

Lip Enhancement: Physical Assessment, Injection Techniques, and Potential Adverse Events

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Lip enhancement is a common injection treatment that may involve several different injection techniques based on the patient's goals, expectations, and facial anatomy. It is the aesthetic provider's professional judgment to determine which technique will provide the desired results. Taking the time to provide a thorough assessment, review the potential complications, and discuss expectations is an important step in building a patient–nurse therapeutic relationship. Understanding the anatomy and the supporting structures around the perioral area will improve the overall results of a lip enhancement treatment.

ASSESSMENT

Lip enhancement injections involve a multifaceted area of treatment. A patient may present with lip asymmetry, lack of vermilion volume, vertical lip lines due to a strong orbicularis oris muscle, downturned mouth corners, and/or an elongated upper lip due to the normal aging process. Assessing the lips from a frontal view, at rest and with animation, will determine any asymmetries. Differences in perioral muscle activity, color change, history of herpes simplex virus infection, previous trauma to the lip, and loss of teeth may all contribute to the appearance of asymmetry. The lips should also be assessed from the lateral profile to determine proper balance by using the Ricketts esthetic line, an assessment tool developed by Dr. Robert Ricketts, an orthodontist, in 1950. The assessment examines the relationship of the upper and lower lips by drawing an imaginary line from the tip of the nose to the tip of the chin. “Dr. Ricketts felt that to have a pleasing facial profile, in the average Caucasian face, the lower lip would be 2 mm behind the line, and the upper lip 4 mm behind the line, with variations being normal for patients of different ethnic backgrounds, but with some commonalities

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applying to all patients” (Spear, 2017; Figure 1). This assessment tool may determine that the chin needs to be augmented and provide the proper proportions.

To achieve natural lip symmetry, the upper lip should be approximately 75%–80% the volume of the lower lip (Ali, Ende, & Maas, 2007). There are trends where the desired result is a 1:1 ratio, which may look aesthetically pleasing on some patients but not all. The supporting structures around the perioral area must also be assessed, as this may require attention as well. The authors experience found that, typically, the upper lip has a rounder and shorter side and a longer and flat side. This asymmetry may be improved by utilizing small, precise injections to the flatter side and providing structural support to Cupid's bow. Assess for asymmetry of the upper and lower lips and document accordingly. If this is not pointed out to the patient before the treatment, he or she may point it out afterward and blame the injector for the asymmetry.

ANATOMY

Understanding the vascular pathway of the facial vessels is crucial when providing medical aesthetic injection treatments. Injection into or occlusion of a blood vessel can be a serious complication resulting from the use of dermal fillers. Understanding the vascular structure of the face can help decrease the risk of complications. The facial artery should be considered for embolization following injections of the cheek, nasolabial folds, and lips. Being able to visualize the path of the facial artery will help determine the needle depth and placement (Table 1).

The *facial artery* crosses the mandibular border, approximately one fingerbreadth anterior to the masseter muscle. It then passes forward and upward across the cheek to the angle of the mouth, where it gives rise to the *inferior labial artery* (lower lip) and the *superior labial artery* (upper lip) (Figure 2). According to a study by Lee et al. (2015), the area where this bifurcation occurs can be seen at approximately 1.5 cm superolateral to the corner of the mouth, at a depth of approximately 3–5 mm. This can be roughly measured by placing a thumbnail beside the corner of the mouth. The superior and inferior labial arteries form a circular vascular network around the mouth, with several small blood vessels branching out radially with the vermilion border of the lip.

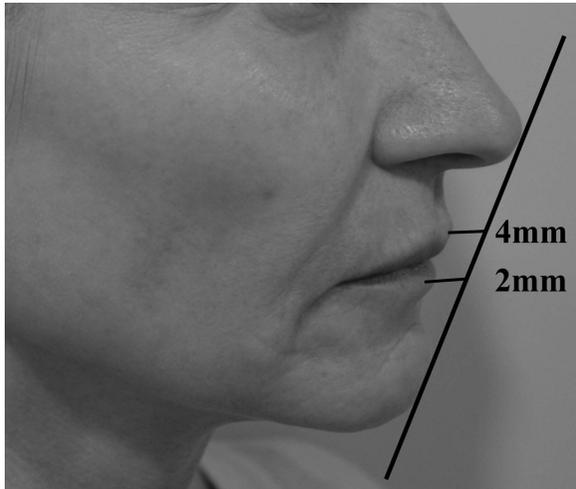


FIGURE 1. Ricketts E line in an assessment tool to examine the relationship of the upper and lower lips by drawing an imaginary line from the tip of the nose to the chin. Photograph used with permission.

