Botulinum toxin type A (BTX-A) has been used successfully for many years for various cosmetic indications. Its use for upper facial rhytides and dynamic line applications (most commonly for the treatment of glabellar lines, horizontal forehead lines, and crow’s feet) is particularly widespread [1,2]. The use of BTX-A in the lower face initially was considered controversial because results were believed to be unpredictable [3]. The demarcation between the upper and lower face was somewhat arbitrary and subjective, however, and the usefulness of this product for several lower facial and neck applications is becoming clear [3]. Although most of our use of BTX-A is still in the upper facial region, in our practices it also is used in the lower face and neck. The literature remains sparse, however, with most published accounts of the use of BTX-A in the lower facial and neck regions reporting individual clinician experience, not rigorous scientific studies. Here, we synthesize and comment on this literature and compare and contrast what has been reported with our observations and current practices.

Available botulinum toxin products

- BOTOX (also known under the names BOTOX Cosmetic, Vistabel, and Vistabex; Allergan, Inc., Irvine, CA) is the most well-known brand of BTX-A, is used worldwide, and is the only brand available in the United States. Dysport (Ipsen Limited, Slough, United Kingdom) is available in some European, Asian, and South American countries, but is not approved or available in the United States.

Treatment recommendations for specific anatomic sites

- Perioral lip line
- Oral commissures
- Nasolabial folds
- Chin
- Platysmal bands
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Masseter reduction

Available botulinum toxin products

There are several brands of BTX-A available and used for aesthetic purposes around the world. BOTOX (also known under the names BOTOX Cosmetic, Vistabel, and Vistabex; Allergan, Inc., Irvine, CA) is the most well-known brand of BTX-A, is used worldwide, and is the only brand available in the United States. Dysport (Ipsen Limited, Slough, United Kingdom) is available in some European, Asian, and South American countries, but is not approved or available in the United States.
and Canada. Xeomin (Merz Pharmaceuticals, Frankfurt, Germany) is approved for use in Germany for noncosmetic indications. Several brands of BTX-A are manufactured in other areas of the world but are neither approved nor commercially available in North America.

Most literature and experience pertaining to the cosmetic use of BTX-A involves BOTOX. This is especially true with lower facial and neck applications, with only one known study [4] reporting experience with Dysport (mandibular contouring). There are differences between BOTOX and Dysport that affect dosing (more units of Dysport are needed to produce the same effect as BOTOX), and thus they cannot be used interchangeably, nor can results with one product be extrapolated to another. Recently published consensus recommendations for the use of BTX-A discuss the use of BOTOX only [5]. In this article, all discussions of BTX-A, unless otherwise specified, refer to BOTOX.

Another type of botulinum toxin—botulinum toxin type B (BTX-B)—is also available under the brand name Myobloc (Solstice Neurosciences, South San Francisco, CA). BTX-B differs from BTX-A in several important ways; it seems to have a faster onset of action, a shorter duration of action, and an association with more pain during injection [6–8]. We are not aware of any studies that have evaluated the effects of the cosmetic use of BTX-B in the lower face and neck.

The favorable results obtained with the cosmetic use of BOTOX, both in the lower face and general facial area, stem from its ability to act directly at the site of injection to produce a natural and relaxed look, minimizing dynamic wrinkles while retaining the patient’s ability to express emotion. This effect is due in part to its minimal migration from the site of injection to other tissues [9,10] where it could cause unwanted muscle weakening.

### Treatment recommendations for specific anatomic sites

#### Perioral lip line

Chemosdenervation of lip rhytides is the BTX-A procedure performed most commonly in the lower face, and meticulous injections in the right patients can produce optimal results [3,11]. Muscles treated include the orbicularis oris (primarily), depressor anguli oris (DAO), and mentalis (Fig. 1) [12]. It is unusual for a patient to request BTX-A treatment of the perioral lip line; rather, patients require information regarding treatment options, such as the risks and benefits of BTX-A, for this indication. Approximately 90% of the time we administer BTX-A in this area in combination with dermal fillers (soft tissue augmentation).

In the literature and as seen in our practices, BTX-A treatment of the perioral lip line is not offered to individuals whose lives may be significantly affected by a potential compromise in oral competency (e.g., singers, musicians, scuba divers, and so forth) [1,5,12–14]. As with any BTX-A procedure, patients may have unrealistic expectations and should be counseled regarding the potential benefits and optimal results [5,12]. We advise patients in advance about the possibility of adverse effects (AEs), especially those related to speech. Occasionally, patients receiving BTX-A in the perioral lip line feel a little awkward with their lip motions for up to 2 weeks after treatment; for example, they might have to concentrate while speaking or drinking through a straw [3,13,14].

