Section 2

Introduction and Foundation Concepts

Dermal filler treatments have become one of the most commonly performed cosmetic procedures in the United States, second only to botulinum toxin treatments, according to statistics from the American Society for Aesthetic Plastic Surgery. They have advanced beyond their primary indication as treatment for facial wrinkles and folds to more sophisticated applications of facial sculpting and contouring. Dermal Fillers are a versatile and elegant tool for facial rejuvenation and filler injection is an essential skill for physicians and qualified healthcare providers who wish to incorporate aesthetic medicine into their practice.

Currently available fillers vary in composition, duration of action, palpability, administration techniques, complications, and other factors. Achieving desirable outcomes and minimizing the risk of complications depend equally on the provider's injection skills, knowledge of dermal filler products and anatomy, as well as an appreciation for aesthetic facial proportions and symmetry.

Facial Aging

Facial aging is associated with a gradual thinning of the skin and loss of elasticity over time accompanied by diminishment of dermal collagen, hyaluronic acid (HA), and elastin. This intrinsic aging process is accelerated and compounded by sun damage and other extrinsic factors such as smoking, resulting in facial lines and wrinkles (also called rhytids or rhytides). Habitual muscle contraction with facial expression also contributes to formation of wrinkles, particularly in the upper one-third of the face. These dynamic wrinkles are typically treated with botulinum toxin injections. In the lower two-thirds of the face volume loss and laxity are more evident and dermal fillers are most commonly used in this region (Figs. 1 and 2). Lines and wrinkles in this area are typically visible when the face is at rest, which are referred to as static lines. Facial volume loss, also referred to as biometric reduction, results from resorption of facial bones, degradation of subcutaneous tissue, and descent of the fat pads. Facial contours change with age from high cheeks and a small chin (Fig. 3A) to a bottom-heavy appearance with flattened cheeks and prominent jowls (Fig. 3B).

Basic and Advanced Procedures

The treatment area, type of product (temporary, semipermanent, permanent, etc.), and injection techniques used determine the level of complexity for dermal filler procedures. When getting started with dermal filler injection, it is advisable to start with the basic dermal filler procedures described below, acquire proficiency, and then proceed to the advanced procedures.

1. Frown lines (Glabellar rhytids)
2. Cheek flattening (Malar atrophy)
3. Nasolabial folds (Melolabial folds)
4. Lip lines (Perioral rhytids)
5. Lip thinning (Lip atrophy)
6. Downturned corners of mouth (Depressed oral commissures)
7. Marionette lines (Melomental folds)
8. Chin line or mental crease (Labiomental crease)
9. Extended mental crease (Extended labiomental crease)
10. Chin flattening (Mentum atrophy)

FIGURE 1 ● Facial wrinkles, folds, and contour irregularities-anterior-posterior (medical term).

Basic Procedures

Recommended dermal filler products for basic procedures include Prevelle Silk®, Juvederm®, and Restylane® all of which are hyaluronic acids (HAs). These dermal fillers are generally easier to handle, with good flow characteristics during injection in tissue, requiring gentle plunger pressure. Once injected, they feel supple and are easily molded and compressed, which reduces the risk of undesired product collections and contour irregularities. In addition, HA products can be degraded using injectable hyaluronidase for correction if necessary. Treatment areas for basic procedures are listed in Table 1.

1. Cheek flattening (Malar atrophy)
2. Nasolabial folds (Melolabial folds)
3. Lip lines (Perioral rhytids)
4. Lip thinning (Lip atrophy)
5. Downturned corners of mouth (Depressed oral commissures)
6. Marionette lines (Melomental folds)
7. Chin line or mental crease (Labiomental crease)
8. Extended mental crease (Extended labiomental crease)
9. Chin flattening (Mentum atrophy)

FIGURE 2 ● Facial wrinkles, folds and contour irregularities-lateral (medical term).

Dermal filler treatments in these facial areas yield predictable results, have the greatest efficacy, fewest side effects, and are preferred for providers getting started with dermal filler procedures. Injection techniques for basic procedures include linear threading, fanning, and cross-hatching (see Techniques for Dermal Filler Injection below).

Advanced Procedures

Recommended dermal filler products for advanced procedures include the products used for basic procedures as well as Perlane® and Radiesse®. Perlane and Radiesse tend to

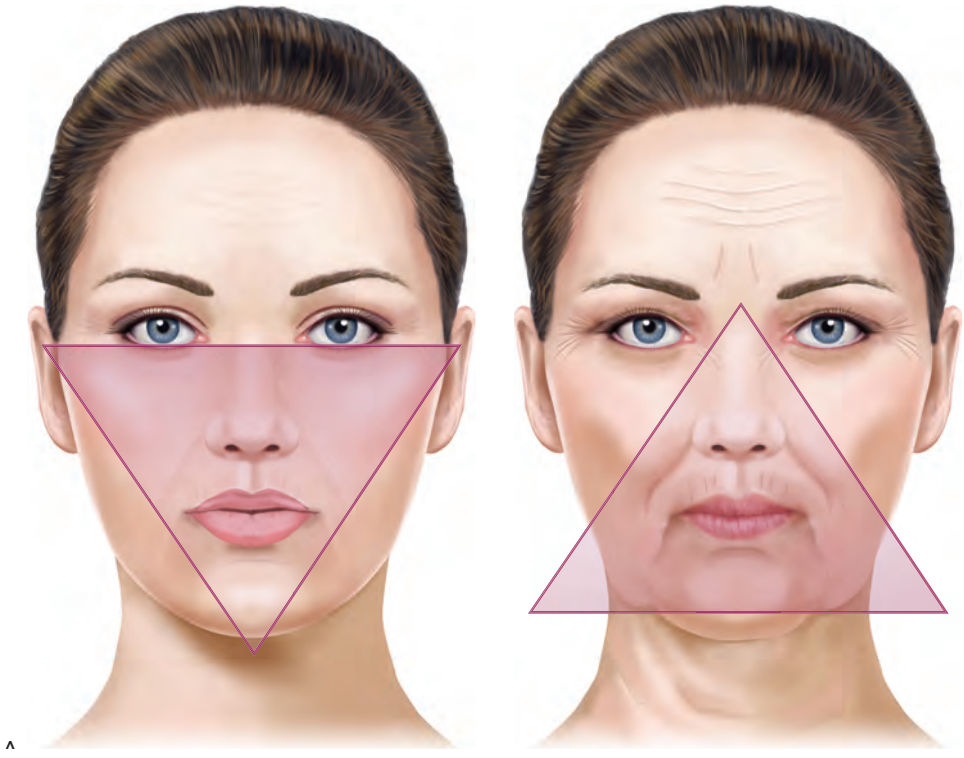

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FIGURE 3 ● Facial aging progression from youthful (**A**) to aged (**B**) contours.