When performing lip augmentation, the provider must be aware of the location of the facial artery, as well as the inferior and superior labial arteries. Unfortunately, the pathway of these blood vessels is not always what is described in a textbook. A case study published by Cardinot et al. (2014) discussed their findings of the multiple anatomical variations of the facial artery. Cadaveric studies demonstrated significant anatomical variations in the course of the facial artery, especially distal to the oral commissure. It was concluded that anatomical variation is the rule rather than the exception.

However, most commonly the inferior and superior labial arteries are located posterior to the wet–dry border

and under the orbicularis muscle (Figures 3 and 4). Superficial injections of a dermal filler above the orbicularis oris muscle would help avoid inadvertent injection into the labial artery. However, there are branches of the labial arteries located above the orbicularis oris muscles in the area of Cupid’s bow. Caution must be used when augmenting Cupid’s bow, because of the communication between the superior labial and columellar arteries. While injecting, the aesthetic provider must examine the skin for any evidence of blanching at the site of injection and the potential pathway of the artery.

INJECTION TECHNIQUES

Injection treatments bring with them a risk of bruising and swelling. Ideally, these treatments should be done at least 1–2 weeks before a special event to allow the product to settle and any bruising to fade.

Lip enhancement into the vermilion border, or the red of the lip, is a commonly sought-after injection procedure. The injection technique may be done with a needle or cannula, depending on the aesthetic provider’s experience and comfort level. Hyaluronic acid (HA) filler placement is within the submucosa just above the orbicularis oris muscle. The provider must be aware of the location of the inferior and superior labial arteries, which is typically posterior to the wet–dry border behind the orbicularis oris muscle. A layering of the HA product to increase distribution helps provide a fuller enhancement (Figure 5).

Patients who present with an aging lip, vertical lip lines, and ill-defined vermilion borders pose a different approach to the lip treatment. The best option may be addressing the structural support first and then a secondary treatment to address the vermilion volume.

TABLE 1 Summary of the Lip Vasculature	
Artery	Origin/Branch
Facial artery	<ul style="list-style-type: none"> • Branch of the external carotid. Ascends from the neck over the mid-body of the mandible just anterior to the insertion of the masseter muscle • Branches into the <ol style="list-style-type: none"> 1. Mental artery 2. Inferior and superior labial arteries 3 Angular artery (courses along the nasolabial fold forming the angular artery) • The facial pulse is palpated where the facial artery crosses the inferior border of the mandible immediately anterior to the masseter
Mental artery	<ul style="list-style-type: none"> • Branch of the facial artery that passes under the mandibular body in an anteromedial direction • Mental artery usually has only one main perforator, which penetrates the platysma • Mental foramen is at the level of the second premolar
Inferior labial artery	<ul style="list-style-type: none"> • Branches from the facial artery—2.6 cm lateral and 1.5 cm inferior to the oral commissure • Arises from the angle of the mouth and branches beneath the orbicularis oris
Superior labial artery	<ul style="list-style-type: none"> • Branches from the facial artery 1.1 cm lateral and 0.9 cm superior to the oral commissure • Follows the edge of the upper lip, lying between the mucous membrane and the orbicularis oris, and anastomoses with the artery on the opposite side
<i>Note.</i> Retrieved and adapted from www.wikipedia.org/wiki .	

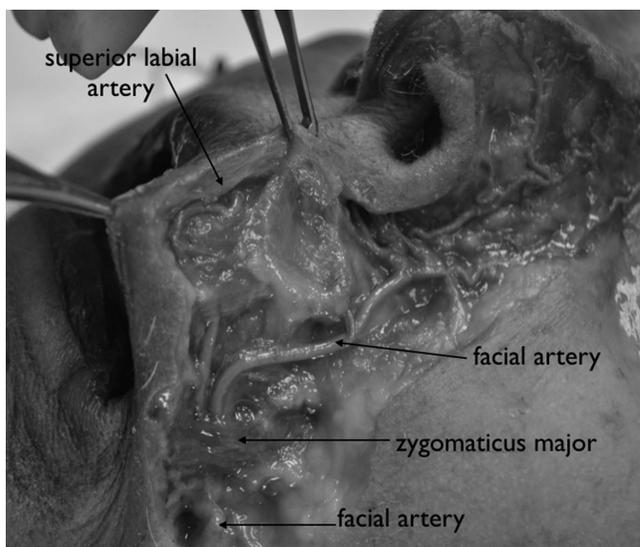


FIGURE 2. Cadaveric dissection of the facial and superior labial arteries, indicating the location of the zygomaticus major muscle. Cadaveric dissection by Claudio DeLorenzi. Photography by Tracey Hotta.

