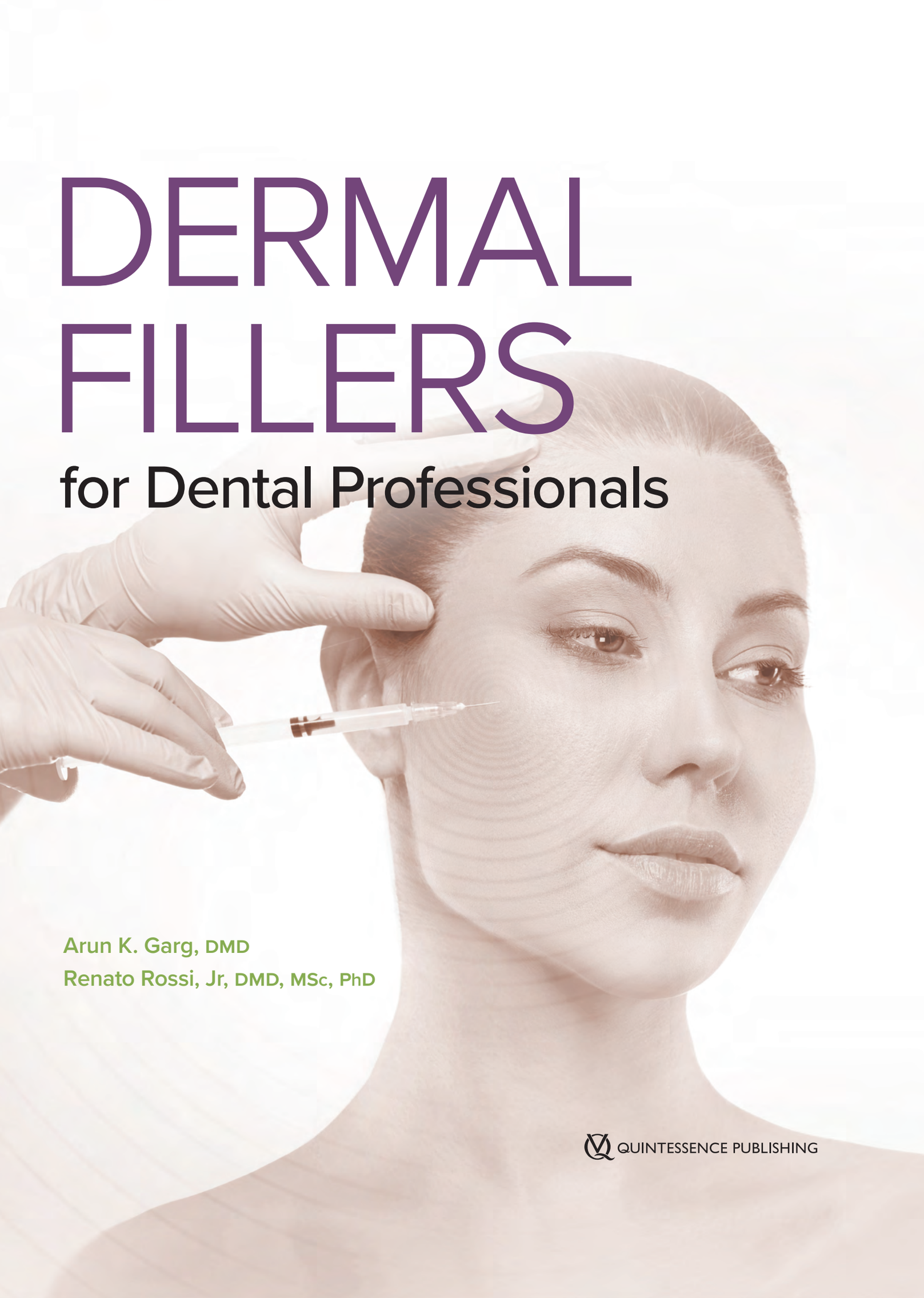
DERMAL FILLERS

for Dental Professionals



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Contents

Preface

This book presents a clinical experience–based framework for the incorporation of dermal fillers for facial rejuvenation procedures into a general dental practice or dental specialty practice. These procedures are a natural progression in the evolution of cosmetic dentistry. The dentist's and dental specialist's existing skill set of esthetic assessment, administration of local anesthesia, and making patients comfortable in the office setting make this type of treatment fairly easy to incorporate into the practice routine.

