

Anesthesia

Providing adequate anesthesia is an essential part of performing dermal filler procedures and successfully incorporating them into practice. In addition to offering the patient a better procedural experience, minimizing discomfort allows for greater dermal filler injection precision and optimal results.

Anesthesia for dermal filler treatments ideally achieves the desired anesthetic effect with minimal distortion of the treatment area, to preserve baseline tissue architecture. The main anesthesia methods for use with the dermal filler procedures in this book are reviewed below.

Anesthesia Methods for Dermal Filler Treatments

- Injectable
 - Local infiltration
 - Ring blocks
- Topical
- Ice and other coolants

The anesthetic method chosen is dependent on the sensitivity of the treatment area, patient tolerance for pain, and the need to preserve baseline anatomy. Patients who have never had injectable cosmetic treatments typically have higher anxiety levels, lower pain tolerance, and often require injectable anesthetics to achieve adequate anesthesia. Patients with high pain thresholds and those with less anxiety around injectable procedures can often be made comfortable with topical anesthetics or topical coolants, particularly when lidocaine-based dermal fillers are used which have less procedural discomfort. Sensitive areas, such as the lips, almost always require injectable anesthesia regardless of the patient's baseline pain threshold. Each chapter recommends one method of anesthesia for use with a given procedure. However, other methods reviewed in this section may be used alternatively or adjunctively, on the basis of the patient's pain tolerance and provider preference.

Before administering anesthesia several preparatory steps are taken, which are outlined in the Preprocedure Checklist that follows.

Preprocedure Checklist

- Confirm that the patient has no history of allergies to anesthetics or adverse responses with injectable procedures.
- Confirm that the patient has had recent food intake. If none in the last 3–4 hours offer the patient a snack, such as a granola bar or juice, to reduce the risk of hypoglycemia.
- Address anxiety symptoms and defer the procedure if the patient is excessively apprehensive.
- Obtain informed consent (for details, see Aesthetic Consultation and Preprocedure Checklist in the Introduction and Foundation Concepts section).

Injectable Anesthetics

Lidocaine is the most commonly used injectable anesthetic for dermal filler treatments. It has a rapid onset of effect for pain inhibition within a few minutes of injection. Pressure, touch, and temperature sensations are also inhibited but the onset of these effects is slower than for pain reduction. Injectable anesthesia methods for dermal filler procedures described in this book include local infiltration and ring blocks, and are described in detail below.

Maximum Lidocaine Dose

A common injectable anesthetic used for dermal filler procedures is lidocaine 2% solution with epinephrine 1:100,000 (referred to as lidocaine-epinephrine solution); lidocaine 1% with epinephrine may be used alternatively. Lidocaine alone is a vasodilator. When mixed with the vasoconstrictor epinephrine, this combination reduces bleeding, increases the duration of anesthetic effect, and reduces the risk of systemic toxicity by localizing the lidocaine to the injection area. Lidocaine injection volumes necessary for dermal filler treatments are typically small, ranging from 0.5 mL to a maximum of 6 mL, making lidocaine toxicity extremely rare. Nonetheless, it is important to know the maximal safe dosing for lidocaine, which is shown in Table 1. Above these doses, patients are at risk for neurotoxicity and cardiotoxicity.

Allergy to Lidocaine

True allergic reactions to lidocaine are extremely rare. Most patients who report a lidocaine allergy describe a vasovagal event or epinephrine related symptoms such as tachycardia. In patients with sensitivity to epinephrine, it is advisable to use lidocaine without epinephrine and inform patients that their risk of bruising with dermal filler treatment is greater than when lidocaine-epinephrine solution is used. In rare cases, patients may report true signs of an allergic reaction such as puritis or papular outbreak with lidocaine injection. These allergic responses are usually because of the paraben preservatives found in multidose lidocaine vials. Single-use lidocaine vials do not contain parabens. A small test injection of 0.1 mL lidocaine from a multidose vial can be performed on the dorsum of the forearm to assess for an allergic response to preservatives. Some patients report an allergic reaction to Novocain (procaine hydrochloride) administered at dental visits. There is no cross-reactivity between lidocaine, which is an amide, and procaine, which is an ester.