have increased longevity compared to the basic dermal fillers. They also offer advantages of significant structural support in tissue and are useful for facial contouring, in addition to soft tissue filling. Greater plunger pressure during treatment and more practiced injection skill are typically necessary with advanced dermal fillers. Treatment areas for advanced procedures are listed in Table 1. Dermal filler treatments in these areas often require precise placement of small volumes and can be associated with greater risks and longer lasting complications. Injection techniques for advanced procedures include those used for basic procedures as well as depot and layering techniques (see Techniques for Dermal Filler Injection below). It is advisable to obtain injection proficiency and confidence with basic dermal filler procedures before proceeding to more advanced procedures.

Dermal Filler Indications

- The U.S. Food and Drug Administration (FDA) approved the injection of HA and calcium hydroxylapatite (CaHA) dermal fillers into the mid- or deep dermis for correction of moderate to severe facial wrinkles and folds, such as nasolabial folds and marionette lines.
- Radiesse, a CaHA dermal filler, has also been FDA approved for the treatment of HIV-associated facial lipoatrophy.
- Dermal filler treatment of lips and other cosmetic areas are considered off-label.

TABLE 1

Basic and Advanced Dermal Filler Treatment Areas

Dermal Filler Treatment Areas	
Common Name	**Medical Term**
Basic	
Nasolabial folds	Melolabial folds
Marionette lines and downturned corners of the mouth	Melomental folds and depressed oral commissures
Mental crease	Labiomental crease
Advanced	
Frown lines	Glabellar rhytids
Cheek flattening	Malar atrophy
Lip lines	Perioral rhytids
Lip thinning (lip border and body)	Lip atrophy
Extended mental crease	Extended labiomental crease
Chin flattening	Mentum atrophy
Scars	Depression scars

Patient Selection

Dermal filler procedures are most commonly performed as corrective measures for patients with skin aging to smooth static lines and wrinkles, particularly in the lower two-thirds of the face, such as nasolabial folds and marionette lines. They are also performed for augmentation purposes and facial contouring, such as lip and malar enhancement. It is important to set the expectation that dermal fillers will soften lines and wrinkles as opposed to erase them, and that subtle improvements in contours can be achieved but fillers do not offer surgery-like results. Patients with excessive skin laxity and folds usually require surgical intervention for significant improvements. Patients with unrealistic expectations or body dysmorphic disorder are not candidates for aesthetic treatments.

Products

Dermal fillers are categorized on the basis of duration of action: short-acting (less than 4 months), long-acting (6 months to 1 year), semipermanent (1–2 years), and permanent (2 years or more). A historical overview of dermal filler products used in the United States is shown in Figure 4, which highlights the increased duration of action that has been achieved with new product formulations over time. Table 2 lists available dermal filler products in the United Sates that are in common use. According to statistics from the American Society for Aesthetic Plastic Surgery, HA is most frequently used. The focus of this book is HA fillers, along with a longer acting product, CaHA, due to their versatility, safety profiles, and ease of administration.

TABLE 2

Dermal Fillers Commonly Used in the United States

Agent	Component	Company	Duration
Short-acting			
Prevelle Silk®	Hyaluronic acid with lidocaine	Mentor	2–4 mo
Long-acting			
Hydrelle®	Hyaluronic acid with lidocaine	Anika	6–12 mo
Juvederm Ultra®/Juvederm® Ultra XC	Hyaluronic acid without/with lidocaine	Allergan	6–12 mo
Juvederm Ultra Plus®/ Juvederm Ultra Plus® XC	Hyaluronic acid without/with lidocaine	Allergan	6–12 mo
Perlane®/Perlane®-L	Hyaluronic acid without/with lidocaine	Medicis	6–12 mo
Restylane®/Restylane®-L	Hyaluronic acid without/with lidocaine	Medicis	6–12 mo
Semipermanent			
Radiesse®	Calcium hydroxylapatite	Merz	1–1½ yr
Sculptra®	Poly-L-lactic acid	Dermik	1–2 yr
Permanent			
ArteFill®	Polymethyl methacrylate with bovine collagen	Artes	Permanent

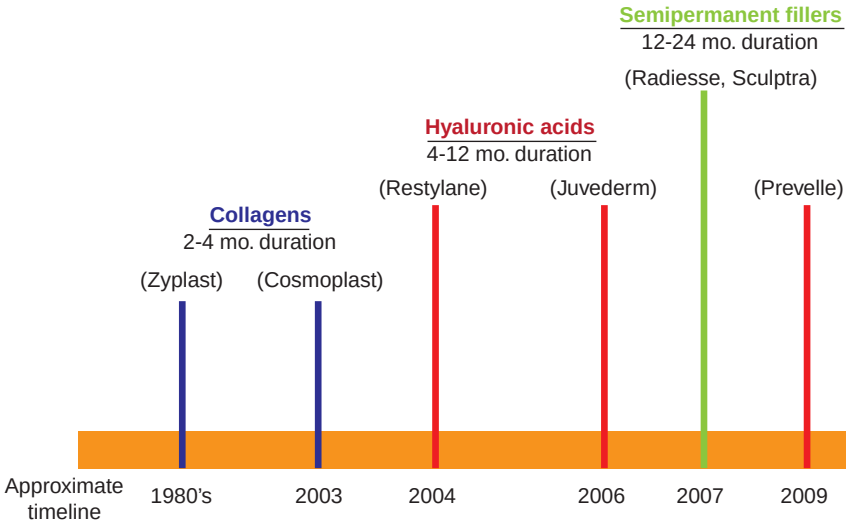

FIGURE 4 History of dermal fillers.

