

Complications in Fillers and Botox

Joseph Niamtu III, DMD

KEYWORDS

- Botox • Injectable fillers • Botox complications
- Filler complications • Injectable filler complications
- Minimally invasive cosmetic facial surgery
- Facial wrinkle improvement

Americans spent \$11 billion on cosmetic surgery procedures in 2007. Almost 3 billion of those dollars were spent on minimally invasive procedures, of which injectable facial fillers and botulinum toxin type A (Botox) were the most popular. Injectables (fillers and Botox) have fueled the fires of the popularity of cosmetic facial surgery. They have provided more options to patients and surgeons and provided quick, affordable, predictable, and long-lasting improvement of facial wrinkles and lip augmentation. Even in sour economies, patients want to look good and although they may not have money to spend on surgical procedures, injectable treatments remain popular. This article addresses common complications of injectable fillers and Botox.

COMPLICATIONS OF BOTOX TREATMENT

At the time of this writing, Botox and botulinum toxin type B (Myobloc) are the only neurotoxins approved by the Food and Drug Administration. Also, at the time of this writing, there are nine other neurotoxins in review for Food and Drug Administration approval. The more correct word for this group of drugs is neuromodulators, which better describes their action.

The mechanism of Botox is to prevent the release of acetylcholine at the motor end plate. Without this release, the electrical impulse is not transmitted; hence, the muscle does not move. Selective paralysis is the keystone of neuromodulator treatment but only if the toxin is in the anticipated and desired location.

When discussing complications of Botox cosmetic procedures, complications must be differentiated from sequelae. A true complication is upper eyelid ptosis, for example, whereas failure to respond to an injection sequence is a sequella. **Box 1** lists some common complications or sequelae of Botox treatment.

Undertreatment

There is threshold at which Botox is effective. I believe that some patients simply are more sensitive than others to the drug's effect. For 12 years I have used 20 units of Botox per treatment area (glabella, frontalis, or lateral canthus) with an estimated 95% success rate for patient satisfaction. Every injector experiences patients who return to the office after Botox injection and report that "my Botox did not work." Some of these patients are adamant and disgruntled and request free re-treatment or refund. This can be an unpleasant situation but easily is prevented by adequate pre-injection discussion and proper informed consent. It is important for patients to realize that some patients are sensitive to Botox and some are resistant or immune. I have been told that a past subclinical botulinum infection from food poisoning that did not require hospitalization could cause an immunity to botulinum toxin type A. Secondary to that, some patients simply do not respond to any amount of the toxin. I once had a nurse who was resistant to 40 units of Botox in the glabella. The Botox representative provided free Botox and another 20 units was given, still with no result, not even a little. I subsequently treated the patient

Cosmetic Facial Surgery, 11319 Polo Place, Midlothian, VA 23113, USA
E-mail address: niamtu@niamtu.com

Oral Maxillofacial Surg Clin N Am 21 (2009) 13–21
doi:10.1016/j.coms.2008.11.001

1042-3699/08/\$ – see front matter © 2009 Elsevier Inc. All rights reserved.

Box 1**Common complications of Botox treatment**

Overcorrection
 Undercorrection
 Asymmetric result
 Upper eyelid ptosis
 Dysphagia, neck weakness
 Perioral droop
 Compromised result in elderly
 Bruising
 Intravascular injection
 Lagophthalmous, exposure keratosis
 Globe perforation
 Diplopia (lateral rectus)
 Psychosomatic problems

with botulinum toxin type B, which still did little to stop her muscle movement. This is a rare occurrence among the thousands of patients I have treated for 12 years.

