Section 2

Introduction and Foundation Concepts

Administering botulinum toxin injections is an essential skill for physicians and qualified healthcare providers who wish to incorporate aesthetic medicine into their practice. According to statistics from the American Society of Plastic Surgeons, since its approval for cosmetic use by the U.S. Food and Drug Administration (FDA), botulinum toxin has become the most commonly performed minimally invasive cosmetic procedure, with over 3 million treatments performed annually. To successfully perform botulinum toxin procedures, an understanding of relevant anatomy and an appreciation for facial aesthetics, in addition to injection skill, are necessary to achieve desirable results.

Skin Aging

Wrinkling is a prominent feature of skin aging. Skin naturally thins and loses volume over time as dermal collagen, hyaluronic acid, and elastin gradually diminish. This process of dermal atrophy is accelerated and compounded by sun exposure and other extrinsic factors such as smoking. Hyperdynamic facial musculature also contributes to formation of visible lines and wrinkles. Initially, lines and wrinkles are seen only during active facial expression such as frowning, laughing, or smiling and are referred to as dynamic lines (Fig. 1A). Over time, dynamic lines become permanently etched into skin resulting in static lines (Fig. 2B), which are present at rest.

A

B

FIGURE 1 Younger patient demonstrating dynamic frown lines seen with glabellar complex muscle contraction **(A)** and lack of static lines at rest **(B)**. Copyright R. Small, MD.

FIGURE 2 ● Older patient demonstrating dynamic frown lines seen with glabellar complex muscle contraction **(A)** and static lines at rest **(B)**. Copyright R. Small, MD.

Skin laxity, redistribution of facial fat, and biometric changes such as bone resorption, contribute to skin folds and facial contour changes. In addition, aged skin exhibits dyschromia such as mottled pigmentation, vascular ectasias such as telangiectasias and cherry angiomas, and undergoes benign and malignant degenerative changes.

Botulinum Toxin Indications (Year Approved)

- Botulinum toxin is FDA approved for the temporary treatment of moderate to severe dynamic glabellar frown lines in adults aged 18–65 years (2002).
- Botulinum toxin is FDA approved for the temporary treatment of primary axillary hyperhidrosis (2004).
- Other FDA approved indications include blepharospasm (1989), strabismus (1989), cranial nerve VII disorders (1989), cervical dystonia (2000), upper limb spasticity (2010), prophylaxis for chronic migraine (2010).
- Other off-label cosmetic uses include reduction of wrinkles in the upper and lower face, neck, and chest; lifting of facial areas; and correction of facial asymmetries.

Mechanism of Action

Botulinum toxin is a neurotoxin protein derived from the *Clostridium botulinum* bacterium. When small quantities of botulinum toxin are injected into target muscles,