Today, providing dermal filler and/or cosmetic neurotoxin injections is permitted by an overwhelming majority of the state dental licensing boards in the United States and abroad. What's more, the American Dental Association and state associations have been sponsoring courses that train dentists in these procedures for many years. And why not? Under U.S. medical licensing guidelines, any physician with a medical degree from an accredited institution—regardless of specialty—can offer cosmetic facial injections as a service to their patients with no additional training. Does anyone really believe that the average obstetrician or rheumatologist has greater expertise in facial anatomy than a dentist? What about estheticians? In some states, an individual with no medical education can take a weekend course and then give facial injections, provided they are under the "delegation" of a physician.

Dental training and skills make the group exceedingly well qualified to provide safe and esthetically pleasing dermal filler injections. Like most dental procedures, administering facial injections for cosmetic purposes requires a combination of excellent technical and artistic skills, as well as comprehensive understanding of head and neck anatomy and knowledge of current materials and treatment modalities.

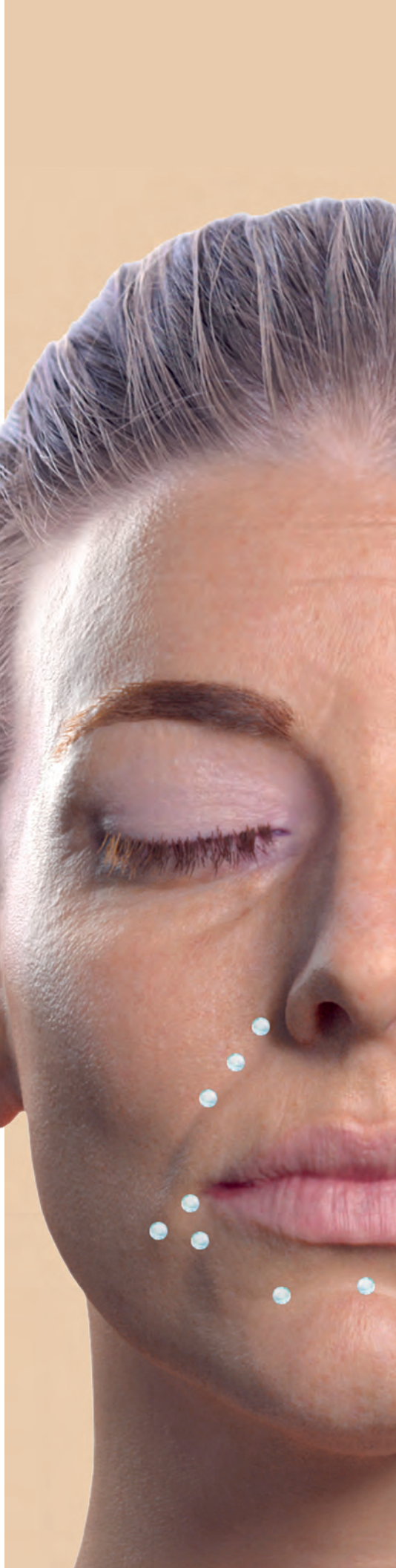
We are certainly not suggesting that the average dentist or dental specialist does not require additional training to learn how to select an appropriate dermal filler product, practice safe facial injection techniques, or prevent complications. On the contrary, our goal in writing this book is to provide the information that the dental clinician needs—and none of the information that dentists, by virtue of their training, already possess—to become qualified providers in the highly rewarding (and potentially lucrative) area of facial rejuvenation.

The scope of dental and dental specialty practice has never been static. The purpose of this book is not to promote the need for all dentists and dental specialists to provide these cosmetic services. But rather the objective is to present how numerous dermal filler procedures can be successfully and safely incorporated into an existing practice using the model that we, as both practicing clinicians and academicians, have developed and taught to hundreds of others over many years.

Section I: Getting Started with Dermal Filler Treatment

1

DERMAL FILLERS: WHAT EVERY DENTIST SHOULD KNOW



The term *facial rejuvenation* refers to several different categories of treatments designed to improve the appearance of the face: plastic surgery such as rhinoplasty, blepharoplasty, and rhytidectomy; less invasive procedures such as dermal abrasions and chemical peels; and the growing list of minimally invasive therapies, including laser skin resurfacing, microdermabrasion, neurotoxin injections, and dermal filler injections (Fig 1-1). In 2019, the American Society of Plastic Surgeons reported that from 2000 to 2018, the number of facelift surgeries declined 9%, while the number of neurotoxin injections increased an astronomical 845%. Similarly, dermal filler treatments have increased 244% since 2006, the first year for which data were collected (Table 1-1).[1] As these numbers demonstrate, neurotoxins and dermal fillers have radically changed the market for facial rejuvenation procedures in the United States, and this trend will continue to increase at least for the next several years.