TABLE 1
Maximum Dose of 2% Lidocaine (20 mg/mL)

Lidocaine Solution	Maximum Adult Dose by Body Weight	Maximum Injection Volume for 140 lb (64 kg) Adult
2% lidocaine without epinephrine	4 mg/kg	13 mL
2% lidocaine with epinephrine	7 mg/kg	22 mL

Complications with Injectable Anesthetics

Complications with injectable anesthetics include adverse responses to the procedure (which are most common), complications related to needles, and specific reactions to the compounds being injected.

- General procedure complications
 - Vasovagal episode
 - Hypoglycemia
 - Anxiety
- Injection complications
 - Bruising
 - Infection
 - Nerve injury
 - Allergic reactions (puritis and papules locally, and the remote possibility of urticaria, angioedema, and anaphylaxis)
 - Lidocaine toxicity of the central nervous system (dizziness, tongue numbness, tinnitus, diplopia, nystagmus, slurred speech, seizures, respiratory distress)
 - Lidocaine toxicity of the cardiovascular system (arrhythmias, hypotension, cardiac arrest)
 - Epinephrine adverse response (tachycardia, tremor, anxiety, local hypoperfusion)

Lidocaine toxicity is extremely unlikely with anesthesia for dermal filler treatments because of the relatively small doses that are used. Neurotoxicity and cardiotoxicity are possible with inadvertent intravascular injection, which can occur with nerve blocks as the targeted nerves are in close proximity with larger vessels.

Techniques for Reducing Discomfort with Injectable Procedures

- Ensure injection solutions are at room temperature.
- Use small gauge needles (e.g., 30-gauge needle) and change after six or more injections to maintain a sharp needle.
- Inject slowly.
- Instruct patients to keep their eyes closed during the procedure and clearly inform them about each step of the process to prevent jumpiness.
- Distract patients by discussing something pleasant.
- Use breathing to assist with relaxation. Instruct patients to take a deep breath in and insert the needle upon exhalation.

Equipment for Injectable Anesthetic Procedures: Local Infiltration and Ring Blocks

- General dermal filler equipment (see General Equipment in the Introduction and Foundation Concepts section)
- 1.0-mL, 3.0-mL, and 5.0-mL Luer-Lok™ tip syringes
- Lidocaine HCl 2% with epinephrine 1:100,000
- Lidocaine HCl 2% without epinephrine 1:100,000
- Sodium bicarbonate 8.4%
- 18-gauge, 1½-inch needle (to draw up)

- 30-gauge, ½-inch needle (for injection)
- Gauze 3 × 3 inches, nonwoven
- Alcohol pads

Buffered Lidocaine

Lidocaine is acidic and may be buffered with sodium bicarbonate 8.4% in a 1:10 dilution to reduce the burning sensation upon injection, and is preferred by the author for increased patient comfort. Buffering of lidocaine is done immediately before injection.

To buffer a 1.0 mL total volume solution of 2% lidocaine-epinephrine 1:100,000 with sodium bicarbonate 8.4%:

- Use a 1.0-mL syringe with an 18-gauge 1½-inch needle to draw up 0.9 mL lidocaine-epinephrine solution.
- Detach the syringe from the needle hub and leave the needle in the lidocaine-epinephrine vial.
- Attach a new 18-gauge 1½ inch needle to the same 1.0-mL syringe and draw up 0.1 mL sodium bicarbonate 8.4%, taking care not to push lidocaine into the sodium bicarbonate vial.
- Detach the syringe from the needle hub and leave the needle in the sodium bicarbonate vial.
- Mix the lidocaine-epinephrine solution by inverting the syringe and tapping, causing the air bubble to move.

Tip

- If a white precipitate is visible in the buffered solution syringe, too much sodium bicarbonate has been added and the buffered mixture should not be used. When the pH is raised too high (pH > 7.8) by the addition of too much sodium bicarbonate, anesthetic precipitates out of solution reducing the clinical effectiveness of the anesthetic and injection of the solution may cause tissue irritation.

Local Infiltration

Local infiltration in or adjacent to the dermal filler treatment area works well for most dermal filler treatments. However, local infiltration results in edema with tissue distortion and care should be taken to inject the smallest possible anesthetic volumes that can achieve adequate anesthesia.