HA is a naturally occurring glycosaminoglycan in the dermal extracellular matrix that provides structural support and nutrients and, through its hydrophilic capacity, adds volume and fullness to the skin. Commercially available HAs vary in formulation, concentration, and degree of cross-linkage which affects their duration of action as well as postprocedure risks of swelling. For example, Juvederm Ultra has 24 mg/mL of HA and typically has mild to moderate postprocedure swelling, compared with Hydrelle, which has 28 mg/mL of HA, and can be associated with more significant postprocedure swelling. HA formulation also affects tissue filling effects. Some HA products have softer tissue filling effects such as Juvederm Ultra XC, whereas others have firmer tissue filling effects such as Juvederm Ultra Plus XC and Restylane-L.

HA products are clear, colorless gels (Fig. 5). Some HAs are formulated with lidocaine (referred to as HA-lidocaine in this book) to increase patient comfort during injection and reduce the need for anesthesia. Maximum treatment doses of HA dermal filler vary by manufacturer and are reported in the product package insert. For example, the maximum dose for Juvederm is 20 mL per year and for Restylane is 6.0 mL per patient per treatment.

Radiesse, the currently available CaHA filler, consists of CaHA microspheres (30%) suspended in a carboxymethylcellulose gel (70%). After CaHA injection, the gel is absorbed at approximately 3 months, at which time the patient's native fibroblasts are stimulated to synthesize new collagen. CaHA offers significant structural support to tissues into which it is injected. CaHA is a white opaque product (Fig. 5). CaHA has also been FDA approved to be mixed with small amounts of lidocaine, which reduces product viscosity and provides some anesthesia.

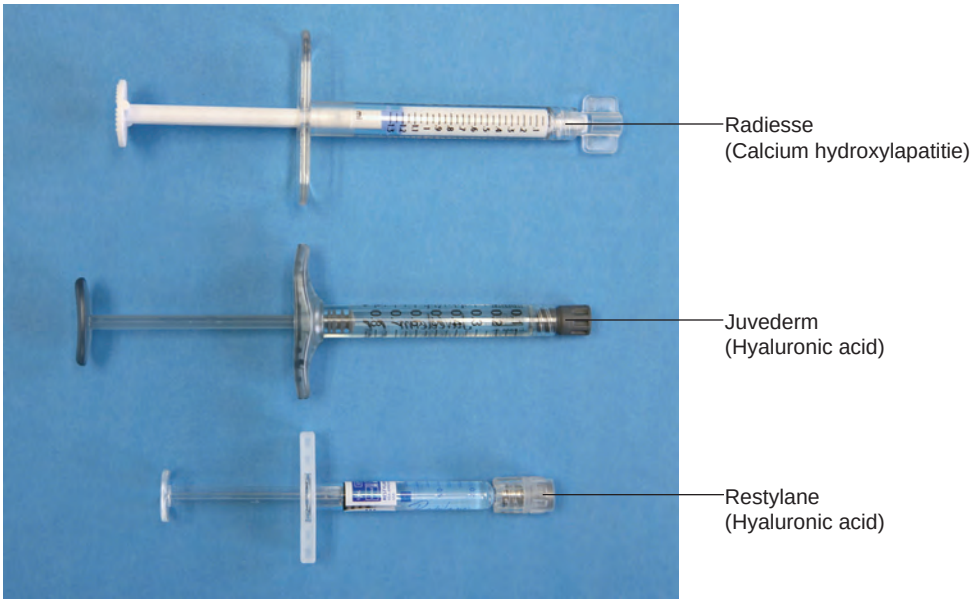

FIGURE 5 Hyaluronic acid and calcium hydroxylapatite dermal fillers.

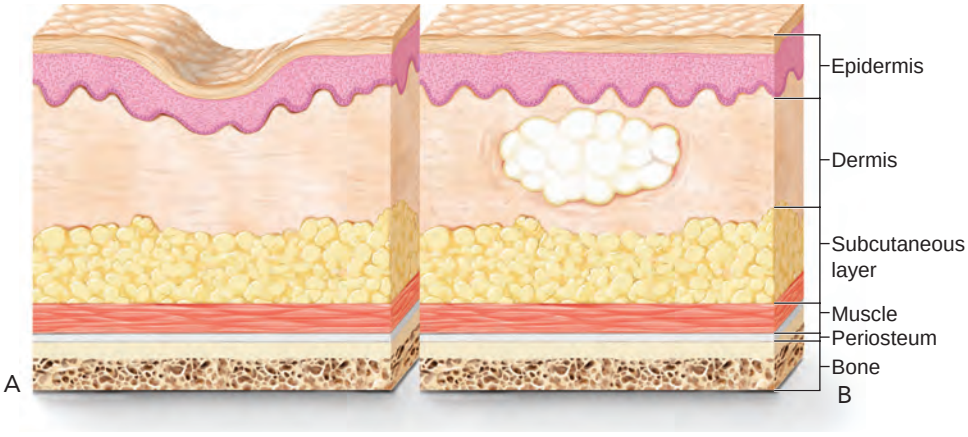

FIGURE 6 ● Mechanism of action for dermal fillers.

Mechanism of Action

Dermal fillers correct wrinkles and augment facial contours by filling a volume deficit either in the dermis or in deeper tissue spaces. This process is shown in Figure 6 in which a volume deficit representing either a skin wrinkle (e.g., frown line) or contour defect (e.g., malar flattening) (Fig. 6A) is smoothed after dermal filler injection (Fig. 6B).

Dermal fillers can also be categorized according to their mechanism of action into space-occupying fillers and biostimulants. Space-occupying fillers replace lost volume without effecting significant change in adjacent tissues, whereas biostimulants stimulate fibroblasts to synthesize new collagen. Common space-occupying dermal fillers include collagen and HA; common biostimulants include CaHA and poly-L-lactic acid.

Product Selection

Dermal filler selection at the time of treatment is dependent on several factors. The treatment area and the severity of volume loss are considered initially. Certain areas such as lips, scars, and frown lines require a thinner, more supple filler, whereas a more structural filler is required for other areas such as the chin and malars. Superficial lines require more supple fillers whereas deep volume loss is treated with more structural fillers. Longevity of results is also an important consideration. Collagen products typically last 4 months or less, HAs 4–12 months, and CaHA 12–18 months. Providers' knowledge and experience with available types of dermal fillers also contribute to product selection.