Some of the reasons for this trend are obvious. Neurotoxins such as Botox Cosmetic (Allergan) and Dysport (Galderma) and dermal fillers can usually be administered in less than an hour, produce effects that are apparent immediately or within days, and require little or no downtime. Moreover, these esthetic enhancements are subtle enough not to attract attention and thus can be undertaken discreetly, which many people appreciate. Indeed, the intent of these procedures is not to make a person look 20 years younger but rather for them to appear more radiant and refreshed at their present age (Fig 1-2).

Unlike surgical procedures, neurotoxin and dermal filler treatments are luxuries that fit many budgets. At an average cost of

FIG 1-1 *Facial rejuvenation* is a term that encompasses esthetic procedures in plastic surgery, nonsurgical procedures such as dermal abrasion and chemical peeling, and minimally invasive procedures such as neurotoxin and dermal fillers.

TABLE 1-1 Facial cosmetic procedure trends in the United States since 2000*

Procedure	2018	2000	Change
Facelift (rhytidectomy)	121,531	133,856	–9%
Nose reshaping (rhinoplasty)	213,780	389,155	–45%
Eyelid surgery (blepharoplasty)	206,529	327,514	–37%
Botulinum toxin type A† injection	7,437,378	786,911	+845%
Soft tissue fillers‡ injection	2,676,970	778,000§	+244%

*Data from the American Society of Plastic Surgeons.[1]
†Includes Botox (Allergan), Dysport (Galderma), and Xeomin (Merz North America).
‡Includes all commercial dermal fillers as well as platelet-rich plasma and acellular dermal matrix.
§Number of procedures in 2006, the year data was first reported.

FIG 1-2 The effects of neurotoxin and dermal filler treatments are subtle and appear natural, unlike plastic surgery procedures.

$397 and $682 per site for neurotoxin and dermal filler (eg, Juvéderm, Allergan) injections, respectively, these treatments are comparable to the cost of tooth whitening or a day at the spa. Compare those numbers to the average cost of a simple rhinoplasty ($5,350) or dermabrasion ($1,250).[1] The relative affordability of minimally invasive procedures makes them appealing to people at all income levels, including those who likely would never consider seeking surgical treatment to address their age-related esthetic concerns.

Based on popular stereotypes, many readers might assume that middle-aged women are the ones primarily driving this trend. Not so. The "daddy do-over" has been quietly gaining in popularity for several years, and the average age of patients skews younger all the time as more 20- and 30-somethings seek dermal filler treatment for acne scars, nose recontouring, lip augmentation, and other cosmetic enhancements. In 2018, individuals aged 20–39 made up 18% of all neurotoxin injections and 11% of dermal filler treatments.[1]

FIG 1-3 Neurotoxins target the dynamic lines and folds of facial expression.

FIG 1-4 Dermal fillers target the static lines and wrinkles that are manifestations of aging on skin.

NEUROTOXINS AND DERMAL FILLERS: UNDERSTANDING THE DIFFERENCES

Currently, there are approximately three neurotoxin procedures for every dermal filler procedure performed in the United States (7.4 million vs 2.6 million).[1] Botox, the first commercially available neurotoxin, was initially developed and gained FDA approval in 1989 as a therapeutic agent for the treatment of strabismus, an eye muscle disorder. Today, many dentists use Botox therapeutically to treat patients suffering from temporomandibular joint pain related to clenching and bruxing and to relax the upper lip in patients who have a gummy smile. Botox Cosmetic was not FDA approved until 2002, just shortly before the approval of the first hyaluronic acid dermal filler in 2003.

Dynamic versus static wrinkles

Although the aim of these injectable agents is the same—to smooth facial wrinkles—they use different mechanisms of action to achieve it. Cosmetic neurotoxin targets the *dynamic* lines of expression that result from repetitive facial movement (Fig 1-3). It is injected directly into the muscles that animate these types of wrinkles, including frown lines, crow's feet, and forehead creases. The muscles become paralyzed, and within 2 to 3 days, the lines and wrinkles disappear. These effects last an average of 3 to 4 months.

Unlike neurotoxins, dermal fillers target *static* wrinkles, the ones we develop over time as we age (Fig 1-4). These static wrinkles are present regardless of facial expression and usually accompany other visible effects of aging, such as hollowed cheeks and eye sockets, irregular or blotchy pigmentation, skin laxity, and dryness. These facial manifestations of intrinsic aging are a result of reduced collagen production and slower cell turnover rates. (Their appearance can, however, be accelerated by extrinsic factors such as chronic sun exposure and smoking.) Intrinsic aging is a natural consequence of physiologic changes over time that occur at variable yet genetically determined rates. In some lucky people, these lines, wrinkles, and folds do not make an appearance until they reach 55 or 60 years old, whereas others begin to see them in their late 30s and 40s, but for all of us they are an inevitable effect of aging.