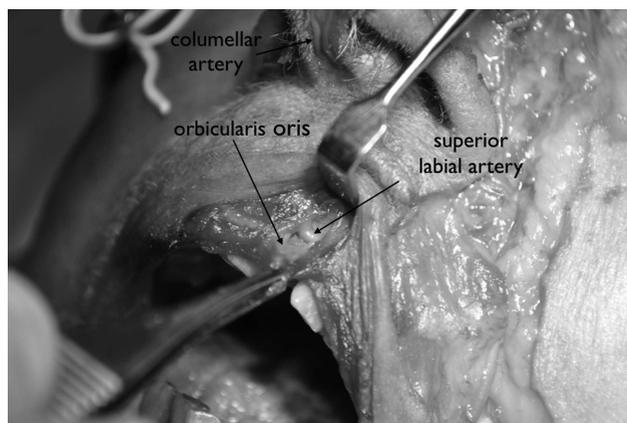


FIGURE 3. Cadaveric dissection of the columellar and superior labial arteries and the orbicularis oris muscle. Cadaveric dissection by Jack Kolenda. Photography by Tracey Hotta.

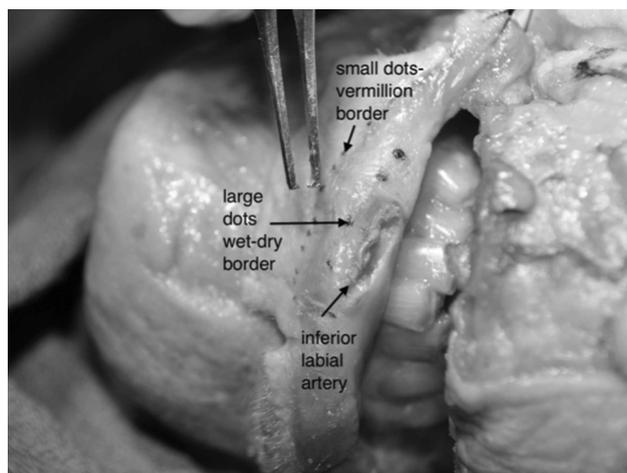


FIGURE 4. Cadaveric dissection of the inferior labial artery. The small dots depict the vermillion border and the larger dots depict the wet-dry border of the lower lip. Cadaveric dissection by Claudio DeLorenzi. Photography by Tracey Hotta.



FIGURE 5. Lower lip augmentation using a 27G 1.5-in. cannula. Used with permission.

The bone absorption of the maxilla, coupled with fat atrophy, can result in a lip that has lengthened and vertical lip lines that are more pronounced when speaking. The treatment choice may be to start with a botulinum toxin A injection to weaken the action of the orbicularis oris muscle. Using a cannula under the vertical lip lines to subcise the attachments and thread a small amount of the product is the preferred method of treatment for the author, as it provides structural support for the upper lip and gently everts the lip (Figure 6).

The perioral lines may be also addressed by injecting each individual line with a low concentration of HA that is indicated for superficial injections. The lines may be injected by serial puncture along the lip line and by linear threading under the lip line for the optimal effect.

The vermillion border (the potential space between the red and white lip segments) may be treated separately to redefine the lip shape and attempt to minimize the appearance of the perioral lines that radiate out from the lip. This is the preferred technique to define the aged border and recreate Cupid's bow. To inject the philtral columns, grasp the philtral column between the fingers and insert the needle at the uppermost point of Cupid's bow and inject into the mid-dermis. Thread the needle toward the angle of the columella and inject in a retrograde fashion. Using a Q-tip in between the two columns to pull them together will enhance the projection (Figure 7).

TREATMENT PROTOCOL

The patient should be reminded of the following instructions to minimize the potential adverse events that may occur. The patient should refrain from taking any anti-inflammatories or blood-thinning medications for at least 3 days prior to the injection or strenuous exercise 2 hours prior to the treatment. Recent research has discussed the potential correlation of sinus infections or dental work around the time of treatment. This may be a contributing factor to the development of biofilm or delayed hypersensitivity reactions (Humphrey, Carruthers, & Carruthers, 2015).



FIGURE 6. Perioral upper lip lines being treated with a 22G 2-in. cannula. Step 1 is to subcise the dermal attachments of the upper lip, followed by injection of a small amount of dermal filler product. Used with permission.

Proper product selection and injection technique are equally important for the successful administration of an HA product for lip enhancement. The result and duration of the correction are extremely technique-sensitive. To optimize results, the provider should follow sequential steps to a treatment protocol to ensure a safe and positive treatment experience. These steps are outlined in Table 2.