Optimal results generally are obtained with a dose of 4 to 8 U (rarely as high as 10 U) in the upper lip and 4 to 6 U (sometimes as high as 8 U) in the lower lip. This result is consistent with what others have found, whereby the total recommended starting doses for the upper lip and lower lip are 2 to 8 U and 2 to 6 U, respectively. (Some practitioners recommend injecting the upper lip only, because treatment of the lower lip is believed by some to be associated with more AEs) [1–3,11–15]. It is recommended that the specific dose be determined based on muscle mass and the degree of weakening desired [3].

Injections at 4 to 5 evenly spaced points on the upper lip and 4 to 5 evenly spaced points on the lower lip provide good results (see Fig. 1). Recommendations in the literature vary from 2 to 11 sites per lip, with 4 to 6 sites most commonly advised [1,2,11–15] and at least one physician suggesting a threading technique [3]. We tend to use
approximately 1 U per injection (the literature recommends 0.5 to 2 U) [1–3,5,11–13,15]. Although we sometimes inject a little bit at the midpoint, others advise against it [3,11,12,14].

When performing the injections, we stay close to the vermilion border (recommendations in the literature range from “just above” to 5 mm above the vermilion border) [3,11,12,14]. Along with others, we advise injecting superficially immediately over the vermilion [2,5,12].

In general, results with BTX-A treatment of the perioral lip line are not as dramatic as those seen in the upper face; however, patients who are particularly interested in improving this anatomic area are generally appreciative of the results from this procedure. This finding concurs with a report in a small series of patients (number not provided) showing that although minimal improvement was seen by the treating clinician, all patients were satisfied with the results [1]. Also of relevance are findings of a retrospective study indicating that satisfaction levels were uniformly high in patients treated in the upper face and the mouth or neck areas (n = 35) as compared with satisfaction levels for those treated in the upper face only (n = 56) [15].

Results last approximately 10 weeks. Duration of effect may be shorter when treating the perioral lip line versus other lower facial areas because of the comparatively lower doses used [12]. Most patients tolerate BTX-A treatment of the perioral lip line well, although there is potential for dysarthria or drooling (usually associated with treating the corners of the lips) with higher doses [2,12,14]. The literature also reports rare cases of lip asymmetry and problems with articulation or elocution, suction, eating, brushing teeth, using a straw, whistling, or proprioception [2,5,12,14,16] and recommends that special care be taken with elderly women who have severe rhytides and minimal muscle mass [3].

**Oral commissures**

The oral commissures are another popular area for BTX-A treatment in the lower face; this is a region patients typically present for improvement [11]. In addition, at least one physician has pointed to this area as having the lowest risk and highest patient acceptance of all the lower facial treatment sites [3]. The muscle involved here is the DAO (Fig. 2) [5]. As with the perioral lip line, oral commissures should not be treated in patients for whom possible compromise of oral competency would be debilitating (eg, singers, musicians, scuba divers, and so forth) [5].

We have obtained good results with BTX-A 5 U/side as the standard starting dose for the treatment of oral commissures, which is slightly higher than the 2 to 4 U/side recommended by others in the literature [2,5,13,14]. We tend to administer one injection per side (others have suggested 1 U [2,5,14] or 2 U [3]). Injections can be made directly into the DAO muscle located on the mandibular body (see Fig. 2). Several specific techniques have been recommended, with care taken not to inject too closely to the mouth or into the mental fold, or in a manner that causes interaction with the orbicularis oris [5]: an injection 1 cm lateral and 1 cm inferior to the angle of the mouth [2], an injection into the DAO belly at the level of the mandible (with caution taken not to inject medially into the depressor labii muscles) [14], and an injection at the midpoint of the DAO with a second injection midway between the first injection and the caudal border of the mandible (taking care to avoid the DAO apex) [3].

We find efficacy and patient satisfaction to be high when treating the oral commissures in combination with a dermal filler. Patients can expect the BOTOX effects to last 10 to 12 weeks. One author has commented that the treatment of oral commissures is associated with the highest patient satisfaction rate of all lower facial BTX-A applications [3].