Calcium Hydroxylapatite and Lidocaine Preparation

CaHA may be used directly from the syringe or may be mixed with small amounts of lidocaine to reduce viscosity. For certain dermal filler treatments that benefit from more structural support, such as chin augmentation, it is not recommended to mix CaHA with lidocaine. For most treatments with CaHA, however, preparation with lidocaine can provide additional patient comfort and ease of injection. The mixing procedure for

FIGURE 7 ● Calcium hydroxylapatite mixing with lidocaine.

preparing CaHA with lidocaine (CaHA-lidocaine) is described below using Radiesse. Treatments using CaHA with lidocaine in this book include the extended mental crease, perioral lip lines, malar augmentation, and layering for deep volume loss of nasolabial folds, marionette lines, and the mental crease.

CaHA-lidocaine preparation procedure:

1. Uncap the 1.5-mL Radiesse syringe and attach a luer-to-luer connector.
2. Prime the connector by gently pushing the Radiesse plunger until the connector is filled with dermal filler product.
3. Using a 3.0-mL syringe and an 18-gauge, 1½-inch needle, draw up 0.3 mL of lidocaine HCl 2% with epinephrine 1:100,000.
4. Connect to the luer-to-luer connector, which is attached to the Radiesse syringe, to the 3.0-mL syringe. The connector should be between the Radiesse and the 3.0-mL syringes (Fig. 7).
5. Gently push all contents from the Radiesse syringe into the 3.0-mL syringe and then back into the Radiesse syringe. Mix slowly to avoid the formation of bubbles in the product. Repeat this process approximately 10 times until the mixture is uniform.
6. Disconnect the luer-to-luer connector from the Radiesse syringe and attach the applicable needle for treatment.
7. Save the 3.0-mL syringe. It will contain residual Radiesse, which can be added to the Radiesse syringe and used for treatment.

Alternative Therapies

Other available treatments of facial lines and wrinkles include botulinum toxin for dynamic wrinkles, skin resurfacing procedures such as microdermabrasion, chemical peels, and nonablative or ablative laser treatments of static lines. For severe wrinkling with sagging lax skin, surgical treatment such as a facelift is an option. Facial contouring of the malar and chin areas can also be achieved surgically with permanent implants.

Contraindications

- Pregnancy or nursing
- Infection in the treatment area (e.g., herpes simplex, acne)
- Hypertrophic or keloidal scar formation
- Bleeding abnormality (e.g., thrombocytopenia, anticoagulant use)
- Accutane use within the last 6 months
- Skin atrophy (e.g., chronic steroid use, genetic syndromes such as Ehlers-Danlos syndrome)
- Impaired healing (e.g., due to immunosuppression)
- Dermatoses active in the treatment area (e.g., vitiligo, psoriasis, eczema)
- Uncontrolled systemic condition
- Previous anaphylactic reaction
- Multiple severe allergies
- Sensitivity or allergy to constituents of dermal filler products
- Body dysmorphic disorder
- Unrealistic expectations

Advantages of Dermal Fillers

- Immediately visible results
- With temporary fillers, most undesirable outcomes spontaneously resolve

Disadvantages of Dermal Filler

- Temporary swelling and bruising posttreatment can occur.
- Repeat treatments are necessary to maintain results.

Equipment

- General
  - Gloves nonsterile
  - Alcohol pads
  - Gauze 3 × 3 inches, nonwoven
  - Wooden cotton-tipped applicators
  - Surgical marker or soft, white eyeliner pencil for marking the treatment area
  - Handheld mirror
- Anesthesia
  - 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
  - Sodium bicarbonate 8.4%
  - 18-gauge, 1½-inch needle (to draw up)
  - 30-gauge, ½-inch needle (for injection)
  - Topical benzocaine 20% (CaineTips™ or gel)
  - BLT ointment (benzocaine 20%: lidocaine 6%: tetracaine 4%)
  - Ethyl chloride mist spray
  - Ice or contact cooling device (e.g., ArTek Spot®)

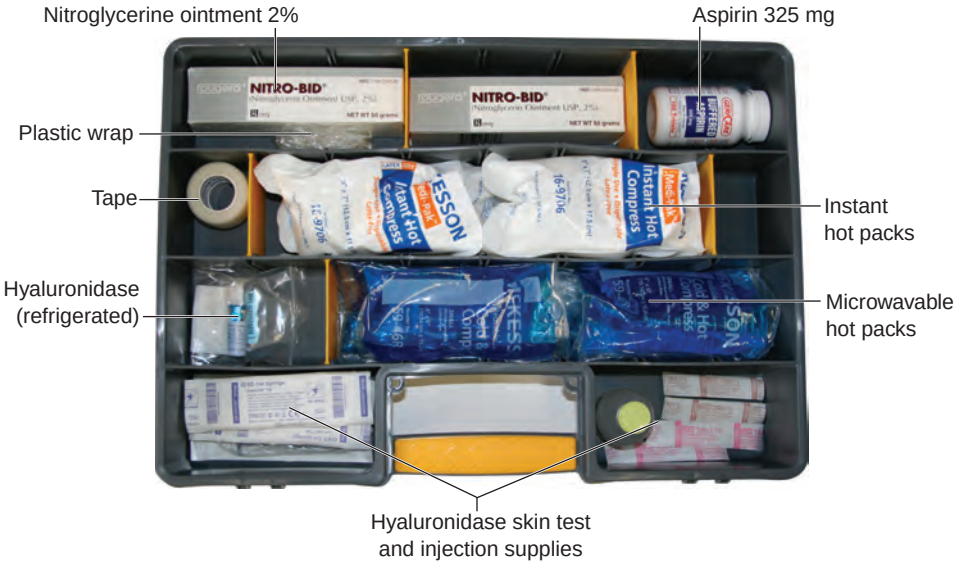

FIGURE 8 ● Emergency vascular occlusion kit.