Potential Adverse Events

Lip injection treatments are generally well-tolerated, with most patients reporting only minor discomfort. Anticipated side effects may occur after any dermal filler injection procedure. As part of the consultation, the practitioner must inform the patient of potential side effects associated with an injection treatment, which may occur immediately or may be delayed. Patients

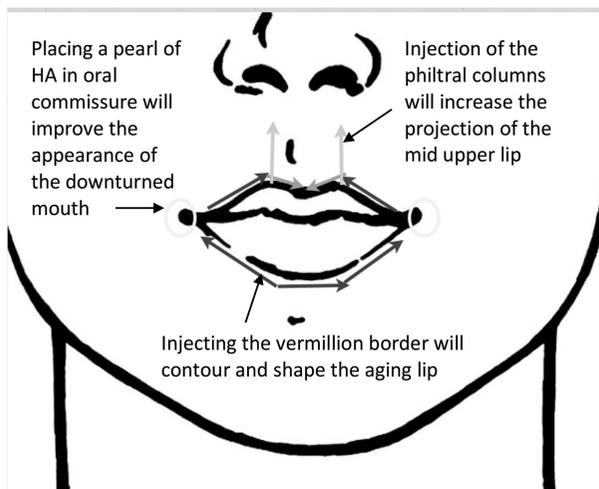


FIGURE 7. Illustration of an injection treatment of an aging lip that presents with an undefined vermilion border, lengthening of the upper lip, and down turned mouth corners.

must be informed about all the potential adverse events so that they may make an informed decision on whether to proceed with the treatment. This must include blindness caused by retinal occlusions, as there have been incidents reported of this devastating complication.

Potential adverse events after any injection may include one or more of the following (Table 3):

Immediate-Onset

Erythema

Erythema may last 1–2 hr depending on the product used, depth of the injection, and the patient's response to the treatment. Prolonged erythema may be camouflaged with makeup once the injection site symptoms have resolved.

Edema

Swelling may last 2–12 hr depending on the product used and the amount injected. Because of the water-binding properties associated with HA products, there tends to be more swelling as compared with collagen products. Patients may use a cool compress postinjection to lessen the degree of swelling.

Injection Site Tenderness

In the event of localized tenderness at the injection sites, patients may take an over-the-counter analgesic if necessary. Increasing discomfort, swelling, or spreading of redness should be brought immediately to the attention of the provider. Patients may also have a vasovagal episode (fainting) from the discomfort or anxiety about the injections.

Ecchymosis

It is possible to have bruising of the soft tissues after an injection. To minimize the risk of bruising, those who are taking aspirin, anti-inflammatories, platelet inhibitors, anticoagulants, vitamin E, *Ginkgo biloba*, and other herbal remedies are advised to discontinue use approximately 3–7 days prior to the injection. Respecting the tissues and changing the needle when it becomes dull or barbed will also help reduce the degree of bruising.

Tyndall Effect

The improper placement of product is caused by superficial placement of HA and presents as a bluish-gray coloration of the skin. Treatment would include manual expression or hyaluronidase injection. Proper product selection will help prevent this complication.

Vascular Compromise (Arterial)

A vascular incident may be caused by vascular occlusion, compression, or injury to the blood vessel. It is best

TABLE 2 Systematic Steps to Providing a Lip Enhancement Treatment

Step	Procedure	Rationale
1. Cleanse the skin	Remove any makeup from the treatment area or areas that may be touched during the treatment procedure	Decreases the risk of infection due to bacteria contained in the makeup
2. Reassess and confirm treatment area with the patient	Use a mirror and mark treatment areas with an eyebrow pencil	Ensures that both parties are in agreement with the treatment program
3. Take consent and approved photographs	Use a standardized method for photodocumentation	Important to have a baseline photograph for comparison posttreatment
4. Prepare comfort measures	Have topical lidocaine, mucosal anesthetic gel, lidocaine injection, and ice packs ready	The more positive the experience, the more likely the patient will refer other patients to the provider
5. Position the patient for the treatment	Mid- to semi-Fowler position is the best position for injection. The patient must have support behind the head	Provides the best angle and visualization of the vermilion border
6. Cleanse the skin with chlorhexidine solution	Cleanse the whole lower face and not jet the perioral area	Prevents the risk of infection from percutaneous injury
7. Inject as per desired technique	Needle and/or cannula may be used. Provide a firm surface for injecting by stretching or pinching the skin	There are several techniques for lip enhancement. Choose the method that must be comfortable for you
8. Lightly massage the treated area	Massage on the surface of the lip or perform a dual-sided massage	Excessive massage with a gauze and/or alcohol can cause redness and irritation at the injection site Change gloves after placing fingers in the mouth to prevent risk of infection
9. Cleanse the area with sterile saline	Use a cleanse gauze and saline to remove blood and chlorhexidine on the surface of the skin	Sterile saline, as this is less irritating than alcohol or peroxide
10. Assess the results with the patient	Have the patient look at the corrected area with a mirror to make certain he or she is satisfied with the results.	Save a small amount of HA so that if an adjustment is to be made, a new syringe of product does not have to be used
11. Apply ice posttreatment	Provide the patient with a new ice pack that is protected with a gauze over the surface	The cold will soothe the area and help reduce bleeding from the injection sites.
12. Record the appropriate information from the treatment session on the patient's treatment record	Information recorded should include type of HA, amount of product used, injection technique (needle or cannula gauge; linear, serial puncture, fanning technique), syringe lot numbers, expiry date, local or topical anesthesia, and posttreatment assessment (i.e., bruising, swelling, vasovagal episode, the patient pleased with early results)	Accurate documentation will allow the provider to properly assess results. This detailed documentation would be a critical component in a potential law suit
13. Provide the patient with verbal and written posttreatment instructions, which include an emergency contact phone number	Avoid strenuous exercise, extensive sun and/or heat exposure, and alcoholic beverages for 24 hr following the injection Any dental appointments must be deferred for at least 1 week after the injection procedure Book a 2-week follow appointment	This type of exposure can cause temporary redness, swelling, and/or itching at or near the injection site Reduces the amount of circulating bacteria in the treatment area Allows for assessment of results and to see whether the patient has any voiced complaints or issues