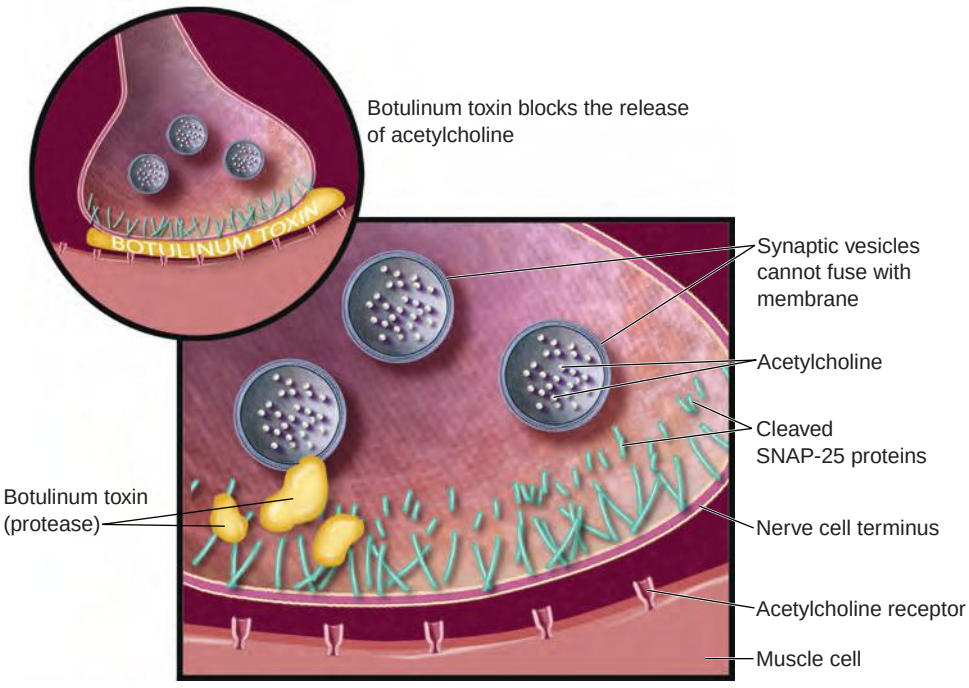

FIGURE 3 ● Botulinum toxin inhibits the release of acetylcholine at the neuromuscular junction. Copyright R. Small, MD.

localized chemical denervation occurs due to inhibition of acetylcholine release at the neuromuscular junction (Fig. 3). This temporarily reduces muscle contractions and smooths skin wrinkles in the treatment area.

Basic and Advanced Procedures

Basic. Areas of hyperdynamic muscles in the upper third of the face (frown lines, crow's feet and horizontal forehead lines) yield the most predictable results with the greatest efficacy, and fewest reported side-effects when treated with botulinum toxin. These areas are ideal for providers getting started with cosmetic botulinum toxin injections and are referred to as basic treatment areas (Table 1) in this book.

Advanced. Botulinum toxin treatments in the lower face are considered advanced procedures (Table 1). This is a highly functional region and, in addition to facial expression, lower face muscles serve essential functions of mastication and elocution. Treated muscles in the lower face must retain partial functionality which requires more practiced injection skill with precise placement of small doses of toxin. Botulinum toxin treatment of neck bands, hyperhidrosis and all facial areas other than the basic treatment areas, are considered advanced procedures in this book. These procedures have a greater risk of complications, and it is advisable for novice injectors to gain skill and confidence with basic procedures before proceeding to advanced botulinum toxin procedures.

Patient Selection

Patients with dynamic wrinkles that have minimal to no static component (Fig. 1) demonstrate the most dramatic improvements with botulinum toxin treatments. Results for

TABLE 1

Basic and Advanced Botulinum Toxin Treatment Areas

Expression Lines		
Common Name	**Medical Name**	**Muscles**
Basic		
Frown lines	Glabellar rhytids	Glabellar complex: corrugator supercilii, procerus, and depressor supercilii
Horizontal forehead lines	Frontalis rhytids	Frontalis
Crow's feet	Lateral canthal rhytids	Lateral orbital orbicularis oculi
Advanced		
Lower eyelid wrinkles	Infraocular rhytids	Inferior preseptal orbicularis oculi
Eyebrow lift	Reduction of ptotic eyebrows and dermatochalasis	Superior lateral orbital orbicularis oculi
Bunny lines	Nasal rhytids	Nasalis
Lip lines (smoker's or lipstick lines)	Perioral rhytids	Orbicularis oris
Marionette lines	Melomental folds	Depressor anguli oris
Downturned corners of the mouth	Depressed oral commissures	Depressor anguli oris
Nasolabial folds	Melolabial folds	Levator labii superioris alaeque nasi
Gummy smile	Gingival show	Levator labii superioris alaeque nasi
Chin line	Mental crease or labiomental crease	Mentalis
Chin puckering	Mentalis contraction	Mentalis
Neck bands	Platysmal bands	Platysma

patients with static wrinkles (Fig. 2) are slower and cumulative, and may require two to three consecutive treatments for significant improvements. Deep static lines may not fully respond to botulinum toxin treatment alone and may require combination treatment with dermal fillers or resurfacing procedures to achieve optimal results. Severe static wrinkles and laxity, commonly seen in patients aged 65 years or older, may require surgical intervention. Discussion regarding realistic expectations and results during the evaluation and consultation process is essential.

