Fig. 5. Younger patient in her late 20s at rest before Botox (note the congenital eyelid ptosis on the left).](image)

![Fig. 6. Activity of the frontalis muscle and markings.](image)
Pretreatment evaluation and diagnosis

The depth and lateral extent of the forehead creases are evaluated. The lowest crease is identified and marked. The distance from the orbital rim and brow is noted along with the 1 cm point above the brow. Also, as in the evaluation before treating glabellar creases, it is important to note the brow position and symmetry.

Brow asymmetry, if recognized, is brought to the patient’s attention. Some patients might believe their brow asymmetry is a uniquely identifying feature and not seek correction.

An important but often underappreciated diagnostic consideration is the relationship of the temporal portion of the frontalis muscle involvement to the brow position. Failure to recognize the individual with prominent lateral brow elevation can result in an overexaggerated lateral brow elevation and a sinister or “Jack Nicholson” look following treatment of the forehead creases and undertreatment of the lateral frontalis muscle (Figs. 8, 9) [10].

Procedure, risks, and complications of treating the forehead

Generally, Botox is placed along identifiable creases in separate injection sites. The recommended dose for effective forehead treatment is three to four units at approximately six injection sites. Care is taken to not deposit excessive amounts of Botox over the lateral brow, which might cause a drop in the lateral brow position and a flattened brow. For patients desiring elevation of the lateral brow, the temporal area of the frontalis muscle is not treated, which allows the brow elevators to remain intact and contribute to brow elevation.

Women with low-set brows and most men are treated conservatively in the forehead to prevent a brow ptosis. If patients desire a motionless forehead, they must be counseled that it will come at the expense of lowering their brow position.

Crow’s feet

Signs of aging are commonly identified just lateral to the eye in an area known as “crow’s feet.” The lateral orbicularis muscle, which is responsible for crow’s feet, is also one of the most responsive muscles to Botox treatments. Following treatment, most patients report a softening to the look of their eyes and a more open and awake appearance (Figs. 10, 11) [11].

Pretreatment evaluation and diagnosis

The medial and lateral extent of the wrinkle is evaluated. The position of the orbital rim and the zygomatic arch in relationship to the wrinkle is noted. Careful inspection and palpation for superficial venous structures (which are highly prominent in this region) is performed. The lower lid position and tone is considered. A snap-back test or lower lid retraction...
test is a quick and effective means for assessing lower eyelid resiliency.

Procedure, risks, and complications of treating crow’s feet

For adequate treatment of crow’s feet, three to five injections into prominent wrinkles, each with one to two units per side, is suggested. The greatest risk in treating this area is an unacceptable bruise. Care is taken to inject into the dermis or just subdermally and carefully mark where the vessels are located. At times it is difficult to identify subcutaneous vessels, espe-

Fig. 10. Pre-Botox injection of the crow’s feet.

Fig. 11. Post-Botox injection of the crow’s feet.

cially in patients who have dark or tanned skin. If a blood vessel is punctured, quickly applied pressure will limit the bruise to a minimal and acceptable pinpoint lesion. An unattended, punctured vessel has potential to cause an expanding hematoma throughout the loose areolar tissues of the periorbital region. Some clinicians have reported success in preventing such bruises by applying ice before and after the injection [12].

A superficial injection can also help avoid placing Botox deep to the orbital septum, which could migrate toward the ocular muscles resulting in diplopia. Injections should be limited to an area superior to the zygomatic arch and lateral to the origin of the zygomaticus major muscle (Fig. 12). Inadvertent paralysis of this muscle will result in a noticeable upper lip ptosis.

Eyelids

Cosmetic Botox treatment of the lower eyelid was initially avoided because of the fear that it might risk postseptal migration of Botox and diplopia; however, this consequence is unlikely when Botox is properly injected pretarsally. For patients who have fine wrinkles under their eyes or a thickened subciliary muscle
Botox treatment provides for a relaxed appearance. Studies performed on Asian patients indicate satisfaction with the widened palpebral aperture and more desirable appearance [12].

Pretreatment evaluation and diagnosis

The patient’s lower eyelids are evaluated for significant wrinkling or a hypertrophic muscular ridge just under the ciliary margin (Figs. 13, 14). Thin, crepe-like skin is noted and the patient is counseled that this will not be improved and could potentially worsen with Botox injections. A snap-back test and lower eyelid retraction test are performed to evaluate lower eyelid tone. The amount and extent of pseudo-herniating orbital fat is also noted.

Procedure, risks, and complications of treating the eyelids

Generally, injection of only one to two units within a fine crease pretarsally is advised. A superficial injection protects against Botox migration deep to the orbital septum, resulting in an ocular muscle paresis and diplopia. The undesirable side effects with pretarsal eyelid injections can be quite noticeable, so caution is advised. To avoid an expanding bruise, pressure is applied quickly if a vein is inadvertently punctured. Patients with a lax lower lid are at risk for developing an ectropion and dry eye and are not treated pretarsally (Fig. 15).

Conservative treatment is advised in patients with prominent post septal orbital fat pads. Lower eyelid “puffy pockets” might appear to be worse following Botox treatments secondary to weakening of the pretarsal muscle, which serve as a supportive sling, allowing the fat to pseudoherniate even further.

Temporal lift

Elevation of the lateral portion of the eyebrow can result in a subtle, yet satisfying change in the appearance of the face. Most patients can expect a modest 2 to 3 mm elevation of the lateral brow (Figs. 16, 17); however, it might be at the expense of an incomplete reduction in the forehead and glabellar creases. In patients with hyperactive or prominent lateral brow elevators, an overelevation...
of the lateral brow can occur, resulting in an undesirable sinister appearance [13].