- CaHA (Radiesse) mixing with lidocaine
  - 1.5-mL Radiesse prefilled syringe
  - 0.3 mL of lidocaine HCl 2% with epinephrine 1:100,000
  - 3.0-mL Luer-Lok tip syringe (supplied with Radiesse)
  - Luer-to-luer connector (supplied with Radiesse)
- Dermal filler procedure
  - Dermal filler prefilled syringes
  - 30-gauge, ½-inch needles (for Juvederm and Restylane)
  - 27-gauge, 1¼-inch needles (for Radiesse)
  - 28-gauge, ¾-inch needle (for Radiesse, supplied with Radiesse)
- Emergency vascular occlusion kit (Fig. 8)
  - Hot packs
  - Hyaluronidase (150 units/mL)
  - 1.0-mL Luer-Lok tip syringe
  - 18-gauge, 1½-inch needles (for drawing up hyaluronidase)
  - 30-gauge, ½-inch needles (for injecting)
  - Aspirin 325 mg, chewable
  - Nitroglycerine ointment 2%
  - Plastic wrap (for occluding nitroglycerin)

Handling

HA dermal fillers are supplied in individual prepackaged syringes ranging from 0.4 to 1.0 mL, based on the manufacturer. CaHA dermal fillers are supplied as 0.3-, 0.8-, and 1.5-mL prepackaged syringes and include supplies for mixing with lidocaine. Syringes are typically stored at room temperature (up to 25°C or 77°F) prior to use. Product shelf life is usually 1–2 years. HA dermal fillers formulated with lidocaine have a shorter shelf life. The specific manufacturer package insert guidelines should be followed for storage and handling.

Anatomy

- Wrinkles, folds, and contour irregularities of the face—anterior-posterior (see Dermal Filler Anatomy section, Fig. 1)
- Wrinkles, folds, and contour irregularities of the face—oblique (see Dermal Filler Anatomy section, Fig. 3)
- Vascular supply of the face (see Dermal Filler Anatomy section, Fig. 4)
- Nerves of the face (see Dermal Filler Anatomy section, Fig. 5)
- Facial landmarks (see Dermal Filler Anatomy section, Fig. 6)

Aesthetic Consultation

Understanding the patient's goals and priorities for treatment and setting realistic expectations for results are essential to achieving high levels of patient satisfaction and desired outcomes. This is accomplished with a thorough history and physical examination and formulation of an individualized aesthetic treatment plan as described below.

Review the patient's complete medical history including medications, allergies, and conditions contraindicating treatment; cosmetic history including minimally invasive procedures and plastic surgeries as well as any side effects and satisfaction with results; and social history including upcoming events. A sample patient intake form is shown in Appendix 1, Aesthetic Intake Form. Patients with unrealistic expectations or body dysmorphic disorder often present with a history of repeated dissatisfaction with prior aesthetic treatments. Examine the areas of concern with the patient holding a mirror and have the patient prioritize the treatment areas. Document any asymmetries or unusual findings in the chart.

Educate the patient about the nature of his or her aesthetic issues and discuss treatment options and alternatives. Early in the consultation process, assess whether the patient will benefit most from surgical intervention or minimally invasive treatments. Formulate an individualized aesthetic treatment plan based on the patient's concerns and observed facial aging changes. Review details of the proposed dermal filler and associated anesthesia for the procedure, realistic expectations for results, typical recovery time, anticipated dermal filler volume necessary for treatment, and procedure cost.

Risks of side effects and complications associated with the proposed procedure and anesthesia are discussed, allowing ample opportunity for all questions to be asked and answered. Patients seeking elective aesthetic treatments typically have high expectations for treatment results and low tolerance for side effects and complications. In addition to having a consent form signed by the patient, it is also important to document the informed consent discussion. A sample consent form for dermal filler treatments is shown in Appendix 3, Consent for Dermal Filler Treatments Form.

Photodocumentation is an important part of aesthetic procedures and involves the use of photographs to demonstrate findings at baseline and results after treatments. Consent for photographs is typically included in the procedure consent form. The usual patient positions for photographs include head fully upright looking straight ahead, 45 degrees and 90 degrees. Photographs are taken of the full face and specific treatment areas with the face at rest and with active facial movements.

Preprocedure Checklist

- Perform an aesthetic consultation and obtain informed consent as described above, including discussion and documentation of the risks, benefits, and complications associated with the procedure and anesthesia, alternatives to the intended procedure, and place the signed consent forms in the chart.
- Take pretreatment photographs with the patient at rest and actively contracting the muscles in the intended treatment area.
- Document and discuss any notable asymmetries or findings prior to the treatment.
- Discuss the type of dermal filler product(s) to be used, estimated volume necessary for the treatment, and cost with the patient prior to the treatment.
- Instruct the patient to avoid aspirin (any product containing acetylsalicylic acid), vitamin E, St. John's wort, and other dietary supplements including ginkgo, evening primrose oil, garlic, feverfew, ginseng, or other herbs and supplements that have anticoagulation properties for 2 weeks prior to the treatment.
- Instruct the patient to discontinue other nonsteroidal anti-inflammatory medications and alcohol consumption 2 days prior to the treatment.
- Provide prophylactic antiviral medication for a history of labial or facial herpes simplex or herpes zoster (e.g., valacyclovir 500 mg, one tablet twice daily) 2 days prior to the procedure and continue for 3 days postprocedure.

Anesthesia

Providing adequate anesthesia is essential to successfully performing dermal filler procedures. Anesthesia is ideally accomplished with minimal tissue distortion of the treatment area to preserve the baseline anatomy. The main methods for providing anesthesia with dermal filler treatments are reviewed in the Anesthesia section.

Dermal Filler Injection

General Injection Principles

- For dermal filler treatments, the needle entry point, also called the injection point or insertion point, is identified by laying the needle against the skin over the treatment area. The length of the needle should correspond to the desired treatment area and the injection point is located at the needle hub (Figs. 9A and 9B).
- Dermal fillers are injected using firm, constant pressure on the syringe plunger. Plunger pressure is released just before pulling the needle out of the skin to avoid tracking dermal filler product in the epidermis.
- Dermal filler is injected confluently and evenly in the treatment area. Achieving smooth dermal filler placement, in the appropriate level of the skin, is an acquired skill for the injector.
- If injecting at the incorrect level, withdraw the needle to the skin insertion and retry.
- After injection, the treatment area is palpated to assess for confluent placement of filler and smoothness. If skipped areas are palpable, additional filler is used to fill these skipped areas.
- If dermal filler is visibly or palpably bumpy, smoothing is required. Filler bumps can usually be smoothed by compressing the product using the following methods:
  - **Two fingers.** Place one finger intraorally and one extraorally to compress the product between the two fingers (Fig. 10).

A

B

FIGURE 9 Injection points are determined by laying the needle over the treatment area **(A)** and the insertion point is at the needle hub **(B)**.