Treatment Goals

Botulinum toxin treatments are directed at specifically targeted muscles or regions of muscles to focally inhibit contraction and achieve intended effects such as smoothing the skin or elevating facial areas. An optimal result yields a pleasing aesthetic effect with minimal to no functional impairment in the treatment area and, lack of other undesired effects and complications.

The degree of muscle inhibition achieved with botulinum toxin in a given treatment area is determined by patient preference and the need to preserve functionality

in the treated muscles. For example, some patients may desire complete inhibition of the glabellar complex muscles with botulinum toxin treatment of frown lines, whereas others may desire partial muscle inhibition with retention of some ability to frown. A greater degree of muscle inhibition is typically sought for treatments in the upper third of the face than in the lower face. In the lower face, partial muscle inhibition is the desired result as the treated muscles must still be able to perform essential functions, such as eating, drinking, and speaking. Treatment goals listed in the following chapters are based on common patient preferences and considerations of muscle functionality in the treatment areas.

Products

C. botulinum bacteria produce eight serotypes of botulinum toxin proteins (A, B, Cα, Cβ, D, E, F, and G). Botulinum toxin serotype A is the most potent and is used for cosmetic indications. The FDA currently approve two botulinum toxin serotype A products for the treatment of the glabellar complex muscles that form frown lines: onabotulinumtoxinA (OBTX) (Botox® manufactured by Allergan, Inc, Irvine, CA) and abobotulinumtoxinA (Dysport® manufactured by Medicis Pharmaceutical Corp, Scottsdale, AZ), both of which were formerly known as botulinum toxin type A. OBTX and abobotulinumtoxinA vary in formulation, diffusion capability, onset of action, efficacy, and complications and are not interchangeable. All references to OBTX in this book refer specifically to Botox.

Alternative Therapies

Botulinum toxin is the only treatment for dynamic wrinkles currently approved by the FDA. Other treatments for static wrinkles include chemical peels; microdermabrasion; topical products such as retinoids, nonablative lasers for soft-tissue coagulation and tightening such as infrared and radiofrequency; nonablative lasers for collagen remodeling such as 1320-nm, 1540-nm, and Q-switched lasers; ablative and fractional ablative lasers such as erbium and carbon dioxide lasers; and operative procedures such as dermabrasion and plastic surgery.

Contraindications

- Pregnancy or nursing
- Active infection in the treatment area (e.g., herpes simplex, pustular acne, cellulitis)
- Hypertrophic or keloidal scarring
- Bleeding abnormality (e.g., thrombocytopenia, anticoagulant use)
- Impaired healing (e.g., due to immunosuppression)
- Skin atrophy (e.g., chronic oral steroid use, genetic syndromes such as Ehlers-Danlos syndrome)
- Active dermatoses in the treatment area (e.g., psoriasis, eczema)
- Sensitivity or allergy to constituents of botulinum toxin (including botulinum toxin serotype A, human albumin, lactose, or sodium succinate)
- Milk allergy with abobotulinumtoxinA products
- Gross motor weakness in the treatment area (e.g., due to polio, Bell's palsy)
- Neuromuscular disorder including, but not limited to amyotrophic lateral sclerosis, myasthenia gravis, Lambert-Eaton syndrome, and myopathies

- Inability to actively contract muscles in the treatment area prior to treatment
- Periocular or ocular surgery within the previous 6 months (e.g., laser-assisted in situ keratomileusis, blepharoplasty)
- Medications that inhibit neuromuscular signaling and may potentiate botulinum toxin effects (e.g., aminoglycosides, penicillamine, quinine, calcium channel blockers)
- Uncontrolled systemic condition
- Occupation requiring uncompromised facial expression (e.g., actors, singers)
- Unrealistic expectations or body dysmorphic disorder

Advantages

- Technically straightforward with short treatment time
- Safe and effective, particularly in the upper third of the face
- High patient satisfaction

Disadvantage

- Short duration of action relative to other cosmetic procedures, although effects may be cumulative over time with recurring treatments

Equipment (Fig. 4)

- Botox reconstitution
  - Botox Cosmetic 100-unit vial
  - 5.0-mL syringe
  - 0.9% nonpreserved sterile saline 10-mL vial
  - 18-gauge, 0.5-inch needle
- Botox treatment
  - Reconstituted Botox Cosmetic (100 units/4 mL)
  - 1-mL Becton-Dickinson Luer-Lok™ tip syringe

FIGURE 4 ● Equipment for botulinum toxin treatments. Copyright R. Small, MD.