Overview of Local Lidocaine Infiltration Procedure

- Most dermal filler facial areas are adequately anesthetized with three to six injections of 0.1 mL buffered lidocaine-epinephrine solution.
- Local infiltration injections are placed subcutaneously. The skin should rise slightly upon injection but not appear dimpled.
- Local infiltration injection sites are shown for basic dermal filler treatment areas in Figure 1 and for advanced treatment areas that can be adequately anesthetized with local infiltration in Figure 2.



Key:

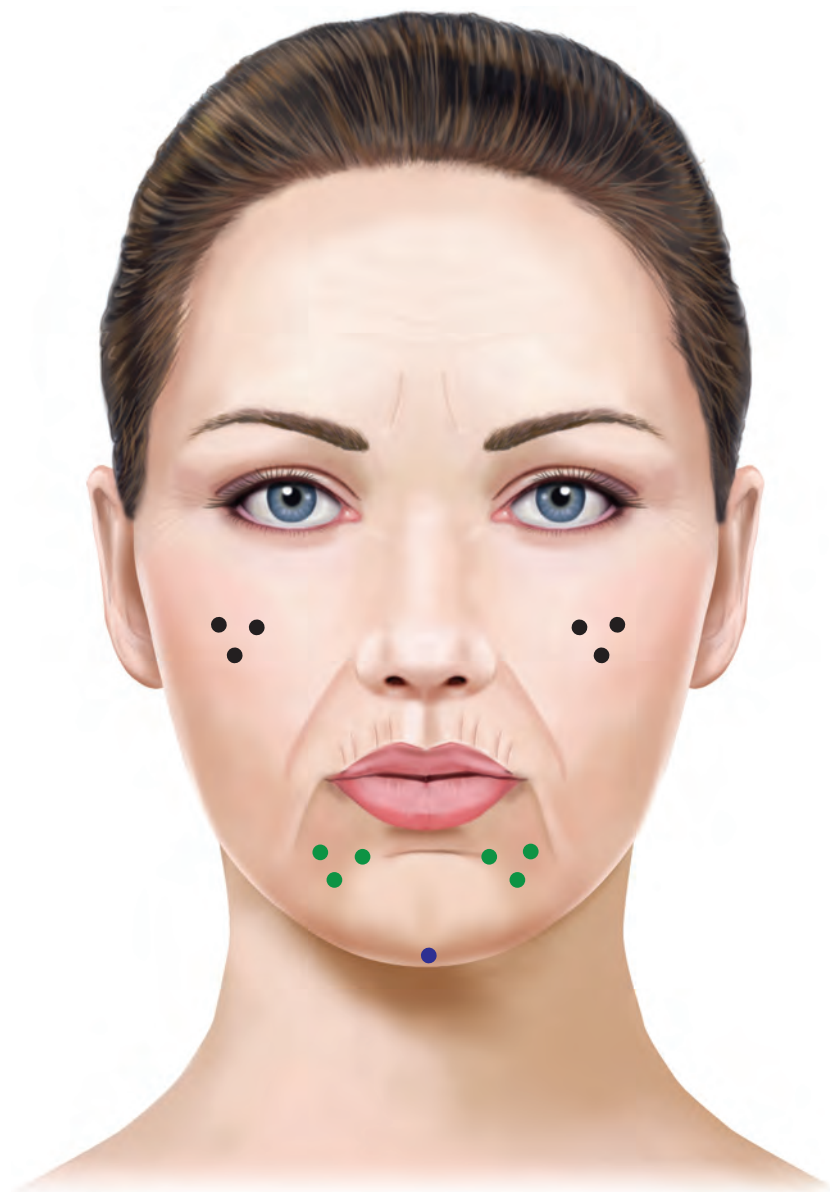
- Nasolabial fold anesthesia
- Marionette line anesthesia
- Mental crease anesthesia

All dots = 0.1 mL Lidocaine

FIGURE 1 ● Overview of local anesthetic infiltration for basic dermal filler treatment areas.

Performing Local Lidocaine Infiltration Procedure

- Perform the Preprocedure Checklist as outlined above.
- Using a 1.0-mL syringe and 18-gauge 1½-inch needle, draw up 1.0 mL buffered 2 % lidocaine-epinephrine solution.



Key:

- Malar anesthesia
- Extended mental crease anesthesia
- Chin augmentation anesthesia

All dots = 0.1 mL Lidocaine

FIGURE 2 Overview of local anesthetic infiltration for advanced dermal filler treatment areas.