FIGURE 10 ● Compression of dermal filler using fingers.

- **Cotton-tipped applicator.** Use one finger intraorally and rolling a cotton-tipped applicator with firm pressure slowly over the bump (Fig. 11).
- **Against bone.** Use fingertips or thumbs extraorally to compress the product firmly against the underlying bone (Fig. 12).

- Achieve desired results in one area before beginning injection in another treatment area.
- Needles may become obstructed with Radiesse, particularly with supraperiosteal depot injections. If plunger resistance is encountered while injecting Radiesse, the needle is

FIGURE 11 ● Compression of dermal filler using a cotton-tipped applicator.

FIGURE 12 ● Compression of dermal filler against bone.

likely obstructed. Withdraw the needle from the skin and prime it by depressing the plunger to observe for extrusion of product from the needle tip. If no product is extruded, place a new needle on the Radiesse syringe, prime the needle, and resume injection.

Tip

- Tissue ischemia can result from vascular compromise due to intravascular injection or overfilling tissues with dermal filler. If this occurs, discontinue injection, massage the area until the tissue appears pink, and institute other measures outlined in the Complications section.

Depth of Injection

Dermal fillers can be injected at different tissue depths, from the deep supraperiosteal plane to the superficial dermis (Fig. 13). Basic dermal filler treatments primarily involve injection in the mid- to deep dermis, whereas more advanced treatments range in depths. For example, the advanced technique of layering involves placing more robust structural dermal filler products, such as CaHA, in the mid- to deep dermis and placing thinner products, such as HAs, in the overlying superficial dermis. Advanced facial contour correction, such as malar augmentation, involves supraperiosteal placement.

The depth of injection can be determined by several factors such as the feel of the needle moving through tissue, plunger resistance during injection, and visibility of the needle tip in the skin. Table 3 lists specific characteristics for different injection depths. It is important to note that if the gray tip of the needle is visible in the skin, injection is too superficial and the needle should be withdrawn and redirected to a deeper level in the skin.

Techniques for Dermal Filler Injection

- **Linear thread.** The fundamental injection technique for placing dermal filler in tissue is the retrograde linear thread. Insert the needle at the desired tissue depth and

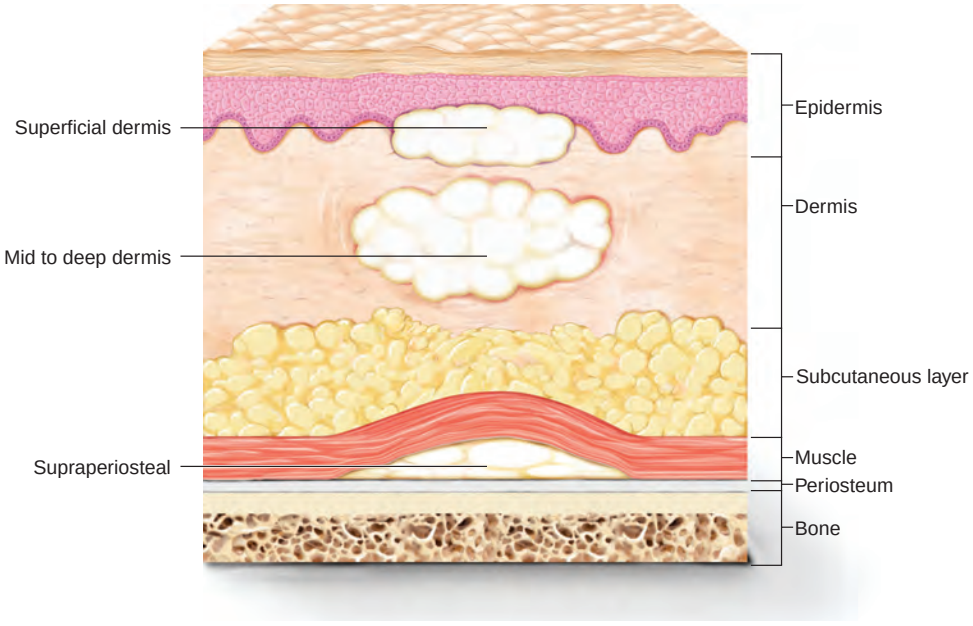

FIGURE 13 ● Injection depths of dermal fillers.

TABLE 3

Injection Depth Characteristics

Skin Depth	Injection Characteristics
Superficial dermis	• Significant resistance when advancing the needle • Significant resistance during injection • Gray needle may be visible in the skin *if injection is too superficial*
Mid- to deep dermis	• Some resistance as needle advances through the tissue • Some plunger resistance during injection • Needle tip is not visible
Subcutaneous layer	• Minimal to no resistance when advancing the needle • Minimal to no resistance during injection • Needle tip is not visible
Supraperiosteal	• Crunchiness as the needle advances through the muscle and a tap on the bone • Minimal to no resistance during injection • Needle tip is deeply placed in tissues and not visible

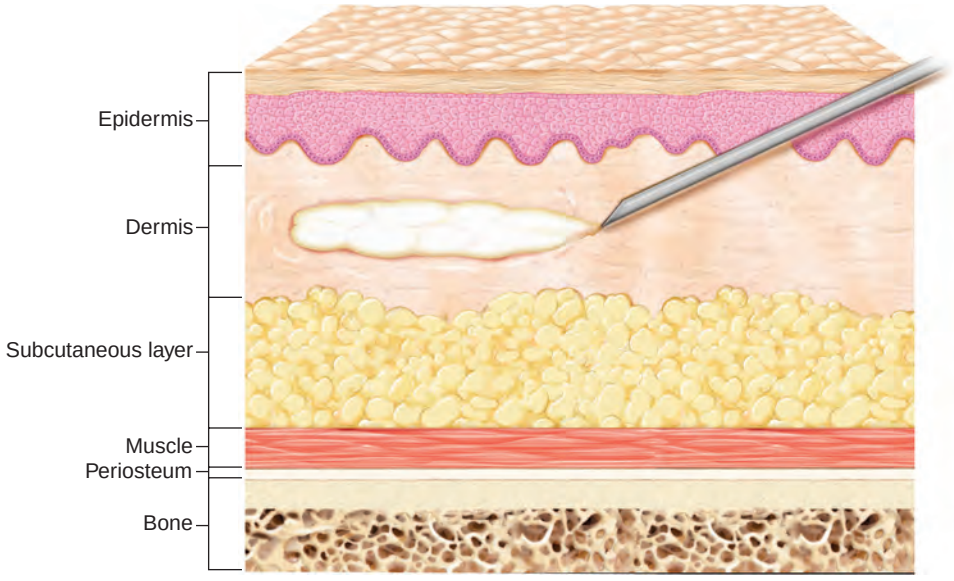

FIGURE 14 ● Linear threading injection technique with dermal fillers.

depress the plunger firmly as the needle is smoothly withdrawn (Fig. 14). Release the plunger pressure just before pulling the needle out of the skin to avoid tracking dermal filler product in the epidermis.