- 30-gauge, 1-inch needle
- 30-gauge, 0.5-inch needle
- 32-gauge, 0.5-inch needle
- 3 × 3-inch nonwoven gauze
- Hand-held mirror (for consultation)
- Nonsterile gloves
- Alcohol pads
- Ice pack
- Bottle opener (for removing metal cap of the botulinum toxin vial for aspiration of fluid at the bottom of the vial)
- Hemostat (for loosening tight Luer-Lok connections)
- Soft, white eyeliner pencil or surgical pen (for marking injection points)

Reconstitution Method

Botox Cosmetic is supplied as a powder, typically in vials of 50 or 100 units. For reconstitution, non-preserved saline is recommended by the manufacturer and the author. Preserved saline is used for reconstitution by some providers because it may reduce discomfort with injection. There is no standardized volume for reconstitution. Botox efficacy is based on the number of units injected rather than the dilution. However, greater dilution volumes (of 10 mL or more) can increase diffusion and in turn the risk of complications.

The author's reconstitution method, using a 100-unit vial of Botox, is outlined as follows:

- Using an 18-gauge needle with a 5.0-mL syringe draw up 4.0 mL of 0.9% nonpreserved sterile saline.
- Insert the needle at a 45-degree angle into a 100-unit Botox vial and inject saline slowly, maintaining upward plunger pressure so that the diluent runs down the sides of the vial.
- Gently swirl the reconstituted Botox vial and record the date and time of reconstitution on the vial.
- Reconstitution of Botox powder using 4 mL of saline results in a concentration of 100 units of botulinum toxin per 4 mL (100 units/4 mL).

Reconstitution Concentrations and Dosing

Small volumes of reconstituted botulinum toxin solution are injected for cosmetic facial and neck treatments and a 1.0-mL syringe is used for injections. Providers must be aware of the exact dose associated with each 0.1-mL increment on the syringe for accurate dosing of botulinum toxin.

- With the earlier Botox reconstitution concentration of 100 units/4 mL:
  - 4.0 mL of reconstituted Botox has 100 units
  - 1.0 mL of reconstituted Botox has 25 units
  - 0.1 mL of reconstituted Botox has 2.5 units
- A table for conversion of botulinum toxin dose (in units) to injection volume (in mL) for Botox reconstituted at 100 units/4 mL is given in the appendix (Appendix 1, Table 1)

- Common reconstitution volumes used with a 100-unit vial of Botox and the resulting dose per 0.1 mL are shown below:

Saline Volume Added to 100-Unit Vial of Botox (mL)	Resulting Botulinum Toxin Dose Per 0.1 mL of Reconstituted Solution (Units)
1.0	10
2.0	5
2.5	4
4.0	2.5

Handling and Storage

Botox is shipped frozen, on dry ice. Before and after reconstitution it may be stored in the refrigerator at a temperature of 2–8°C (35.6–46.4°F) for up to 24–36 months based on the vial size. While the manufacturer recommends using Botox within 24 hours of reconstitution, the American Society for Plastic Surgery Botox Consensus Panel recommends using Botox within 6 weeks after reconstitution and notes no loss of potency during that time.

Anatomy

- Musculature of the face–anterior-posterior (Anatomy section, Fig. 1)
- Musculature of the face–oblique (Anatomy section, Fig. 2)
- Superficial and deep musculature of the face (Botulinum Toxin Anatomy section; Fig. 3)
- Wrinkles and folds of the face–anterior-posterior (Anatomy section, Fig. 4)
- Wrinkles and folds of the face–oblique (Anatomy section, Fig. 5)
- Surface anatomy of the face (Anatomy section, Fig. 6)
- Functional anatomy (Anatomy section, Fig. 7)

Understanding the facial anatomy in the treatment areas is necessary before performing botulinum toxin procedures (Anatomy section; Figs. 1–7). Most facial muscles have soft-tissue attachments to the skin through the superficial muscular aponeurotic system. When a muscle contracts, the overlying skin moves with it causing wrinkles (also called "rhytids") to form perpendicular to the direction of the muscle contraction. This allows for a diverse array of subtle facial expressions and functions.