- Change to a 30-gauge 1/2-inch needle.
- Prepare the skin with alcohol.
- Inject 0.1 mL buffered lidocaine-epinephrine solution subcutaneously (Fig. 3). The solution should be injected slowly to minimize discomfort.



FIGURE 3 ● Lidocaine infiltration technique.

- Proceed with subsequent injections of 0.1 mL buffered lidocaine-epinephrine solution as indicated for the specific treatment area.
- Repeat the above injections for the contralateral side of the face if required.
- Compress the injection sites away from the treatment area to minimize edema from the anesthetic.
- Allow a few minutes for the anesthetic to take effect.

Patients with Low Pain Thresholds

Patients who have anxiety with injectable procedures, are new to your practice or have never had dermal filler treatment, often experience heightened discomfort with injections. In addition to the Techniques for Reducing Discomfort discussed above, several other techniques can aid in reducing discomfort with local infiltration:

- Pretreat the anesthetic injection sites with ice for a few minutes or another coolant such as ethyl chloride (see Ice and Other Coolants section below).

- 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 (see Topical Anesthetics section below).

Ring Blocks

A ring block is particularly useful with dermal filler treatment in the lip area, as it offers profound anesthesia with minimal to no distortion of the treatment area. Traditionally, nerve blocks, such as the infraorbital nerve block and mental nerve block, have been used to anesthetize lips for dermal filler treatments. These involve injection of anesthetic proximally along the nerve or at the foramen, and require larger gauge and long needles, which can be associated with greater risks. In addition, the targeted nerve may not be adequately anesthetized. Lip ring blocks are performed with short, small gauge needles and can reliably achieve upper and lower lip, as well as perioral anesthesia with minimal risks. Ring blocks are the preferred method by the author for dermal filler treatment of the lips and perioral area.

Anatomy

- The upper and lower lips' sensory innervation is primarily from the infraorbital and mental nerves (Fig. 4; Dermal Filler Anatomy section, Fig. 4).

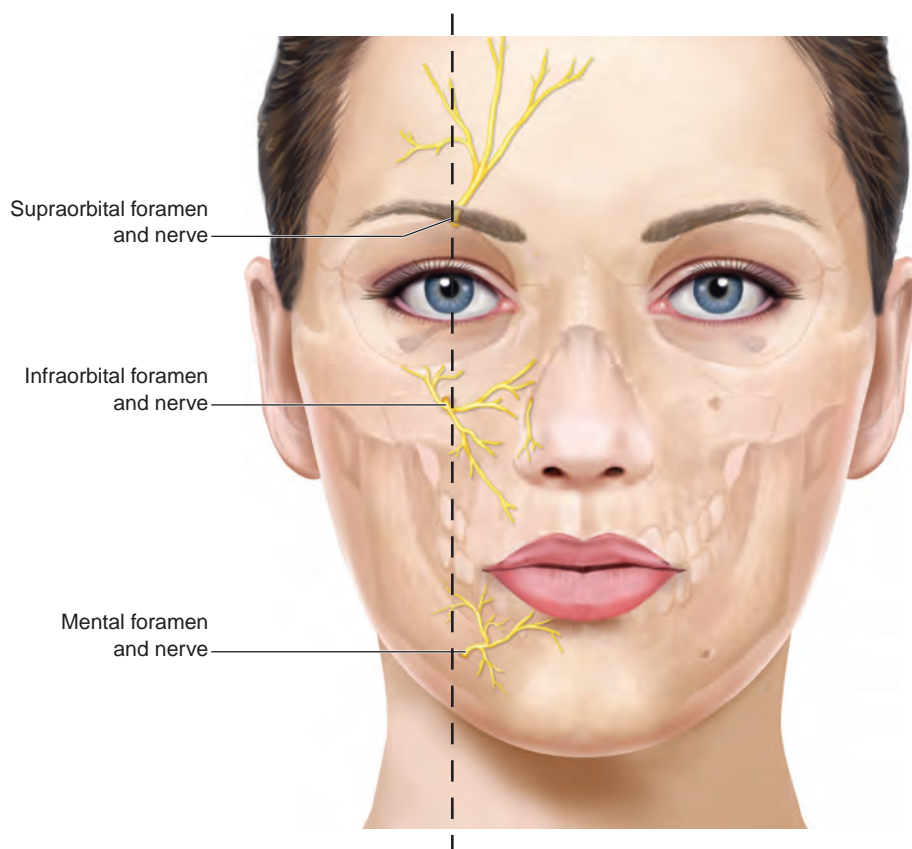


FIGURE 4 ● Nerves and foramen of the face.