Nevertheless, we spend billions of dollars each year on expensive elixirs and procedures in our never-ending quest to prevent and diminish the visible signs of aging on our

TABLE 1-2 **Costs and total expenditures of the multibillion-dollar industry to combat aging***

Procedure	National average surgeon/ physician fee	Total expenditure
Cosmetic surgical procedures		
Cheek implant (malar augmentation)	$3,015	$43,322,535
Chin augmentation (mentoplasty)	$2,364	$38,769,600
Dermabrasion	$1,249	$100,790,553
Ear surgery (otoplasty)	$3,163	$72,382,092
Eyelid surgery (blepharoplasty)	$3,156	$651,805,524
Facelift (rhytidectomy)	$7,655	$930,319,805
Forehead lift	$3,623	$140,554,285
Lip augmentation (other than injectable materials)	$1,767	$54,527,853
Lip reduction	$2,009	$2,147,621
Neck lift	$5,424	$280,819,182
Nose reshaping	$5,350	$1,143,723,000

*Data from the American Society of Plastic Surgeons.[1]

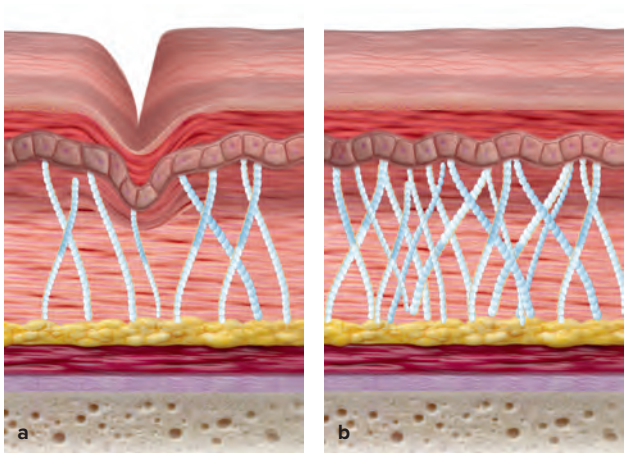


FIG 1-5 Some dermal filler products stimulate the production of collagen and elastin to diminish the appearance of lines and wrinkles. *(a)* Before application of dermal filler. *(b)* After application of dermal filler.

skin. And every year, the industry expands with new agents and modalities added to the long list of topical medical products (vitamin A acid, α-hydroxy acids, antioxidants, and moisturizers) and procedures (glycolic acid peels, deep peels, dermabrasion, laser resurfacing, and plastic surgery) already available (Table 1-2).

In this book, we focus exclusively on the treatment of static wrinkles associated with aging using FDA-approved commercial dermal fillers and autologous serum-derived agents. As detailed in chapter 3, choosing a dermal filler requires an understanding of how its constituent components interact with the body. Broadly speaking, dermal fillers achieve their effects by one of two mechanisms of action. A *stimulator* works to reverse the loss of hydration and elasticity in the skin by inducing the production of new collagen (Fig 1-5), whereas a *volumizer* provides immediate volume replacement to smooth the appearance of

TABLE 1-2 *(CONT)* **Costs and total expenditures of the multibillion-dollar industry to combat aging**

Procedure	National average surgeon/ physician fee	Total expenditure
Cosmetic minimally invasive procedures		
Botulinum toxin type A (Botox, Dysport, Xeomin)	$397	$2,952,639,066
Chemical peel	$669	$926,114,763
Injection lipolysis (eg, Kybella [Allergan])	$1,054	$67,448,622
Intense pulsed light (IPL) treatment	$391	$264,140,832
Laser hair removal	$285	$307,084,650
Laser skin resurfacing		
Ablative	$2,071	$332,878,043
Nonablative (Fraxel [Solta Medical], etc)	$1,144	$495,961,752
Microdermabrasion	$131	$92,933,103
Nonsurgical skin tightening (Pelleve [Cynosure], Thermage [Solta Medical], Ultherapy [Ulthera])	$2,059	$690,362,110
Soft tissue fillers		
Acellular dermal matrix	$2,065	$17,707,375
Calcium hydroxyapatite (Radiesse [Merz North America])	$691	$157,018,694
Fat-face	$2,126	$96,435,360
Hyaluronic acid (eg, Juvéderm Ultra, Ultra Plus, Voluma, Volbella, and Vollure, Restylane Lyft and Silk [Galderma], Belotero [Merz North America])	$682	$1,451,925,486
Platelet-rich plasma (PRP)	$683	$87,010,102
Polylactic acid (Sculptra [Galderma])	$915	$111,556,800
Polymethyl-methacrylate microspheres (Bellafill [Suneva Medical])	$889	$15,614,396
Total 2018 expenditures		$16,507,440,034