Overtreatment

When Botox first came on the scene, the trend was for doctors and patients to aim for a treatment goal of total paralysis. In the early days, patients complained at the least bit of forehead or glabellar movement. This “frozen face” appearance came to be disdained by patients and contemporary treatment goals are relaxing or softening the muscle movement. Overtreating any area can produce unnatural animation, which patients do not like. My personal words of wisdom to novice injectors are,

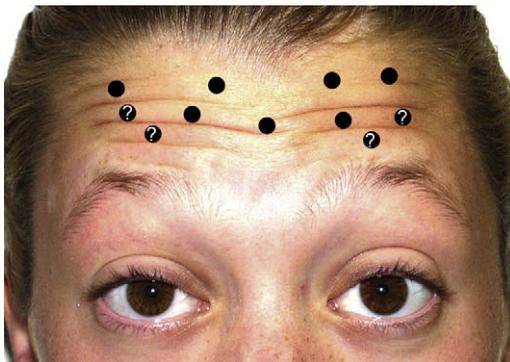


Fig. 1. The dots on this image show a common pattern for frontalis injection. The question marks indicate areas to avoid or to inject conservatively in patients who have upper lid excess.



Fig. 2. This patient was injected at another office and experienced severe upper eyelid ptosis lasting 10 weeks.

“always be conservative as you can always add more Botox, but you can’t take it away or turn it off.” Having said this, I believe patients should understand that Botox treatment is a sculpting process and that returning to the office 1 to 2 weeks after the first series on injections is a good thing so that they can be precision treated or adjusted.

The biggest problem I have witnessed in my practice and that of colleagues is overtreatment of the frontalis in female patients who have upper lid skin excess. The problem is as follows. Many women unconsciously lift their eyebrows (any surgeon who performs brow lift surgery and tries to get prospective patients to relax their brows can testify to this), which elevates the excess skin of the upper eyelid. If the frontalis is heavily treated (especially the lateral areas) the main brow elevator is deactivated. When this happens, patients who usually lift their lids no longer can, making the brow and lid feel heavy and, because the brow is not elevated, the excess upper lid skin is more apparent. Classically this occurs on approximately the third postinjection day, when patients apply eye shadow to their upper lids and cannot elevate them. Next, patients go to the Internet to



Fig. 3. This patient exhibits the Spock eyebrow from undertreatment of the lateral frontalis. The black circle illustrates the area to retreat to correct the problem.



Fig. 4. When a patient comes to a doctor to look better and leaves with a bruise, the impact is negative.

search out Botox complications and then accuse the injector of “drooping their eyelid.” In reality, their eyelid function is fine; the problem is that they cannot elevate their brow as they have been used to and, because of that, the upper eyelid skin appears excessive. The antidote to this situation is to treat the lateral frontalis conservatively in older patients who have dermatochalasis and protect with informed consent and preinjection consultation **Fig. 1**.



Fig. 5. This patient was treated at another office for the DAO but the lip depressors (likely the depressor labii) were affected. The patient's left side is affected in this image.

Box 2 Common filler complications

- Unrealistic patient expectations
- Bruising/hematoma
- Undercorrection
- Overcorrection
- Asymmetry
- Lumping
- Iatrogenic factors
- Allergic reaction

True Eyelid Ptosis

Thankfully true ptosis is a rare and usually novice complication. Eyelid opening is controlled by the levator palpebrae superioris muscle, which in turn inserts into the levator aponeurosis of the upper eyelid. If Botox is injected (or more commonly diffuses) into this muscle, the eyelid does not open (**Fig. 2**). Albeit temporary, this is a huge problem for patients as it not only affects their appearance in a negative way but also may make simple tasks, such as reading and driving, impossible. This complication can be avoided by keeping all injections at least 1 cm above the bony orbital rim. Some teachers recommend injecting just beneath the brow. This is acceptable if patients have normal positioned brows, but in patients who have ptotic brows, the injection may be close to the levator muscle. Injecting 1 cm above the orbital rim is a pearl that has kept this author from producing upper lid ptosis over the past 12 years. Drops of lolidine 0.5%



Fig. 6. This patient was developed swelling, bruising, and minor hematoma immediately after filler injection.



Fig. 7. These patients treated at other offices show not only overfill but also incorrect placement of the filler in the lips.

stimulate Müller's muscle and provide several millimeters of lid opening to assist the problem. The effects of the drops are not long lasting and usually are applied before social interaction to slightly open the affected lid. Although not a "cure," it can assist a distraught patient.

Another periorbital muscle problem involves Botox diffusion into the extraocular muscles, namely the lateral rectus muscle. Diplopia can result and has resulted from paralysis of the lateral

rectus muscle. Again, staying 1 cm lateral to the orbital rim prevents this problem in my experience.