- **Fanning.** A single needle insertion point is used to inject a series of adjacent linear threads placing dermal filler product in a triangular area. Insert the needle at the desired tissue depth, advance the needle to the hub, and inject filler in a linear thread as the needle is slowly withdrawn; without fully withdrawing the needle from the skin, redirect the needle using small angulations, advance needle to the hub again and repeat until desired correction is achieved (Fig. 15).

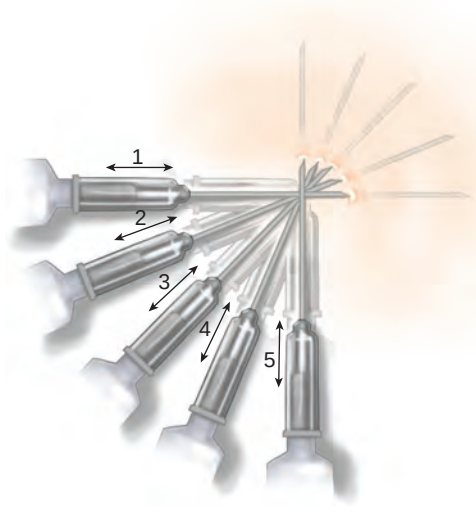

FIGURE 15 ● Fanning injection technique with dermal fillers.

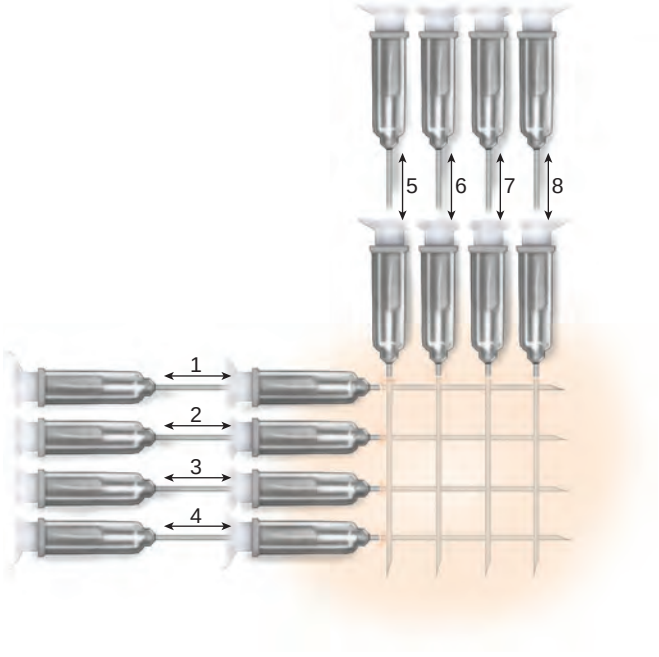

FIGURE 16 ● Cross-hatching injection technique with dermal fillers.

- **Cross-hatching.** Multiple insertion points are used to form a grid pattern of linear threads placing dermal filler product in a square area. Insert the needle at the desired tissue depth, advance the needle to the hub, and inject filler in a linear thread as the needle is fully withdrawn. Reinsert the needle in an adjacent area and place another linear thread parallel to the first thread. Repeat at 90 degrees to the first filler threads until desired correction is achieved (Fig. 16).
- **Layering.** Dermal filler product with more structural support (e.g., CaHA) is injected first in the mid- to deep dermis to treat areas of deep volume loss, using one of the above techniques. A thinner, more malleable dermal filler product (e.g., HA) is then injected in the superficial to mid-dermis overlying the first product to treat superficial wrinkles, using one of the above techniques (see Layering Dermal Fillers chapter).
- **Depot.** A single insertion point is used to place a collection of product in tissue. This technique is often used at the supraperiosteal level and is described here. A 28-gauge, ¾-inch needle is inserted through the skin and muscle and advanced until a gentle tap is felt against bone. The needle is then withdrawn 1 mm and a bolus of dermal filler product is administered just above the bone (Fig. 17). The volume injected is determined by the dermal filler product used and by the depth of the needle in the tissue. Deeper injection sites receive greater volumes. Below are listed typical depot injection volumes using a CaHA filler, Radiesse.

  If the 28-gauge, ¾-inch needle is inserted to:
  - full depth, inject 0.2–0.3 mL of Radiesse
  - half depth or less, inject 0.1 mL of Radiesse

Release the plunger pressure just before pulling the needle out of the skin to avoid tracking dermal filler product in the epidermis.

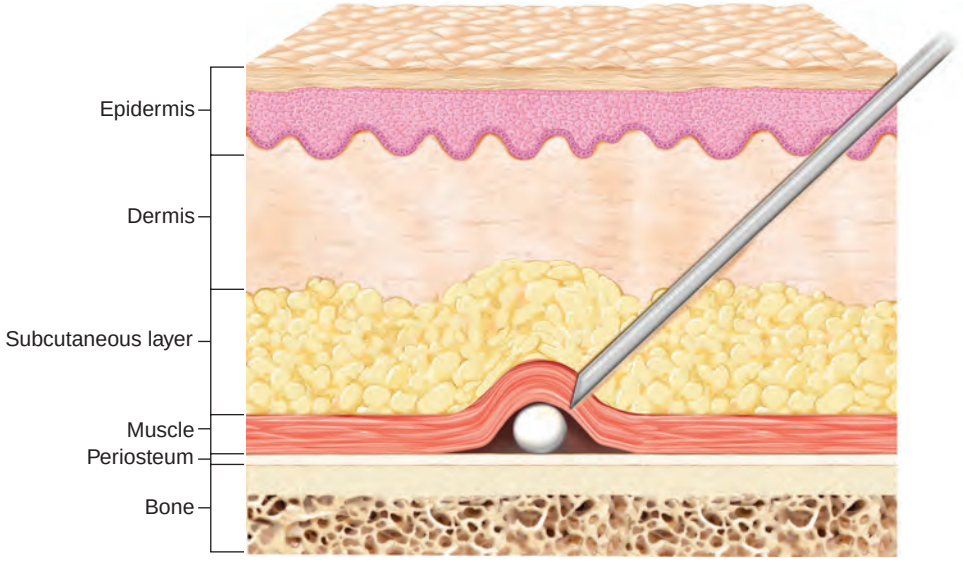

FIGURE 17 ● Depot injection technique with dermal fillers.