- The **upper lip** is innervated by the distal portion of the inferior branch of the infraorbital nerve. The superior branches of the infraorbital nerve innervate the lower eyelid, lateral nose, and medial cheek.
- The **lower lip** is innervated by the mental nerve.
- The **corners of the lips** are innervated by the distal portion of the buccal nerve.
- The infraorbital and mental nerves lie along a vertical line that extends from the supraorbital notch to the mandible (Fig. 4). The supraorbital notch lies along the upper border of the orbit, and is palpable approximately 2.5 cm lateral to the midline of the face. The infraorbital foramen is palpable approximately 1 cm inferior to the infraorbital bony margin and the mental foramen is palpable 1 cm above the margin of the mandible.

Overview of Lip Ring Block Procedure

- Perform Preprocedure Checklist as outlined above.
- The primary target for the upper lip ring block is the distal portion of the inferior branch of the infraorbital nerve and the primary target of lower lip ring block is the distal mental nerve. The lip ring block technique described below utilizes a short, ½-inch needle, which reaches only the distal portions of the infraorbital and mental nerves that innervate the lips.
- Lip ring block injections are intraoral and use lidocaine 2% with epinephrine 1:100,000 (buffered or unbuffered).
- **Upper lip ring block** injection sites and doses are shown in Figure 5. There are four injections for the upper lip and a total of 1.2 mL lidocaine-epinephrine solution is injected. The upper lip is more sensitive than the lower lip and anesthesia of the injection sites may also be required for patient comfort. Injection site anesthesia can be achieved using topical benzocaine before performing the ring block.



● = 0.1 mL Lidocaine ○ = 0.5 mL Lidocaine

FIGURE 5 ● Overview of upper lip ring block injection sites and doses.



● = 0.1 mL Lidocaine

FIGURE 6 ● Local lidocaine infiltration for anesthetizing the corners of the lips.

- **Corners of the lips** are poorly anesthetized with upper or lower lip ring blocks and require additional local lidocaine infiltration. Injection sites and doses for anesthetizing the corners of the lips are shown in Figure 6. There is one injection of 0.1 mL lidocaine-epinephrine solution at each corner.
- **Lower lip ring block** injection sites and doses are shown in Figure 7. There are four injections for the lower lip and a total of 1.2 mL lidocaine-epinephrine solution is injected.



● = 0.1 mL Lidocaine ○ = 0.5 mL Lidocaine

FIGURE 7 ● Overview of lower lip ring block injection sites and doses.

- All lip ring block injections are placed at the gingivobuccal margin just under the submucosa, except for the injections targeting the distal branches of the infraorbital and mental nerves. These injections are placed deeper under the submucosa along the maxilla and mandible bones, respectively.

Performing Upper Lip Ring Block Procedure

- Position the patient upright at about 60 degrees with the chin tipped upward.
- The provider is positioned on the opposite side of upper lip to be anesthetized.
- Lift the upper lip to visualize the gingivobuccal margin.
- The injection points along the gingivobuccal margin can be anesthetized with benzocaine, using either a prefilled swab (e.g., CaineTips) (Fig. 8) or a small amount of benzocaine gel 20% (e.g., Ultracare) on a cotton-tipped applicator. The swab or gel is placed along gingivobuccal margin between the frenulum and the maxillary canine tooth. Benzocaine takes effect in less than 1 minute and does not need to be removed prior to injection.
- The first upper lip injection point is at the gingivobuccal margin just lateral to the maxillary canine (third tooth from the midline). Insert a 30-gauge, ½-inch needle under the mucosa and direct the needle superiorly toward the pupil, staying parallel to the maxilla. Advance the needle almost the full length and inject 0.5 mL lidocaine (Fig. 9). The anesthetic should flow easily. If the needle is angled too superficially, lidocaine may be placed in the dermis which can be felt as resistance during injection. After removing the needle, compress the deep palpable wheal of lidocaine superiorly toward the infraorbital foramen.
- The second upper lip injection point is just lateral to the upper lip frenulum. Insert the needle tip just under the mucosa and inject 0.1 mL lidocaine (Fig. 10). After the needle is removed, compress the injection site to distribute the lidocaine.