**Pretreatment evaluation and diagnosis**

Before the Botox injection, the lateral portion of the patient’s brow is evaluated in relation to the medial third of the brow. The activity of the temporal portion of the frontalis muscle is also assessed. The position and force with which the lateral brow is elevated when the patient raises their brows is noted.

**Procedure, risks, and complications in treating the temporal area**

Injection of approximately two or three units of Botox under the tail of the brow is adequate to achieve the desired benefits. Care is taken to prevent migration of Botox into the upper eyelid, which can result in paralysis of the levator palpebral muscle and an eyelid ptosis [14]. Experience and proper evaluation are required to recognize patients who will benefit from a small injection of Botox (approximately one unit above the lateral brow) to avoid a sinister elevation to the brow yet still achieve a subtle, natural, desirable elevation.

**Perioral region**

Excessive sun exposure, smoking, and a genetic predisposition can lead to deep-etched, vertical creases in the lip’s vermilion border. Lipstick wearers might find it disconcerting when their makeup migrates vertically into the fine lines. Botox placed periorally can soften upper and lower lip creases (Figs. 18, 19), and unlike many filler injections, it will not leave a lumpy, beady look. Caution is advised in treating patients who cannot tolerate the slightest weakness in their perioral musculature such as vocalists or wind instrument players [15].

The extent and depth of the creases are evaluated at rest and during motion. The patient is asked to purse the lips, and usually four or five prominent creases are well defined and marked. It is important for the physician to recognize and indicate to the patient pre-existing asymmetry of the lips so that correction will not exaggerate it.

**Procedure, risks, and complications in treating the perioral region**

The recommended dose of Botox to achieve an acceptable improvement in the appearance of the lips is one unit per defined crease, not to exceed five units per lip. Excess Botox placed into the lip area can result in lip weakness and asymmetry. Patients might potentially develop difficulty with mastication and articulation, and they might drool. Even therapeutic doses of Botox into the lip area can result in a
subclinical weakness. This is usually not noticeable with regular activity, but it might become evident when attempting motions such as whistling.

**Chin**

The irregularly textured area overlying the mentalis muscle of the chin has been compared with the peau d’orange appearance. By placing a small dose of Botox into the inferior–medial chin pad, a decrease in the hyperkinesis of the mentalis muscle is achieved, resulting in a softening of the chin’s appearance [16].

**Pretreatment evaluation and diagnosis**

The texture and firmness of the chin pad is assessed by palpation at rest and with contraction (Figs. 20, 21). The symmetry of the lower lip is noted, and any asymmetry is pointed out to the unaware patient.

**Procedure, risks, and complications in treating the chin**

The recommended dose of Botox is four to ten units of Botox placed into the inferior and medial portion of the chin pad. Care is taken to stay medial to avoid migration of Botox into the depressor labii inferioris muscles. Inadvertent paralysis of these muscles can result in a unilateral lip weakness with potential for lip biting, difficulty articulating, and drooling.

**Angle of mouth**

Many patients complain of a deepening and downward rotation of the creases at the mouth corners, resulting in an appearance of anger or sadness. The muscle responsible for the downward pull, depressor anguli oris, can be treated. A subtle elevation at the corner of the mouth can be expected.

**Pretreatment evaluation and diagnosis**

The symmetry of the lips is evaluated, as is the corner of the mouth, at rest and in motion. Patients are asked to “grit their teeth” and the depressor anguli oris muscle is palpated at its origin on the mandible. Its contribution to the corner of mouth depression can be best assessed by inspection and palpation during patient contraction.

**Procedure, risks, and complications in treating the angle of the mouth**

Injection of approximately three units of Botox to the belly of the muscle is adequate for a satisfactory and acceptable response. Care is taken to be certain of injection into the depressor anguli oris muscle and not
into the more medial levator labii muscle (Fig. 22). Inadvertent paralysis of the levator labii muscle can result in a lip asymmetry, difficulty articulating, lip biting, and drooling [17].

Neck

Following Botox injections, the prominence of the cord-like vertically oriented neck bands secondary to the underlying platysmal muscle can be reduced and softened. For patients who are resistant to a surgical intervention or who display persistent neck bands despite surgical correction, Botox treatments are an ideal alternative [18].

Pretreatment evaluations and diagnosis

The neck is evaluated by inspection and palpation at rest and in motion (Figs. 23, 24). The bands will become prominent if the patient is asked to “grit their teeth.” If previous rhytidectomy or submentoplasty has been performed, a prominent midline band secondary to a platsysmaplasty might be evident. The vertical extent of the band is marked along with its relationship to the thyroid cartilage.

Procedure, risks, and complications in treating the neck

Depending upon the severity of the neck banding, the injection amount can vary significantly between patients. Usually, for an effective treatment, 30 to 50 units per neck are required. The main risk following Botox treatment of the neck is dysphagia or voice abnormalities. If anatomic knowledge and skill are employed, a complete paralysis of the vocal cords with compromise of the airway is highly unlikely. Additional protection from undesirable side effects such as dysphagia is afforded by staying superior at least 1 cm from the thyroid cartilage.

Summary

Patient expectations of Botox treatments vary and need to be managed in accordance with the diagnosis.
It is imperative for patients to realize their uniqueness and that their results might vary from those of their peers. The underlying facial muscle anatomy might, at times, hinder or prevent the desired result. At other times, the patient’s aesthetic desires will be inconsistent with the physician’s practices and judgment. Patient individuality prohibits treating each patient in exactly the same manner. This article describes the use of Botox for the effective treatment of facial rhytids. An understanding of the preprocedural analysis, Botox dosages, potential adverse outcomes, and preventative techniques and treatments allows the physician to optimize patients’ outcomes and ultimately assume their satisfaction.

References