Note. HA = hyaluronic acid.

TABLE 3 Potential Adverse Events From a Hyaluronic Acid Dermal Filler for Lip Enhancement		
Immediate-onset 0–2 days	Intermediate-onset 3–14 days	Delayed-onset >14 days
Erythema	Angioedema	Inflammatory nodules/biofilm
Edema	Recurrence of herpes simplex virus infection	
Injection site tenderness	Vascular compromise—venous	
Ecchymosis	Noninflammatory nodule	
Tyndall effect		
Vascular compromise—arterial pending necrosis or blindness		

prevented by having an in-depth knowledge of the facial vascular anatomy in relation to surface landmarks. The provider should always be aware of the location of the needle or cannula and observe the skin for color changes while injecting. If the patient experiences a sudden pain,

immediately stop injecting and observe the injection site for blanching (Figure 8). Injecting slowly and with low pressure has been proven to provide a safer and more comfortable injection experience for the patient. Early symptoms of an arterial occlusion include immediate pain

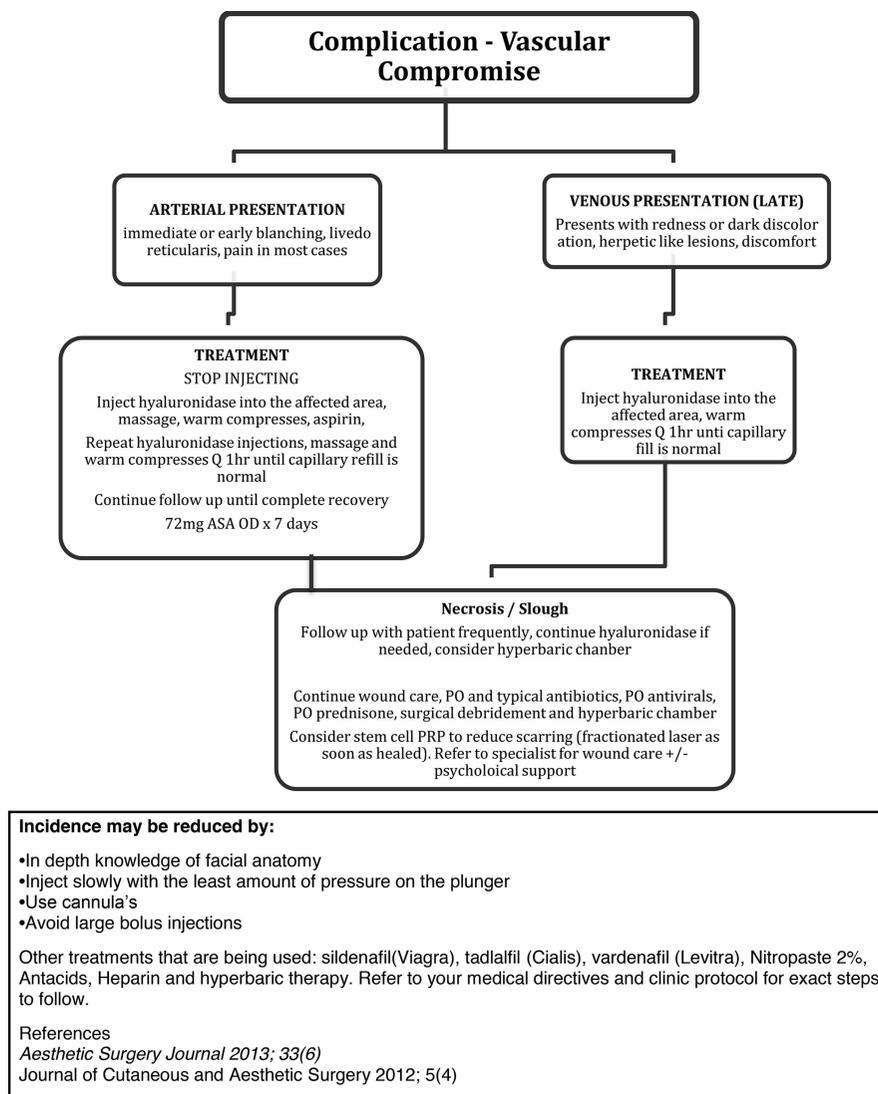


FIGURE 8. Vascular compromise algorithm.

and blanching of the skin with progression to darkening of tissue that is reticulate and motley in appearance.