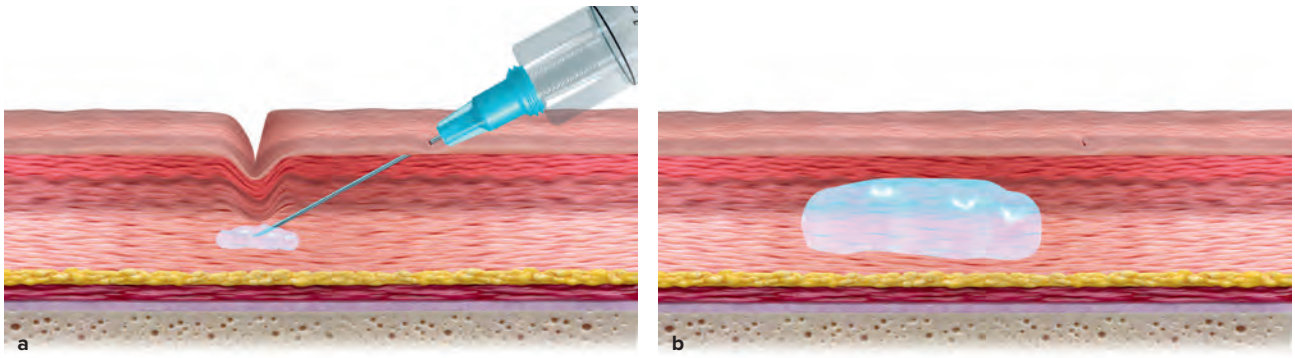


FIG 1-6 Other dermal filler products are designed to add volume to sunken skin as a way to smooth the appearance of fine lines and wrinkles. *(a)* At the start of application of dermal filler. *(b)* After application of dermal filler.

fine lines and wrinkles (Fig 1-6). Many products combine these mechanisms of action in one agent. With dozens of commercial products to choose from, it is incumbent on clinicians to understand how their physicochemical properties affect their performance in terms of biocompatibility, longevity, and other clinical considerations, all of which are discussed in chapter 3.

OVERCOMING OBSTACLES

As more dentists (and specialists from other medical fields) begin to compete for patients in the lucrative facial rejuvenation market, they face growing opposition from the so-called core physicians in the medical esthetic field—namely board-certified cosmetic dermatologists and plastic surgeons. Those in support of this trend argue that dentists are better qualified to perform dermal filler procedures than most physicians: They are experts in the facial musculature, are proficient in administering local anesthesia, routinely encounter the most common adverse events (ie, pain, swelling, inflammation) in their daily practice, and have a fine-tuned esthetic sensibility. Those opposed assert that dentists lack the knowledge and training to achieve the types of results that patients demand and are woefully unprepared to respond to the most serious complications, which can result in blindness or death.

Ultimately, the decision is a personal one. The following are some important issues to consider.

Legal considerations

A decade ago, the idea of dentists becoming providers of facial rejuvenation therapy would have raised a lot of eyebrows, not only within professional dental associations but also among rank-and-file dentists. However, it appears that attitudes have changed. Today, a majority of state dental licensing boards allow dentists to perform dermal filler and Botox procedures for general esthetic and therapeutic purposes. Some of the states that permit dentists to perform these services limit their scope, stipulating that they must be delivered as part of a dental treatment plan and not as a standalone procedure. Others have outlined specific regulations or certification requirements that dentists must meet before they can offer these services. And yes, a small number of states still consider them outside the scope of dental practice and prohibit them altogether.

Moreover, the American Dental Association, dentistry's national governing body with more than 163,000 members, has been providing and sponsoring continuing education in both neurotoxin and dermal filler injection procedures to general dentists and specialists alike for many years. Can there be any doubt that these procedures—like tooth whitening 20 years ago—will become a standard part of mainstream dentistry and eventually practiced throughout the United States? Check with your state dental board if you do not know the rules and regulations in your state before making your decision.

Another question relevant to state regulations has to do with malpractice insurance. If your dental liability malpractice insurance does not cover dermal filler procedures, you

are strongly advised to find a third-party carrier who will add a rider policy to protect you in the event of a liability claim.

Ethical considerations

While the boundaries separating general and specialty practices are fading, both in medicine and dentistry, even some dentists question whether their training adequately prepares them to administer cosmetic facial injections. After all, don't dermatologists undergo rigorous training to specialize in these procedures?