FIGURE 8 ● Benzocaine swabs.



FIGURE 9 ● First lidocaine injection for upper lip ring block.



FIGURE 10 ● Second lidocaine injection for upper lip ring block.

- Perform injections for the corners of lips as described below.
- Reposition to the opposite side and repeat earlier injections to anesthetize the contralateral upper lip.
- Anesthetic effect typically takes 5–10 minutes.
- Test sensation of the upper lip before initiating dermal filler treatment. If adequate anesthesia is not achieved, repeat the procedure injecting an additional 0.5 mL lidocaine at the maxillary canine injection site and wait an additional 10 minutes.

Performing Local Infiltration Injections for Corners of Lips

- The provider is positioned on the opposite side of the corner to be injected.
- Insert the needle tip just under the mucosa and inject 0.1 mL lidocaine (Fig. 11).
- After the needle is removed, compress the injection site to distribute the lidocaine.
- Reposition to the opposite side and repeat the above injection.

Performing Lower Lip Ring Block Procedure

- Position patient upright at about 60 degrees with chin tipped downward.
- The provider is positioned on the opposite side of the lower lip to be anesthetized.
- Lift the lower lip to visualize the gingivobuccal margin.
- The first lower lip injection point is at the gingivobuccal margin just lateral to the first mandibular bicuspid (also called the first premolar, which is the fourth tooth from the midline). Insert a 30-gauge, ½-inch needle under the mucosa and direct the needle inferiorly toward the mental foramen, staying parallel to the mandible. Advance the needle half way and inject 0.5 mL lidocaine (Fig. 12). The anesthetic



FIGURE 11 ● Corner of the lip lidocaine injection technique.



FIGURE 12 ● Lower lip ring block injection technique.

should flow easily unless the needle is angled too superficially into the dermis. After removing the needle, compress the deep palpable wheal of lidocaine inferiorly toward the mental foramen.

- The second lower lip injection point is just lateral to the lower lip frenulum. Insert the needle tip just under the mucosa and inject 0.1 mL lidocaine. After the needle is removed, compress the injection site to distribute the lidocaine.
- If the upper lip ring block procedure was not performed, then proceed with injections for the corners of the lips as described in the previous section.
- Reposition to the opposite side and repeat the earlier injections to anesthetize the contralateral lower lip.
- Anesthetic effect typically takes 5–10 minutes.
- Test sensation of the lower lip before initiating dermal filler treatment. If adequate anesthesia is not achieved, repeat the procedure injecting an additional 0.5 mL lidocaine at the first mandibular bicuspid injection site and wait an additional 10 minutes.

Topical Anesthetics

Topical anesthetics are often used with dermal filler procedures due to their ease of application. With the incorporation of lidocaine into dermal filler products, discomfort with dermal filler treatment has been reduced. Some patients, particularly those with high pain thresholds, can tolerate treatment with a dermal filler product plus lidocaine using only a topical anesthetic or topical coolant for anesthesia.

Topical anesthetics have the same mechanism of action as injectable anesthetics with blocking sensory nerves through neuronal impulse inhibition, and they reduce discomfort associated with needle insertion. Table 2 shows commonly used topical anesthetic products. BLT is one of the most potent and fast acting topical anesthetics

TABLE 2

Commonly Used Topical Anesthetic Products for Dermal Filler Procedures

- L-M-X (lidocaine 4%–5%)^a
- EMLA (lidocaine 2.5%;prilocaine 2.5%)^b
- BLT (benzocaine 20%;lidocaine 6%;tetracaine 4%)^c

^aOver-the-counter product
^bPrescription
^cCompounded by a pharmacy
See Appendix 5 for suppliers

and is preferred for use by the author. It is applied in-office, with a maximum dose of 0.5 g and is typically applied for 15 minutes. Some providers enhance topical anesthetic effects by occluding the product under plastic wrap once applied to the skin, however, due to its potency, occlusion under plastic wrap is not necessary with BLT. Some pharmacies formulate BLT with the vasoconstrictor phenylephrine, which may reduce the risk of systemic toxicity through localizing the BLT to the application area, similar to epinephrine’s effect with lidocaine.