Retinal occlusion causing blindness, though rare, can result when product is inadvertently injected into the facial artery and causes embolization of the retinal artery (Funt & Pavicic, 2013).

Intermediate-Onset

Angioedema

Angioedema is a skin reaction. Small blood vessels in the subcutaneous and/or submucosal tissues leak watery liquid through their walls and cause swelling. It is most often characterized by an abrupt and short-lived swelling of the skin and mucous membranes. All parts of the body may be affected, but swelling most often occurs around the

eyes and lips. Patients with mild acute angioedema can usually be treated the same way as those with an allergic reaction. In many cases, the swelling is self-limiting and resolves spontaneously after a few hours or days. In more severe cases, where there is persistent swelling, itchiness, or pain, a medical intervention is necessary (Figure 9).

Recurrence of a Herpes Simplex Virus Infection

Patients undergoing lip enhancement with a history of herpes virus infection are at an increased risk of developing a cold sore posttreatment. This is because the herpes virus lives within the vermilion border of the lip, which is also the area injected. For patients with a chronic history of cold sores or who have had an outbreak in the past 6 months, a prescription is given for an antiviral medication as a prophylactic measure.

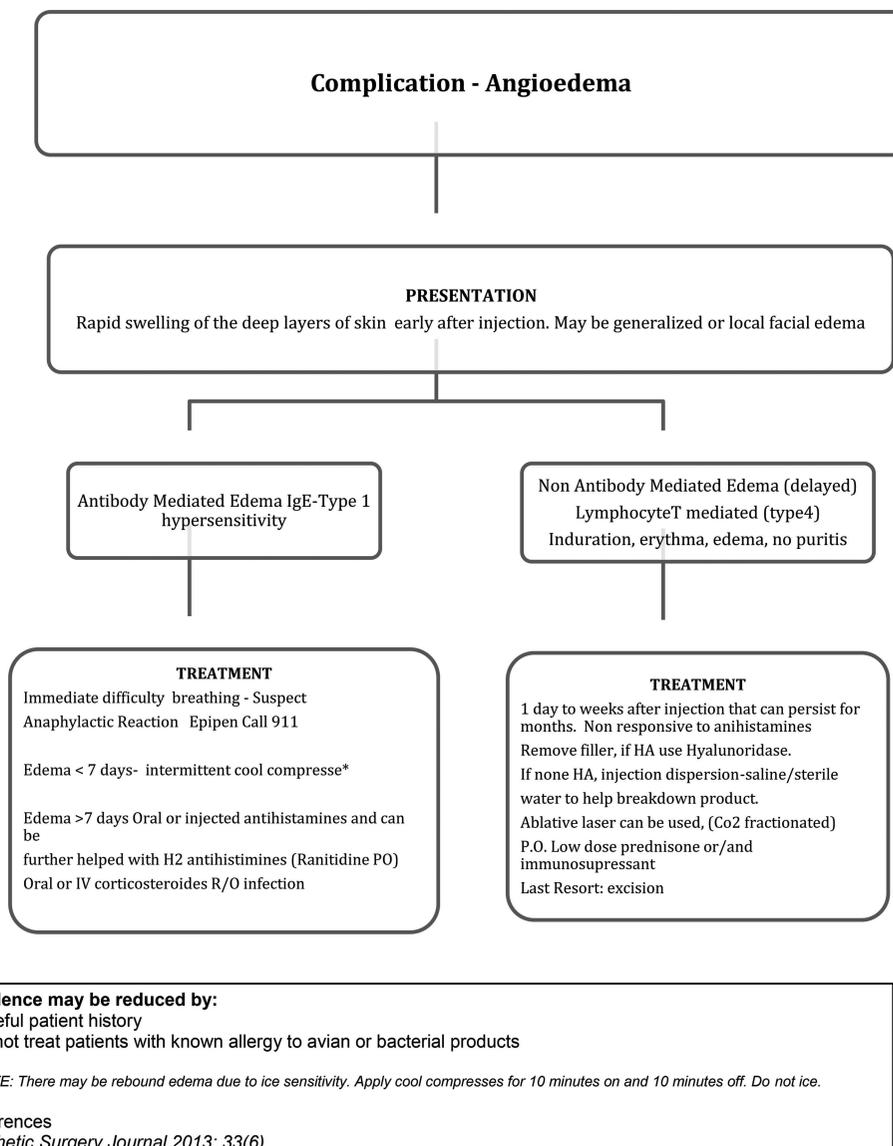


FIGURE 9. Angioedema algorithm.