Actually, many dermatology and plastic surgery programs provide minimal training in dermal filler procedures. The Accreditation Council for Graduate Medical Education (ACGME) requires dermatology residents to "demonstrate knowledge of the indications, contraindications, complications, and basic techniques of" many popular cosmetic procedures (including dermal fillers), and to "perform or observe" five dermal filler procedures.[2] (Dermatologists who complete a fellowship in esthetic medicine are a different story.) Moreover, according to the American Academy of Facial Esthetics, dermal filler procedures are routinely performed by physicians trained in obstetrics and gynecology, ophthalmology, gastroenterology, internal medicine, and podiatry as well as registered nurses, physicians' assistants, and so-called medical estheticians.[3] A strong argument can be made that dentists have more knowledge and training in the anatomy, biochemistry, and physiology of the head and neck than any of these providers.

Practical considerations

There are important practical questions to ask yourself before making your decision. For example, how would adding esthetic facial therapy to your practice affect your personal brand? A practice that already promotes smile makeovers, tooth whitening, and other cosmetic services will find it easier than one that promotes holistic therapies, for instance. Similarly, your current patient demographics should be an important factor in your decision. Is your practice family-oriented with an emphasis on conservative treatment? Or is it more spa-like, appealing to patients who like to be pampered with personal music devices and the like? And don't forget to factor in your competition. Is there another dental practice in your area offering filler treatments? That could have a big impact on your decision one way or another. If there is a cosmetic dermatologist in your building or vicinity, that will also influence your thinking.

Finally, do not underestimate the importance of gaining buy-in from both your front and back office staff. It is vital that all members of the staff receive training in how the procedures work, what they cost, the amount of time to schedule for appointments, the materials required, and how to incorporate them into operating systems. Your patients' first line of contact is your front office staff, so they will need scripts to help them answer questions about the treatments.

One effective way to engage your staff in the new service is to treat them (and even their family members) at no cost. Staff treatment sessions are a win-win: Employees cannot help but take a personal interest in the new procedures, and you get more opportunities to practice your injection techniques. A huge bonus is that your employees can share their own experiences with current and prospective patients and become true advocates of the new service.

All of these considerations must be weighed against the potential benefits of adding facial rejuvenation treatments to your practice portfolio.

RETURN ON INVESTMENT

A standard dental operatory is suitable for performing cosmetic dermal filler injections and requires no retooling or purchase of special equipment. And at $500 to $600 per procedure, these services are not only profitable but can have a dramatic impact on practice production. Investment costs, on the other hand, are negligible. The practice management software may have to be updated and new forms and letterhead printed. Inventory costs will rise with the need to stock filler products. As described previously, staff training can be carried out in-house at minimal cost. That leaves marketing, which requires a careful strategy for those who want to offer their new services to others beyond their patients of record.

Most dentists learn early in their career that a personal recommendation made by a satisfied patient can do more for their bottom line than any marketing campaign. Dental appointments top the list of the average person's least-favorite activities, so having a patient refer a friend is an exceptional honor. Indeed, the dentist-patient relationship is a unique and special one, with few if any analogues.

Our patients trust our professional skills in diagnosing their problems and delivering their treatment safely

and effectively. They also trust our advice on matters that are purely esthetic, such as matching a shade or choosing the shape of a crown. We know our patients' faces better than anyone else (except perhaps their spouses). Who better, then, to matter-of-factly suggest a minimally invasive procedure to smooth the lines around their mouth (ie, nasolabial folds) that add years to their appearance? Especially considering many of these patients may otherwise never seek such treatment.

This strategy will obviously take time and patience, but you can use that time to improve your skills through practice on staff, family, and friends. In the beginning, you will want to focus on patients who are more likely to feel comfortable if the procedure takes longer than expected or requires a follow-up to add more filler. The same discretion was required when you first opened your dental practice. The advantage today is that you have a whole practice of patients who already respect and trust you.

CONCLUSION

If you ultimately decide to incorporate cosmetic dermal filler procedures into your dental practice, you cannot hope to be successful unless you continue to deliver the same high quality of care, and that requires training and knowledge. This unique book was written by dentists for dentists; it recognizes and builds on the practicing dentist's knowledge in areas of overlap, such as head and neck anatomy, facial musculature, anesthesia, and managing patient expectations. In areas that fall outside the scope of dentistry, it takes a more comprehensive approach. Thus, in addition to providing step-by-step instructions for performing dermal filler procedures to address simple, moderate, and advanced conditions, the book includes chapters on the physicochemical properties of commercial fillers, standard injection protocols, facial esthetic analysis, adverse effects and potential complications, locating specific dermal planes, and other critical concepts.

Expanding your practice to include facial esthetic treatment can be a catalyst for positive change and bring many rewards, such as the unfamiliar pleasure of witnessing your patients' enthusiasm and excitement on the day they present for their new treatment.