Aesthetic Consultation

Review the patient's complete history, including medications, allergies, medical history including conditions contraindicating treatment, cosmetic history including minimally invasive aesthetic procedures and plastic surgeries as well as satisfaction with results and any side effects, and social history including occupations in which facial expression cannot be compromised.

Examine the areas of concern and, with the patient holding a mirror, have the patient prioritize the areas. Note any asymmetries, such as uneven eyebrow height, document in the chart and photograph. Discuss treatment options, number of recommended

treatments, anticipated results, realistic expectations, and procedure cost. Review risks of complications associated with the procedure. Formulate a cosmetic treatment plan and record in the chart along with a consent form signed by the patient. It is advisable to use photographic documentation (referred to as photodocumentation) with aesthetic procedures and take dynamic and static photographs before botulinum toxin treatment and approximately 2 weeks posttreatment to demonstrate results.

When discussing botulinum toxin or other injection treatments, it can be helpful to use nonmedical or "patient friendly" terminology to reduce patient anxiety. Examples of terms used include the following:

Medical Terms	Patient-Friendly Terms
• Toxin	• Natural purified protein
• Paralyzes	• Relaxes
• Pain	• Discomfort

Preprocedure Checklist

- Perform an aesthetic consultation and obtain informed consent.
- Take pretreatment photographs with the patient actively contracting the muscles in the intended treatment area and with the muscles at rest.
- Document and discuss any notable asymmetries before treatment.
- Minimize bruising by discontinuation of aspirin, vitamin E, St. John's wort, and other similar-action dietary supplements including: ginkgo, evening primrose oil, garlic, feverfew, and ginseng for 2 weeks. Discontinue other nonsteroidal anti-inflammatory medications and alcohol consumption 2 days before treatment.
- For hyperhidrosis treatment, discontinue antiperspirant use 24 hours before treatment and see Hyperhidrosis chapter for other preprocedure steps.
- For the procedure, position the patient comfortably in a reclined position at about 65 degrees.
- Identify the *safety zone* for treatment, which is the recommended region within which injections are administered. Confining treatments to the safety zone area can maximize efficacy and minimize side effects.
- Locate the target muscles for botulinum toxin injection, which are located within the safety zone, by instructing the patient to contract the relevant muscles using particular facial expressions as outlined in each chapter.
- Identify the botulinum toxin injection points and OBTX starting doses from the overview figure, which accompanies each chapter.
- Instruct the patient to close their eyes during the procedure.
- Cleanse the treatment areas with alcohol prior to injection and allow alcohol to dry.

Anesthesia

Anesthesia is typically not required for botulinum toxin treatments. If necessary, ice or a topical anesthetic may be used before injections (e.g., benzocaine, lidocaine, tetracaine).

Pretreat the anesthetic injection sites with a topical anesthetic such as benzocaine 20% : lidocaine 6% : tetracaine 4% (BLT) for 15–20 minutes prior to treatment.

Commonly used topical anesthetic products include:

- L-M-X (lidocaine 4%–5%)*
- EMLA (lidocaine 2.5% : prilocaine 2.5%)**
- BLT (benzocaine 20% : lidocaine 6% : tetracaine 4%)***

* Over-the-counter product ** Prescription ***Compounded by a pharmacy
See Appendix 6, Supply Sources.

BLT is one of the most potent and fast acting topical anesthetics and is preferred for use by the author. It is applied in-office, with a maximum dose of 1/2 gm applied topically for 15 minutes. Effects are enhanced for certain topical anesthetics by occluding the product under plastic wrap once applied to the skin. Occlusion under plastic wrap is not necessary with BLT due to its potency.