Dosing

The local effect of a topical anesthetic is related to the concentration of ingredients, surface area, duration of application, and penetration into the skin.

The dosing of BLT is limited by the concentration of tetracaine, as this agent has the greatest toxicity risk. Tetracaine 4% corresponds to 40 mg/g. An application of 0.5 g BLT contains 20 mg tetracaine, which is the maximal recommended dose (Table 3). BLT products formulated with phenylephrine may have different maximal doses and it is advisable to ascertain the maximal dose of the specific BLT product used from the compounding pharmacy.

Complications with Topical Anesthetics

The application surface area is small with dermal filler treatments, and consequently, there are few reported complications with topical anesthetics applied to the face. Cases

TABLE 3

Maximum Dose of Topical Anesthetics

Topical Anesthetic	Maximum Adult Dose	Time to Peak	Duration of Effect
Lidocaine	500 mg/dose	2–5 min	30 min
Lidocaine with prilocaine	60 mg/dose	60–120 min	90 min
Tetracaine	20 mg/dose	3–8 min	45 min

of toxicity with topical anesthetics have been reported with application to large surface areas, such as full lower extremities prior to laser hair reduction treatments, and with fractional ablative laser treatments where skin is not intact. Possible topical anesthetic complications are listed as follows:

- Allergic reactions (puritis and papules locally, and the remote possibility of urticaria, angioedema, and anaphylaxis).
- Lidocaine toxicity of the central nervous system (dizziness, tongue numbness, tinnitus, diplopia, nystagmus, slurred speech, seizures, respiratory distress).
- Lidocaine toxicity of the cardiovascular system (arrhythmias, hypotension, cardiac arrest).
- Tetracaine toxicity of the central nervous system (restlessness, agitation, seizure activity).
- Lidocaine, tetracaine, or prilocaine can cause methemoglobinemia (cyanosis, acidosis).

Equipment for Topical Anesthetics

- Topical anesthetic
- Alcohol pads
- Plastic wrap (for occlusion of topical anesthetic)

Performing Topical Anesthetic Procedure

- Perform Preprocedure Checklist as outlined above.
- Prepare the skin in the treatment area using alcohol to degrease the skin and enhance anesthetic penetration.
- Apply the topical anesthetic to the skin in the treatment area using a gloved finger or cotton-tipped applicator and rub gently to enhance penetration. Figure 13 shows a patient with BLT on half the face (for demonstration purposes).
- If not using BLT, occlude topical anesthetic under plastic wrap to enhance penetration.
- Remove all topical anesthetic with alcohol after 15 to 30 minutes, depending on the topical anesthetic used.

Ice and Other Coolants

Ice and other topical coolant modalities are anesthetic options that may be used as alternatives to or adjunctively with other anesthesia methods listed above. These include:

- Ice packs
- Vapocoolant (e.g., ethyl chloride spray)
- Contact cooling device (e.g., ArTek® Spot)

Equipment for Ice and Topical Coolants

- Ice or coolant
- Alcohol
- Power source for contact cooling devices

Performing Ice and Topical Coolant Procedures

- **Ice** may be applied to the skin immediately before injection for approximately 1–2 minutes, until the skin is erythematous but not blanched (Fig. 14). Prepare the skin in the treatment area using alcohol.



FIGURE 13 ● Topical anesthetic.



FIGURE 14 ● Ice.



FIGURE 15 ● Vapocoolant (ethyl chloride spray).

- **Vapocoolant**, such as ethyl chloride (e.g., Pain Ease), may be sprayed immediately before treatment by holding the can upright 3–4 inches from the injection site and spraying for about 5 seconds until the skin just turns white (Fig. 15). Prepare the skin with alcohol.
- **Contact cooling devices** (e.g., ArTek Spot) can be used in place of ice or a vapocoolant. Anesthesia is achieved by applying contact cooling immediately before treatment for approximately 1–2 minutes or until the skin is erythematous. Prepare the skin in the treatment area using alcohol.

Tip

- The goal temperature for contact cooling is approximately 5°C. Over cooling with prolonged blanching of the skin can result in epidermal injury.