Potential complications associated with this procedure are often the result of injections that are not precisely placed. If injections are made too medially, there can be a flattening of the contour of the lower lip when the patient attempts to form an “O” (affecting the depressor labii inferioris); if injections are made too high, there can be problems with speech and suction [5,16]. Flaccid cheeks, an incompetent mouth, and an asymmetric smile can also occur [2,5]. In our practices we have seen asymmetry following injections in this region. Any
Although some complications have been suggested following BTX-A treatment of the masseter muscle, such as mastication difficulty, muscle pain, speech difficulties, and awkwardness with smiling [4,5,13], none of our patients experienced any complications following BTX-A treatment of this area.

**Considerations for using botulinum toxin type A in the lower facial and neck regions**

In contrast to BTX-A use in the upper facial regions, the lower facial and neck areas are less forgiving of inexact technique and dosing that may lead to AEs (although it is important to remember that most BTX-A adverse effects, although undesirable, are completely reversible). With experience, and along with others, we have become aware of several factors and techniques that can greatly improve the chances for successful use of BTX-A in the lower face and neck.

First, an understanding of the functional anatomy of the lower facial muscles is extremely important for success [16,27,28]. Less-than-ideal outcomes (eg, smile dynamics that are not aesthetically pleasing) are often related to a functional imbalance, with the risk for such outcomes being higher in the lower versus upper face because of the greater complexity of muscle arrangements in the lower facial area [11,29]. Such outcomes, however, are much less likely when functional dynamics are understood and taken into account.

A related consideration when injecting in the lower face is that complications can be minimized by site- and patient-specific dosing [16]. Many lower facial muscles vary greatly in the way they move each individual's lower face; ideally clinicians are not just memorizing doses and injection points but are individualizing therapy based on each patient's unique animation patterns [3].

Second, good technique—most importantly, precisely placed injection—is key to minimizing complications in the lower face and neck [13,16]. Most BTX-A–related complications are attributable to poor injection technique [5]. Excellent control is needed for success in the lower face, because unlike the upper face, the lower face cannot tolerate even a few misplaced units, which most commonly affect the smile in an undesirable way [3]. In addition to precise placement, injecting superficially and symmetrically are important for avoiding complications [5].

Third, doses are much smaller for perioral treatments versus upper facial applications, because the lower facial muscles (in particular, those supporting the oral complex) respond more strongly to the same BTX-A dose [5,13]. Especially when clinicians first begin to administer BTX-A injections into the lower face, a conservative approach (eg, lower dosing followed by touch-ups) is recommended, because lower doses are associated with fewer AEs than higher doses [3,5] and complications are often caused by overenthusiastic use of BTX-A in large doses [5].

Finally, because most AEs are the result of unwanted diffusion into nontargeted muscles, concentrated doses (dilutions of 1 to 3.3 mL) are recommended [2,5,14,15]. In addition, because different types of botulinum toxins are associated with different migration patterns [9,10], we recommend exercising caution with dosing and placement when using other BTX-A products.

When using BTX-A for lower facial applications, it is important to establish reasonable patient expectations (eg, during pretreatment counseling), thereby ensuring greater satisfaction for both patient and physician.

**Fillers in combination with botulinum toxin type A**

The simultaneous use of BTX-A and fillers for lower facial applications is not an either–or proposition; rather, their conjunctive use is encouraged and it is where usage trends appear to be headed [2,3,9,12,13,17]. Specific areas in which BTX-A and fillers are commonly administered include the perioral lip line, oral commissures, and nasolabial folds [3,12,17].

Frequently, we use BTX-A in combination with fillers when treating lower facial areas. For example, we use BTX-A with hyaluronic acid fillers (eg, Restylane [Medicis Aesthetics Holdings, Inc., Scottsdale, Arizona]) for the lip body; collagen (eg, Cosmoderm [Allergan, Inc., Irvine, California]) for the fine lines associated with the lips; and BTX-A with Restylane or a calcium hydroxylapatite filler (eg, Radiesse [BioForm Medical, Inc., San Mateo, California]) when treating the oral commissures and nasolabial folds. Initial experience with Juvéderm (Allergan, Inc., Irvine, California), a family of new hyaluronic acid fillers recently approved by the US Food and Drug Administration, has been promising in these areas also.

**Summary**

The use of BTX-A is evolving beyond upper facial applications, with a wide variety of procedures now being successfully performed in the lower face and neck. In this region, BOTOX is the BTX-A most studied and has been shown to be safe and effective in several applications. One of the desirable characteristics of BOTOX that allows it to work so well is its distribution within the injected tissue,
with minimal migration outside of the target area. In the hands of an experienced injector, this allows for precise effect. An understanding of functional facial anatomy, the importance of precise injections, and correct dosing all are critical to obtaining positive outcomes.

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References