Some practitioners recommend not lying down, working out, or performing other strenuous activity for 4 hours after Botox injection to prevent septal diffusion leading to ptosis. Although I used to recommend this, I stopped approximately 5 years ago and now tell patients to do anything they want post injection. I have yet to see a complication from that.



Fig. 8. This patient was treated properly with augmentation of the vermilion-cutaneous border, but the deep vermilion was undertreated and should have been augmented with enough filler to increase the pout and projection of the lips.



Fig. 9. This patient exhibited asymmetry from undertreatment of her left side. The marked area indicates where the touch up filler was needed.

Asymmetry

Asymmetric treatment results are not uncommon and can be a result of injector placement or patient anatomic variation. One of the most common asymmetries is the Spock eyebrow. This is a demonic curvature of the lateral brow that occurs when the central frontalis is deactivated but the lateral frontalis is active and only lifts the brow tail (**Fig. 3**). This is easily corrected by placing some additional Botox at the active area on the frontalis.

Bruising

Postinjection ecchymosis is a phenomenon that even the most experienced injectors occasionally see (**Fig. 4**). This occurs when a vessel is disrupted by the injection needle. Using a 32-gauge needle and paying close attention to the superficial vasculature can limit this situation. The most common area for bruising is the lateral canthus region where the skin is thin and the veins superficial.

Besides the outward negative cosmetic effect of a bruise, women who have facial bruises may lead others to assume spousal abuse may have occurred. Finally, many women do not tell their significant others that they are spending money on Botox and the bruise is difficult to explain. Screening patients for aspirin or other drugs that affect platelet aggregation also is important in preventing bruising.

Perioral Droop

Injecting Botox in the lips to address vertical rhytids, injecting the depressor anguli oris (DAO) to upturn the corners of the mouth, and injecting the mentalis to address skin puckering of the chin have become commonly requested treatments. Injecting the lower face is more tenuous

in terms of complications that the upper face. Lip, DAO, and mentalis injections all can cause or contribute to dysfunctional animation of the perioral region (**Fig. 5**). The best treatment for this is prevention. Again, a patient who presents to a cosmetic office to look better but is left drooling, lisping, or with the inability to pucker will not be happy. Lower facial Botox treatment should be reserved for advanced injectors and conservative treatment should be a mantra. Remember, more Botox always can be added but cannot be taken away.

Unrealistic Patient Expectations

Although not a complication, an unhappy patient is a problem. If patients are injected and return with an incomplete treatment (residual muscle movement), they may want free retreatment or refund. This is common especially when an office charges by the area. Patients pay a certain amount for glabellar treatment and when they return with residual muscle movement, they expect the doctor to be



Fig. 10. This patient was injected with a particulate filler that not only was improperly placed as interrupted boluses but also was not blended by massaging.



Fig. 11. Blanching should alert the injector that the filler may be placed too superficially. Blanching is usually self-limiting as shown in the bottom picture, but if too much pressure is placed on the tissue, necrosis can result.

responsible for it. As discussed previously, preinjection discussion and informed consent should cover this. When practitioners charge by the unit instead of the area, it is a cut-and-dried decision as to patients needing more Botox—they simply pay for the extra units.

COMPLICATIONS OF INJECTABLE FACIAL FILLERS

Like Botox, injectable fillers are one of the most requested minimally invasive cosmetic procedures. In theory they are simple—plumping up wrinkles or lips by injecting a volume of fillers. As simple as they seem, however, the learning curve of fillers is steep. Anyone can inject, but only experienced injectors can make magic. The number one rule for fillers is the same as for Botox and for all cosmetic procedures: be conservative, start with appetizer portions, and encourage patients to return for postinjection follow-up. I explain to my patients that filler treatment is a sculpting process and sometimes requires more than one injection session to get the job done right. It can be considered a quality control process. Many times I have been happy with the immediate injection result but when patients return at 2 weeks, I am not happy. Sometimes patients are happy at follow-up, but I know the results can be better. A subtle asymmetry or other problem that would pass as acceptable to an untrained eye can affect my reputation among professionals. Unfavorable cosmetic surgery cannot be hidden, so it pays to follow-up treatments.