Botulinum Toxin Dosing

- Each chapter has an overview figure of botulinum toxin injection points and recommended starting doses for a given treatment area using OBTX.
- Summary tables of starting doses for all treatment areas are provided in the appendix for OBTX (Appendix 1, Table 2a) and abobotulinumtoxinA (Appendix 1, Table 2b).

General Injection Techniques

- Insert the needle into the area of maximal muscle contraction, which is typically visible as a "hill" or "ridge" of muscle.
- The target for axillary hyperhidrosis is sweat glands located in the dermis. The targets for all other botulinum toxin treatments described in this book are muscles. In some facial areas, where the skin is thin and muscles are superficially located, subdermal injection adequately delivers botulinum toxin to the target muscle. In other areas deeper intramuscular injection is required.
- Depth of botulinum toxin injection is site specific and is either:
  - intradermal, visible as a wheal with dimpled skin (e.g., treatment of axillary hyperhidrosis);
  - subdermal, visible as a wheal without dimpled skin (e.g., treatment of crows feet); or
  - intramuscular, visible as a subtle wheal without dimpled skin or as mild edema in the injection area (e.g., treatment of frown lines).
- Botulinum toxin is typically injected as the needle is withdrawn and should flow very easily with minimal plunger pressure. If resistance is encountered, fully withdraw the needle and reinsert.
- Avoid intravascular injection. Intravascular injection is apparent when the surrounding skin blanches during injection. If this occurs, withdraw the needle partially from the blanched site, reposition, and inject.
- Avoid hitting the periosteum, particularly with frontalis muscle treatments, as this is painful and dulls the needle.
- After injecting, the site may be compressed to reduce discomfort and bleeding. When treating around the eye, compression is directed away from the eye.
- If bleeding occurs, achieve hemostasis before proceeding to subsequent injection points.
- Avoid vigorous massage of the area after treatment to minimize undesired dispersion of botulinum toxin to adjacent muscles.

- Changing needles after six or more injections maintains a sharp needle and minimizes discomfort.

Aftercare

On the day of treatment, instruct the patient to avoid lying down for 4 hours immediately after treatment, manipulating the treated area (e.g., a facial or massage), and activities that can cause facial flushing (e.g., application of heat to the face, alcohol consumption, exercising, and tanning) to reduce the likelihood of product migration and risk of side effects. If bruising or swelling occurs, a soft ice pack may be applied for 10–15 minutes to each bruise site, every 1–2 hours until it is improved.

Results and Follow-Up

- Treated muscles typically demonstrate partial reduction in function 2–3 days after botulinum toxin treatment, with maximal reduction 1–2 weeks after treatment. Effects are most noticeable for treatment of dynamic lines. Static lines are slower to respond, typically requiring two to three consecutive treatments and may need to be combined with other minimally invasive aesthetic procedures such as dermal fillers or resurfacing procedures to achieve optimal results.
- If desired reduction of muscle function is not achieved in the treatment area, a touch-up procedure may be performed 2 weeks after the initial treatment. The botulinum toxin touch-up dose varies according to the degree of movement remaining in the target muscles and the treatment area (see individual chapters for recommended touch-up doses). Reassess the treatment area 2 weeks after the touch-up procedure. Document and include photographs at each visit.
- Results of botulinum toxin treatments in the lower face are subtle, relative to the dramatic changes seen in the upper third of the face. Patients may be able to appreciate pre- and posttreatment improvements in dynamic lines of the lower face if they are schooled in how to make these assessments with animation. In addition to a pleasing aesthetic effect, a desirable result in the lower face also has minimal to no functional impairment of the mouth.
- Muscle function in the treatment area gradually returns 2–5 months after treatment, based on the dose of botulinum toxin used, treatment area and the patient's physiology. Subsequent treatments are recommended when muscles in the treated area begin to contract, prior to facial lines returning to their pretreatment appearance.