Aftercare

Direct the patient to apply a wrapped ice pack to treatment areas for 10–15 minutes every 1–2 hours and continue for 1–3 days, or until swelling and bruising resolve. Advise patients to avoid activities that can cause facial flushing such as heat application, alcohol consumption, exercising, and tanning until swelling resolves. Acetaminophen may be used if needed for discomfort. Elevating the head overnight postprocedure can reduce swelling. Advise patients against self-massaging dermal filler.

Results and Follow-up

Dermal filler procedures yield immediate results. Providers can show patients these immediate improvements in the mirror after half the face is treated or at the end of the treatment. The duration of results is dependent upon several factors including the type of product and volume used, the patient's metabolism, degree of motion in the treatment area due to facial expressivity. In addition, dermal filler injected too deeply in the subcutaneous layer may have a shorter than intended duration, and filler injected too superficially may last longer than intended. HA dermal filler effects typically last 4–12 months, depending on the specific HA product used, and CaHA dermal filler effects typically last 12–18 months. Subsequent injection in the treatment area to maintain results is recommended when the volume of dermal filler product visibly diminishes but is still palpable, before the area returns to its pretreatment appearance. Timely subsequent treatments usually require less dermal filler product, as residual volume from the previous treatment is still present.

Learning the Techniques

- Dermal filler injection techniques such as linear threading, fanning, cross-hatching, and depot can be practiced initially using clear silicon packs or synthetic skin models,

which may be obtained from dermal filler manufacturers. However, practicing dermal filler injection on patients is necessary to acquire skill with placing product at the correct level and to gain a feel for product flow characteristics in natural tissue.

- Starting with hyaluronic acid dermal filler products that have the least resistant flow characteristics is advisable (e.g., Prevelle Silk or Juvederm Ultra XC). Hyaluronic acid treatments are also potentially correctable with the use of hyaluronidase.
- Treatment of the nasolabial folds is an ideal area to start with as the tissue is easily compressible if necessary. Beginning treatments with staff and family provides an opportunity to obtain feedback and observe the full course of a dermal filler treatment.
- Use of conservative dermal filler volumes is recommended initially as additional volume may be injected at a follow-up procedure 4 weeks after treatment if further correction is necessary.
- Once proficiency is acquired with basic dermal filler treatments, providers may choose to perform advanced filler treatments, most of which use longer lasting, more structural products (e.g., Radiesse or Perlane). When getting started with Radiesse, the technique outlined in the Layering Dermal Fillers chapter for treatment of nasolabial folds can be used without superficial layering of a second product.

Follow-ups and Management

Patients are assessed 4 weeks after treatment to evaluate for reduction of lines and wrinkles and correction of contours. Common issues experienced by patients during this time include:

- Erythema
- Swelling
- Tenderness
- Bruising

Erythema, swelling, tenderness, and **bruising** are expected after dermal filler procedures. Application of a soft, wrapped ice pack to the treatment area can minimize swelling and bruising and may be applied immediately after treatment and repeated as outlined in the Aftercare section above. Swelling typically resolves in 1–3 days and bruising may last 7–10 days, depending on the size of the bruise. Bruising can be concealed with makeup (Fig. 18). Specific colors can counter bruises at different stages: peach minimizes blue and lilac minimizes yellow discoloration. Patients who are known to have significant swelling with dermal filler injections may benefit from pretreatment with an oral over-the-counter antihistamine (e.g., cetirizine 10 mg, one tablet daily) the day of treatment, which can be continued until swelling resolves. Over-the-counter remedies that may help support healing and reduce bruising and swelling are *Arnica montana*, vitamin K, bromelain, copper, vitamin A, vitamin C, and zinc.

Storage and Usage of Partially Used Dermal Filler Syringes

It is not uncommon to have residual dermal filler product in a syringe after treatment, especially if small volumes are required for treatment. Most package inserts that accompany dermal fillers advise against saving and, at a later date, treating with partially used syringes. One of the main concerns is possible bacterial contamination and increased risk of patient infection. A recent retrospective study evaluated infectious complications

A

B

FIGURE 18 ● Bruise before (**A**) and after (**B**) makeup application.

associated with the use of residual HA dermal filler product (Juvederm and Restylane) that had been refrigerated at 4°C (39°F) for approximately 6 months and found no associated infections.

New Products and Current Developments

Beletero® is a new HA dermal filler product distributed by Merz currently used in Europe, which is undergoing trials in the United Sates. It has an expected duration of 6–9 months.

Financial Considerations

CPT Codes	
11950	Subcutaneous injection of filling material ≤1mL
11951	Subcutaneous injection of filling material 1.1–5.0 mL
11952	Subcutaneous injection of filling material 5.1–10 mL

Cosmetic dermal filler treatments are typically not covered by insurance. Dermal filler fees are based on the type of filler used, size and number of syringes, the injector's skill, and vary according to community pricing in different geographic regions. Prices range from $500 to $650 per syringe of 0.8-mL HA dermal filler and from $650 to $1200 per syringe of 1.5-mL CaHA dermal filler.

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, pigmented and vascular lesions, undesired hair growth, as well as benign and malignant degenerative changes. Achieving optimal rejuvenation results often requires a combination of minimally invasive aesthetic treatment to address these different aspects of aging. Dermal fillers can be easily combined with other procedures such as botulinum toxin to treat dynamic lines; lasers and intense pulsed light for hair reduction, skin resurfacing and treatment of benign pigmented and vascular lesion; exfoliation procedures such as microdermabrasion and chemical peels; and topical skin care products. The combination of dermal fillers and botulinum toxin may also offer advantages of longer filler duration and improve filler smoothness in highly mobile areas such as the lips and frown.