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2

ANESTHESIA FOR DERMAL FILLER INJECTIONS

In facial esthetics, as in dentistry, patients often assess the quality and success of treatment based not on the outcome, but on the process. Dentists know, perhaps better than most medical professionals, that pain control is an integral part of the process: The more attention given to pain management, the more likely the patient will feel happy and satisfied with the outcome. Pain control and the methods used to achieve it play a central role in the practice of facial cosmetic rejuvenation.[1]

Aside from reducing patient discomfort, proper anesthesia administration minimizes tissue alteration of the treatment site, increases injection/application accuracy, and optimizes esthetic outcomes. The choice of anesthetic method depends on a number of factors, including patient pain tolerance, treatment site sensitivity, type of filler used, tissue plane of the dermal injection, and amount of product injected. In general, the more sensitive the site, the more likelihood there is that injectable anesthesia should be used. Understanding the available armamentarium is critical in determining which method or methods are best for the patient and practitioner. This chapter offers a detailed review of pain control methods, from least to most invasive.

NONINVASIVE ANESTHESIA TECHNIQUES

Cooling therapy and vibration

As most dentists know, a calm demeanor and gentle touch can go far in reducing the fear and anxiety that many patients experience before an injection. This approach is even more effective when combined with other noninvasive modalities of pain control.

There are many different forms of cooling therapy that offer safe, simple, and effective pain control at the site of the injection. Ice packs, vapocoolants, and contact cooling devices can be used alone or in conjunction with topical anesthetics as a pretreatment for pain. Covered ice can be applied to the skin for about 1 to 2 minutes to numb injection sites.[2,3] While this method will only blunt the pain at best, it is safe, inexpensive, and easy. Spraying the injection site with a vapocoolant, such as topical ethyl chloride (Fig 2-1) or dichlorotetrafluoroethane skin refrigerant, desensitizes topical nerves immediately upon application. A randomized split-face study found a statistically significant reduction in pain of 64% when patients were treated with vapocoolant spray prior to dermal filler injections.[4] This method is less cumbersome than ice packs, fast-acting, and cost-effective. However, the spray should only be used in the cheek and nasolabial folds area, and caution should be exercised for those at risk for reactive hyperpigmentation.[2] Alternatively, contact cooling devices (Fig 2-2), again applied to the injection site for only 1 to 3 minutes until the skin is erythematous, not only anesthetize the treatment area, but can also reduce posttreatment ecchymosis and swelling at the site due to the vasoconstrictive effects of the cold. Patients who participated in a split-face trial experienced a 61% decrease in immediate pain and a 66% reduction in ecchymosis as measured 1 day after receiving dermal filler injections.[5] However, prolonged contact at one site can result in injury to the epidermis.

FIG 2-1 Topical ethyl chloride (Gebauer) can be used to numb the injection site prior to injection of dermal fillers.

Vibration (Fig 2-3) has also been shown to be an effective method to minimize the pain of dermal filler injections.[2] The application of a vibration device to an area adjacent to the injection site is thought to reduce pain through stimulation-induced analgesia—a concept associated with the gate control theory of pain—and by relaxing facial muscles.[3,6] The vibration is applied concurrently with the injection (Fig 2-4) or just before it is administered, depending on the model used, and it is completely safe.

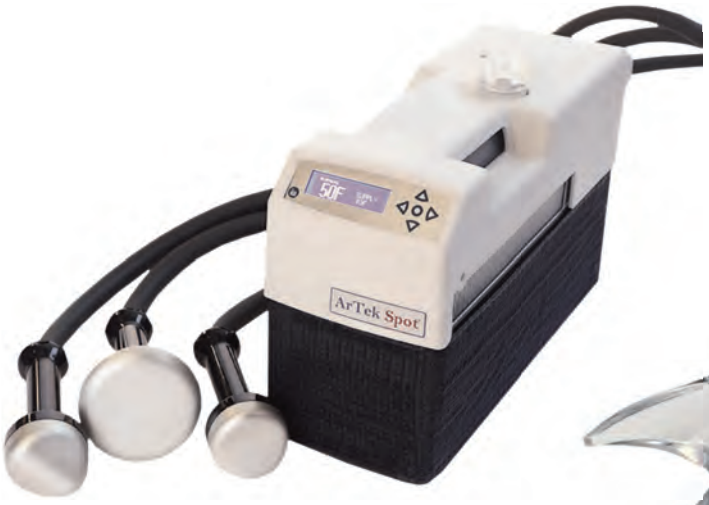

FIG 2-2 A contact dermal cooling device (ArTek Spot, ThermoTek) not only numbs the skin but reduces posttreatment bruising and swelling as well.

FIG 2-3 A vibration anesthesia device (Blaine Labs) achieves its effect through stimulation-induced analgesia and muscle relaxation.