Learning the Techniques

- Marking the safety zone with a soft, white eyeliner pencil or surgical marker before treatment can help with locating the target muscles for treatment and marking the injection points can help with needle placement.
- It is advisable to start with conservative botulinum toxin doses; each chapter has recommended starting doses for a given treatment area.
- Consider performing initial treatments on staff and family to get feedback and to closely observe the effects of botulinum toxin.
- Touch-up procedures may be performed 2 weeks after initial treatment if necessary.
- Consider receiving a treatment to gain personal knowledge about botulinum toxin procedures.

Complications

Complications and side effects can be categorized into injection-related or botulinum toxin–related issues. Botulinum toxin–related complications listed below may be associated with treatment of the face and the neck. Complications associated with treatment of specific areas, as well as suggestions for management, are discussed in their respective chapters.

General Injection-Related Complications

- Pain
- Bruising
- Erythema
- Edema
- Tenderness
- Headache
- Infection
- Numbness or dysesthesia
- Anxiety
- Vasovagal episode and loss of consciousness

Pain with botulinum toxin injections is minimal as small-gauge needles are used for treatment. If necessary, injection pain can be reduced using ice, or topical anesthetics. Pretreatment anesthesia, especially with topical anesthetics, can prolong treatment times.

Bruising is commonly seen with botulinum toxin injections, particularly with treatment of crow's feet.. Bruises can range in size from pinpoint needle insertion marks to quarter-sized ecchymoses or, rarely, hematomas. The time for resolution of a bruise depends on the patients' physiology and the size of the bruise, where larger bruises can be visible for up to 1–2 weeks. Prevention of bruising is preferable and several suggestions for bruise prevention are listed in the Preprocedure Checklist above. Immediate application of ice and pressure to a bruise can minimize bruise formation. Bruises can be camouflaged after treatment with makeup.

Erythema and **edema** are seen with almost all injections and usually resolve within a few hours after treatment. Firm compression of injection sites, particularly on the forehead, can effectively reduce edema. Icing is not typically necessary for these issues.

Headaches can occur with upper face injections and usually resolve within a few days after treatment without medication. There are reports of idiosyncratic severe headaches lasting 2–4 weeks. Nonsteroidal anti-inflammatory medications are usually adequate for management of headaches.

Infection is rare with botulinum toxin injections but can occur with any procedure that breaches the skin. The most common etiologies are bacterial or reactivation of herpes simplex. Prolonged **pain, tenderness,** and **erythema,** of more than a few days' duration can signal infection and necessitates evaluation, with infection-specific treatment.

Numbness or **dysesthesia** in the treatment area is extremely rare and could result from nerve injury with injections.

Anxiety with injection procedures is common. Most patients have mild procedural anxiety, which can be reduced by ensuring that injection equipment is not visible during treatment and can be managed with breathing techniques. Rarely, patients with more severe anxiety may require preprocedural medications (e.g., tramadol 50 mg, 1 tablet 30 minutes prior to procedure). Vasovagal episodes associated with severe anxiety are possible, and it is advisable for offices to have emergency protocols when performing injection procedures.

Botulinum Toxin–Related Complications

- Localized burning or stinging pain during injection
- Blepharoptosis (droopy eyelid)
- Eyebrow ptosis (droopy eyebrow)
- Ectropion of the lower eyelid (eyelid margin eversion)
- Lagophthalmos (incomplete eyelid closure)
- Xerophthalmia (dry eyes)
- Epiphora (excess tearing)
- Diplopia (double vision)
- Impaired blink reflex
- Photophobia (light sensitivity)
- Globe trauma
- Infraorbital festooning (worsening of eye bags)
- Lip ptosis with resultant smile asymmetry
- Oral incompetence with resultant drooling and impaired speaking, eating, or drinking
- Cheek flaccidity
- Dysarthria (difficulty articulating)
- Dysphagia (difficulty swallowing), necessitating nasogastric tube placement in severe cases
- Hoarseness
- Neck weakness
- Facial asymmetry, alteration, or poor aesthetic result
- Inadequate reduction of wrinkles or lack of intended effect in the treatment area
- Worsening wrinkles in areas adjacent to the treatment area
- Weakening muscles adjacent to the treatment area
- Autoantibodies against botulinum toxin. Autoantibodies may be present or develop after injection, rendering treatments ineffective (1–2% of patients treated for cosmetic indications per Allergan)
- Extremely rare, immediate hypersensitivity reaction with signs of urticaria, edema, and a remote possibility of anaphylaxis
- Case reports of severe side effects due to distant spread from the site of injection have been reported with large doses of botulinum toxin, including: generalized muscle weakness, urinary incontinence, respiratory difficulties, and death due to respiratory compromise. These complications have been reported in patients hours to weeks after receiving large doses of botulinum toxin for noncosmetic indications (e.g., 300 units in the calf muscles). They have not been reported with cosmetic use of botulinum toxin at the labeled dose of 20 units (for glabellar lines) or 100 units (for primary axillary hyperhidrosis).