When considering the possible complications of filler treatment, an entire text could be written; however, the most common problems are discussed in this article (**Box 2**).

Unrealistic Patient Expectations

As with any cosmetic procedure, a problem can be patients expecting too much or surgeons failing to discuss a procedure and details adequately. Older patients who have atrophic lips, smoker's lines, and perioral wrinkles cannot be led to believe



Fig. 12. The correct needle placement for white roll (vermilion-cutaneous) outlining is in the potential space between the mucosa and muscle at the skin-vermillion interface. The top image shows the proper placement whereas the bottom image shows the filler clumping in a ball from a too superficial injection.



Fig. 13. The bluish tinge of a clear hyaluronic acid filler is seen in the lower lids of this patient injected for tear trough deformity.

they will leave with voluptuous lips. They can be improved, but underpromising is a good idea.

Some patients also have unrealistic expectations about such things as how long fillers last and degree of correction. Experienced injectors use common sense, before and after pictures, and informed consent to present a realistic expectation for patients.

Bruising/Hematoma

Bruising/hematoma is a harmless but disconcerting problem for patients and surgeons. Patients present to look better and leave looking worse. The lips and perioral areas are vascular and even the best injectors on occasion experience bruising and, less frequently, hematoma. Making sure that patients are not taking any substances that effect platelet aggregation is a primary consideration.

Also, icing the lips before and immediately after injection is helpful. **Fig. 6** shows bruising or hematoma that can occur with facial fillers. These areas are treated initially with ice, then with heat.

Undertreatment

Undertreatment is a relative complication and the best one to have if there is choice. Undertreatment occurs when inadequate filler is placed and the result is less than desired. This can be a true undertreatment or a patient-centered situation. Underfilling lips or wrinkles, other than the inconvenience to patients, generally is a problem as they simply require more filler. A patient-centered situation refers to situations that occur when patients decline to purchase the correct amount of filler required to fill a defect adequately. Over the years I have declined to treat nasolabial folds in adults who have had a single syringe of filler. Many patients want to economize and only want to purchase a single syringe of filler. For anyone over age 40, this generally is inadequate volume to do the job. By trying to “split” a syringe on each side, there is not enough filler to complete the correction. What remains is a substandard treatment and a disappointed patient. When patients request this, I politely ask them to save their money and return when we can do the procedure correctly. This has paid off in excellent treatment results. The situation is that deeper folds need more filler and there is no better experience than a patient who can afford to use as much filler as necessary to achieve the maximum aesthetic result.



Fig. 14. This patient was treated improperly at another office. The lump of superficial filler is nicked with an 18-gauge needle and expressed by compressing the surrounding tissue.

Overtreatment

Overtreatment is a problem that definitely makes unhappy patients. Patients seek filler injection for a natural correction and an overaugmented result calls attention to the result, which is aggravating to patients and surgeons. The best way to avoid overcorrection is to be conservative. As discussed previously, there is nothing wrong with a second session. Depending on the filler, it is possible to reverse the result. Hyaluronidase dissolves the hyaluronic acid fillers. Although permanent fillers sound like a great idea to patients, when overfilled, sometimes surgery is required to correct the problem. Great care must be taken when using longer-lasting or permanent fillers. **Figs. 7 and 8** show two patients not only who were overtreated but also whose filler was placed in the incorrect tissue plane or area of the lip.

Asymmetry

Asymmetry is a situation of overcorrection of one side or undercorrection of the other. This sometimes is not noticed at the actual treatment because of tissue edema, especially with the hydrophilic hyaluronic acid fillers. This is why it is important to follow-up filler patients. The patient pictured in **Fig. 9** was adequately treated for vermilion border fill but undertreated on her left side.

Lumping

One of the most common novice problems is an inhomogeneous placement of the filler material. Massage is just as important as filler placement in my opinion. The filler is placed in small spheres or strands and is fluid in the tissues. By massaging the injected areas, the filler is compacted and blended to form a more contiguous and smooth texture. Failure to do this can lead to palpable and visible irregularities (**Fig. 10**).