Vascular Compromise (Venous)

A venous occlusion does not produce immediate pain or blanching but progresses slowly with a gradual area of darkening and dusky appearance. Treatment recommendation is to use hyaluronidase 150 IU per 1 × 1-cm² treatment area. The affected area should be flooded with high dose hyaluronidase, and repeated every 15-30 minutes until the treatment area returns to normal color and capillary refill is improved. If a stronger contouring HA product is used, a higher dose of hyaluronidase will be needed. Typically, these contouring products are not indicated for lip augmentation. Patients may also benefit from a hyperbaric chamber, although there is no clinical research to prove this is helpful.

Noninflammatory Nodule

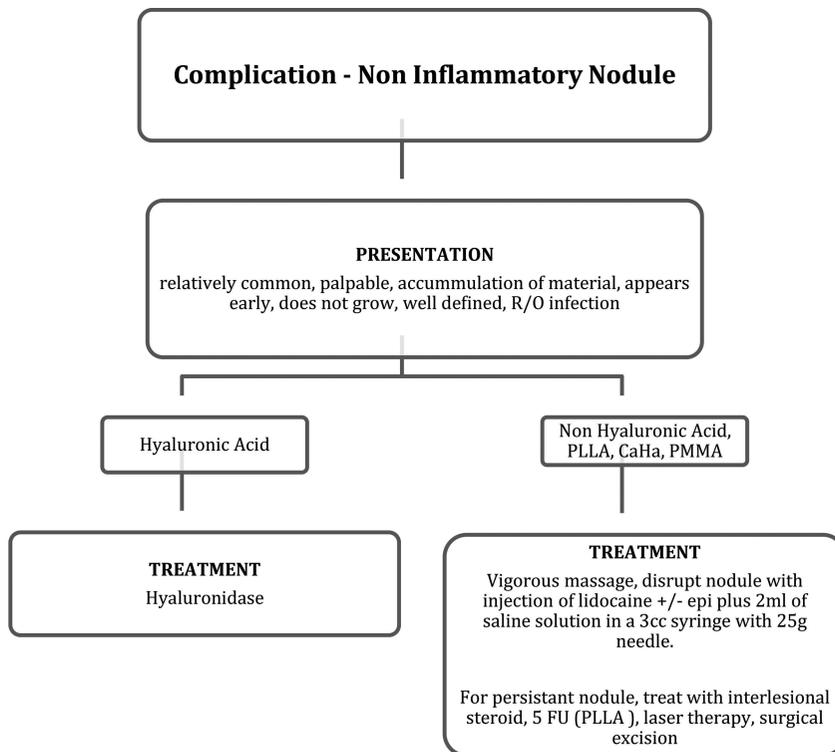
Firmness may occur postinjection, which usually resolves within 1–2 weeks. This may be caused by too much

product being injected at one site, an injection that is too superficial, or failing to effectively massage the product postinjection to ensure even distribution. Treatment would include massage, manual expression, or hyaluronidase. This complication may be confused with Fordyce cysts in the lip. These are small white bumps that may become more visible from the enhancement in the vermilion border (Figure 10).

Delayed-Onset

Inflammatory Nodules/Biofilms

Although infection following injection of tissue fillers is unusual, bacterial, fungal, or viral infection can occur. Preinjection cleansing of the treatment area with chlorhexidine or alcohol will help prevent a postprocedure infection. True infections must be treated with oral



Incidence may be reduced by:

- Avoid over correction or superficial placement of filler
- Appropriate filler selection for appropriate site
- Massage for even distribution

Suggested dose for intralesional steroid is triamcinolone 0.3ml of 10mg/ml or 40mg/ml depending on the size of the nodule