Some complications can be improved with botulinum toxin treatment of muscles that antagonize the affected muscles. However, for most complications, there are no corrective treatments and they spontaneously resolve as botulinum toxin effects diminish.

Utilizing precise injection technique into targeted muscles and minimizing diffusion of botulinum toxin with low reconstitution volumes, reduce involvement of adjacent muscles and decrease the likelihood of undesired effects and complications.

Botulinum Toxin Treatments in Multiple Facial Areas

Botulinum toxin treatments in the upper third of the face can be safely and easily combined with treatment in the lower face during a given visit.

Concomitant botulinum toxin treatment of multiple areas in the upper face may be performed; however, this can decrease expressivity. Some patients may, therefore, prefer to space out treatments in the upper face. For example, two areas may be treated together, such as the crow's feet and frown, and 1–2 months later, treatment of the forehead and an eyebrow lift may be performed.

The lower face is a highly functional region, responsible for speaking, eating, and drinking. Excessive weakening of the muscles in this region can result in significant complications from functional impairment and it is advisable to use caution when treating multiple areas in the lower face and the neck. A conservative approach is to rotate treatment areas every 3–4 months such that only one area is treated with botulinum toxin at any give time. For example, if botulinum toxin treatment of upper lip lines and mental crease are desired, then the orbicularis oris muscle may be treated initially, followed by treatment of the mentalis muscle 3 months later once the upper lip botulinum toxin effect has resolved.

New Products and Current Developments

IncobotulinumtoxinA (Xeomin® manufactured by Merz Pharmaceuticals, Greensboro, NC), and PurTox® (manufactured by Mentor Corporation, Santa Barbara, CA) are new injectable botulinum toxin products currently undergoing FDA approval for cosmetic use in the United States.

RT001 or ReVance (ReVance Therapeutics, Newark, CA) is a physician-applied topical botulinum toxin under investigation for cosmetic applications including treatment of the crow's feet and axillary hyperhidrosis.

Reimbursement and Financial Considerations

Cosmetic botulinum toxin treatments are not covered by insurance. Fees for botulinum toxin injections are usually based on the number of units used, or on the treatment site. Prices vary widely according to community pricing in different geographic regions and range from $10–$25 per unit or $250–$500 per site. The Current Procedural Terminology (CPT) designation for botulinum toxin procedures of the face is chemodenervation of muscles innervated by the facial nerve (CPT code 64612).

Combining Aesthetic Treatments

Facial aging is a multifaceted process involving not only the formation of facial lines and wrinkles but also contour changes, skin laxity, formation of dyschromic and vascular lesions, undesired hair growth, as well as benign and malignant degenerative changes. Achieving optimal rejuvenation results often requires a combination of treatments to address these different aspects of facial aging. Botulinum toxin can be easily combined with other minimally invasive aesthetic procedures such as dermal fillers to treat static lines and volume loss; lasers and intense pulsed light for hair reduction, skin resurfacing, and treatment of benign pigmented and vascular lesion; exfoliation procedures like microdermabrasion and chemical peels; and topical skin care products.

Minimally invasive aesthetic procedures like botulinum toxin offer patients a means to enhance their appearance in a subtle, natural way and maintain a healthy youthful appearance. From the provider's perspective, these procedures can be readily incorporated into practice to provide office-based aesthetic care.