Iatrogenic Factors

Technically, all the complications discussed previously may be classified as iatrogenic (the fault of the operator). Injecting in the incorrect tissue plane is a good example of a physician-induced problem. Most fillers are intradermal, and, although this exact tissue plane is debatable, fillers frequently are injected too deeply or too superficially. When teaching new injectors, I tell them that they should be able to see a wrinkle or fold improve as they are injecting or they are in the wrong plane. It also is important to realize the proper plane of injection for each specific filler as the particles are designed to be placed in specific planes. Some are superficial dermal, most are



Fig. 15. This patient was injected with hyaluronic acid filler for tear trough correction and the filler was injected too superficially (*top image*). The same patient is shown 24 hours later (*lower image*) after injecting 70 units of hyaluronidase (diluted with local anesthetic) in each lower lid in the area of the filler excess.

mid-dermal, and others are subcutaneous. Injecting too deep simply wastes filler and does not properly plump the wrinkle. Injecting too superficially makes the contour irregular or even necroses the tissue. **Fig. 11** shows blanching from a filler injection that is too superficial. When an injector sees blanching, the needle should be redirected as the blanching could cause necrosis from disruption of the surrounding vasculature.



Fig. 16. Hyaluronidase (1 mL) is mixed with local anesthetic (1 mL) for a total of 150 units per 2 mL; 1 mL (70 units) is injected in areas of significant filler whereas smaller amounts are used for less significant filler excess.



Fig. 17. This patient is shown before and immediately after injection of hyaluronic acid filler (0.4 mL) in each lip. Significant and immediate swelling occurred but resolved spontaneously within 48 hours.

When injecting the lips, two planes are involved. For white roll or Cupid's bow definition, the filler is injected into the potential space between the mucosa and muscle. When a needle is in this correct plane, the syringe pressure should be easy and the filler should flow antegrade and retrograde making a well-formed outline. If a needle is too superficial, the syringe pressure is increased and the filler clumps up in a ball instead of flowing freely along the vermilion-cutaneous border (**Fig. 12**).

Given the popularity of hyaluronic acid fillers, the Tyndall effect (or similar phenomenon) commonly is seen, especially in areas of thin skin. The Tyndall effect is a situation where a clear filler appears blue under the skin. This can be seen in any dermal region but is particularly common in the thin lower eyelid skin in white patients (**Fig. 13**). In the tear trough region, the filler should be placed at the periosteal level or at least in the suborbicularis oculi plane.

Getting rid of or reducing unwanted filler can be achieved by several means. For excess superficial filler, sometimes making a stab incision with an 18-gauge needle and expressing the excess filler are all that is necessary (**Fig. 14**).

One insurance policy when using hyaluronic acid fillers is the ability to reduce or reverse them with hyaluronidase. Hyaluronidase hydrolyzes the hyaluronic acid in a matter of hours. The hyaluronidase is mixed with saline or local anesthetic and then injected into the region of excess filler. I

generally use approximately 70 units of hyaluronidase to reverse significant excess and a smaller amount for less severe overcorrections. A small amount, approximately 20 units, may be used to slightly reduce excess whereas large amounts totally reverse the result. Sometimes patients want all the filler dissolved and other times just want the specific area reduced. There is little danger in placing too much hyaluronidase in an area. The substance also dissolves some of the native tissue hyaluronidase, but this is replenished within 24 hours. **Fig. 15** shows a patient who was over-treated in the tear trough region (top image) and the same patient 24 hours later after injecting 70 units of hyaluronidase in each lower lid in the plane the filler was placed. **Fig. 16** shows the materials used to dissolve hyaluronic acid fillers.

Allergic Reaction

True allergic reaction is rare and most fillers no longer require allergy testing. Any patient can be allergic to some component of any filler. Some reactions are simply treatment edema or sometimes angioneurotic edema, which can lead to severe and disfiguring swelling (**Fig. 17**). Patients who have these reactions are treated with heat and tapering steroids. True granulomatous reactions infrequently are seen and can be delayed. These may respond spontaneously but sometimes require steroid injection or surgical excision.