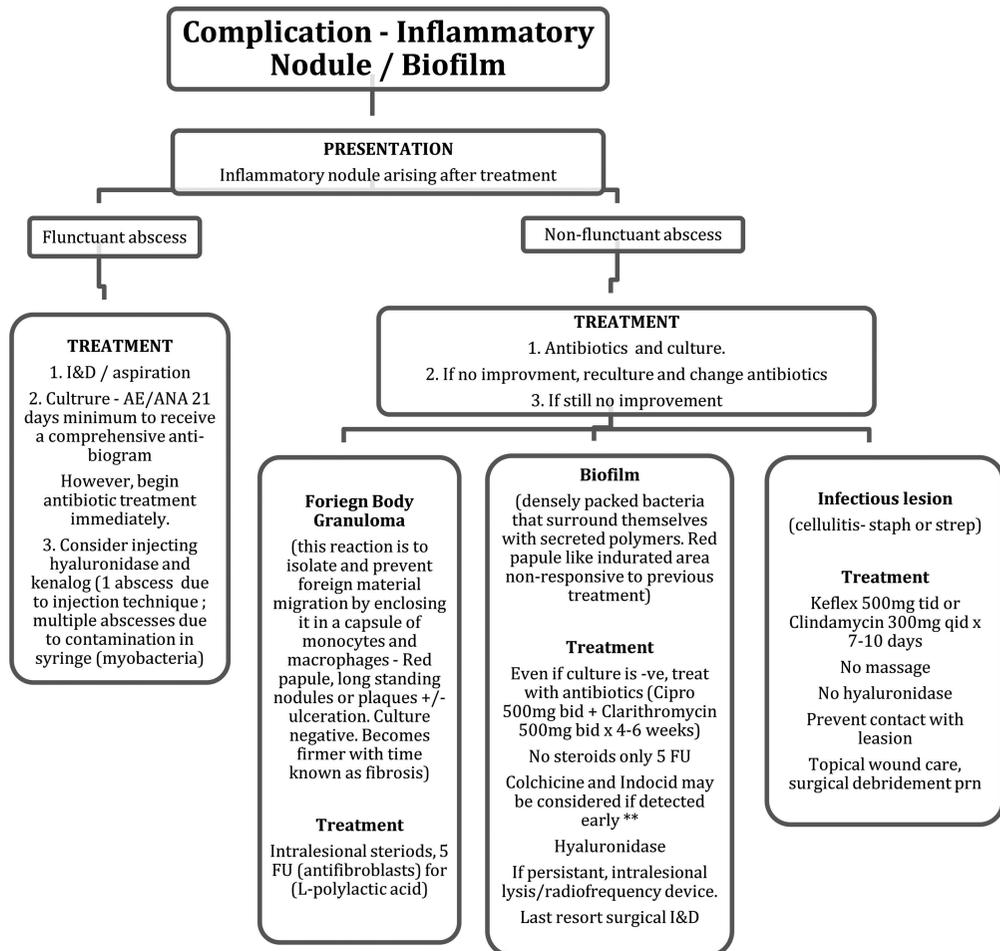
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Aesthetic Surgery Journal 2013; 33(6)
Journal of Cutaneous and Aesthetic Surgery 2012; 5(4)

FIGURE 10. Noninflammatory nodule algorithm.

antibiotics, as ointments will offer little protection. A granuloma usually presents itself as a red and/or thickened nodule arising at the injected site and may persist for several weeks or months. A true granuloma from an HA filler injection is rare. Clinically, foreign body granulomas

appear as red papules, nodules, or plaques (with or without ulceration). Any material expressed is culture-negative. The lesions become firmer over time due to fibrosis. Should this occur, additional treatments—including antibiotics or intralesion injections—may be necessary.



Incidence may be reduced by:

- Proper aseptic technique with chlorexidine prep and maintain aseptic technique during treatment process
- Avoid bolus injections over .2cc
- Massage for even distribution

Suggested recipe for intralesional cortisone and 5-FU
 Triamcinolone 0.3ml(10ml/ml) + 5-FU 0.5ml(50mg/ml) + 0.2ml of lidocaine with epi in a 1 ml syringe.
 Inject 0.1ml (TT and lips); up to .5ml cheeks
 Series of 2-3 injections Q2-4 weeks

** Colchicine interrupts the inflammatory response/cascade preventing it from spreading to other injected areas. Day 1: Colchicine 0.6mg x 2 tabs; Indocid 75mg TID
 Day 2-5: Colchicine 0.6mg x 1tab & Indocid 75mgTID

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Journal of Cutaneous and Aesthetic Surgery 2012; 5(4)

FIGURE 11. Inflammatory nodule algorithm.

Biofilms are widespread in nature and consist of densely packed communities of bacteria that surround themselves with secreted polymers. When a material is injected into the skin or subcutaneous tissue, it can become coated with bacteria and form a biofilm. These complex collections of bacteria secrete a protective and adhesive matrix that allows them to irreversibly adhere to a living structure or inert surface, where they give rise to a low-grade chronic infection that is resistant to antibiotics. Colchicine has been used with success for treating delayed hypersensitivity reactions but has not been documented in written article (Figure 11).

CONCLUSION

Lip enhancement is an injection treatment that may involve several different injection techniques, based on the patient's goals, expectations, and facial anatomy. The aesthetic provider must understand the different product choices and indications of each one. There must also be an understanding of the different injection techniques to achieve the desired results. Of utmost importance is understanding the perioral anatomy and being cognizant of any potential complications that may occur. Taking the time to provide a thorough assessment, review the potential complications, and discuss expectations is an important step in building a patient–nurse therapeutic relationship.

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