Topical anesthesia

Topical anesthetics offer the same nerve-blocking qualities as injectables and can increase patient comfort when used separately or in conjunction with injectable anesthetics.[7] Lidocaine, alone or in combination with another anesthetic, is the most widely used topical anesthetic.[8] Today, many commercially prepared dermal fillers add lidocaine to the product, allowing patients with high resistance to pain the option to receive topical anesthetics alone in lieu of injectable anesthetics.

The effectiveness of a topical anesthetic depends on the depth of skin penetration, the location of the skin surface, the length of exposure time, and the concentration of the ingredients (Table 2-1).[8] Table 2-2 lists several properties of different topical anesthetic types.[9] The topical anesthetic favored by the authors is a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine (commonly referred to as *BLT* and widely used in cosmetic procedures[1]), and 10% dimethyl sulfoxide (DMSO) in a Lipoderm (Professional Compounding Centers of America) base. DMSO is added to the standard formula not only for its anti-inflammatory effects, but also because of its capacity to rapidly and easily penetrate the skin. This formula can be ordered from any compounding pharmacy.[2] Most topical anesthetics take effect within 15 minutes of administration of a 0.5-mg dose.

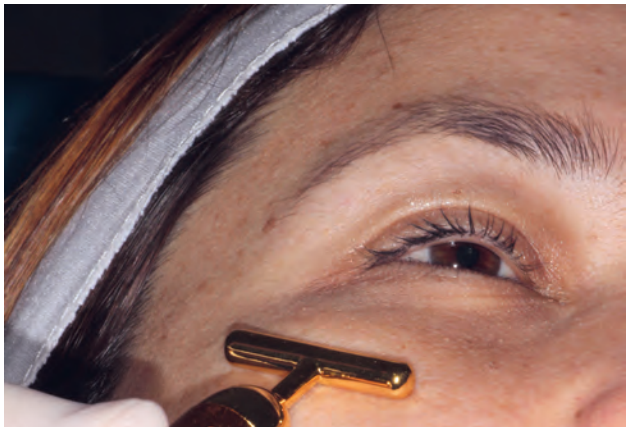

FIG 2-4 Vibration anesthesia device applied concurrently with anesthesia injection.

Few complications are associated with the use of topical anesthesia (Table 2-3).[8] For facial dermal filler procedures, topical anesthetic is applied on a relatively small surface area, and therefore the risk of toxicity is minor. The risk of this complication increases when these agents are used on larger surface areas, such as in certain laser treatments.[8] When using a compounded formula, it is extremely important to know whether the compounding pharmacy

TABLE 2-1 Formulas for commonly used topical anesthetics

Name	Ingredients
LMX4 (Eloquest)	Lidocaine 4%
EMLA	Lidocaine 2.5%, prilocaine 2.5%
BLT plus (compounded formula)	Benzocaine 10%, lidocaine 10%, tetracaine 10%, dimethylsulfoxide 10% in Lipoderm (Professional Compounding Centers of America) base

TABLE 2-2 Properties of topical anesthetics[9]

Topical anesthetic	Maximum dose	Onset (min)	Duration of effect (min)
Lidocaine	500 mg	< 2	30–45
Lidocaine with prilocaine	60 mg	< 60	60–120
Tetracaine	20 mg	3	45

TABLE 2-3 **Complications associated with topical anesthesia**

Adverse event	Signs and symptoms
Allergic reaction	Pruritis 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
Methemoglobinemia caused by lidocaine, tetracaine, or prilocaine	Cyanosis, acidosis

FIG 2-5 A topical anesthetic cream will generally take effect within about 5 minutes and last at least 30 minutes, depending on the formulation.

is formulating the anesthetic with phenylephrine because this can affect dosing (as can tetracaine, the ingredient most commonly associated with toxic dosing). The addition of phenylephrine, a vasoconstrictor, reduces the risk of systemic toxicity.[7,10,11]

In the authors' practices, most patients receiving dermal filler treatments begin with a microdermal needling procedure for dermal rejuvenation of the entire face. As described in chapter 6, a topical anesthetic is applied before microdermal needling. For patients who have a high pain tolerance, dermal filler treatments can proceed without the need for injectable anesthetics for all of the areas covered in this text with the exception of the lips, which are highly sensitive and generally require a lip ring block prior to dermal filler treatment (see chapter 10).[2] Depending on their size and depth, scars and frown lines can be treated using only a topical anesthetic in most patients.

Topical anesthetic procedures begin with the application of alcohol to remove skin oils and to boost the penetration of the anesthetic. The anesthetic can then be rubbed directly on the skin either with gloved hands or a cotton applicator (Fig 2-5). Alcohol is used again to remove the anesthetic once the nerve-blocking effect has been achieved.

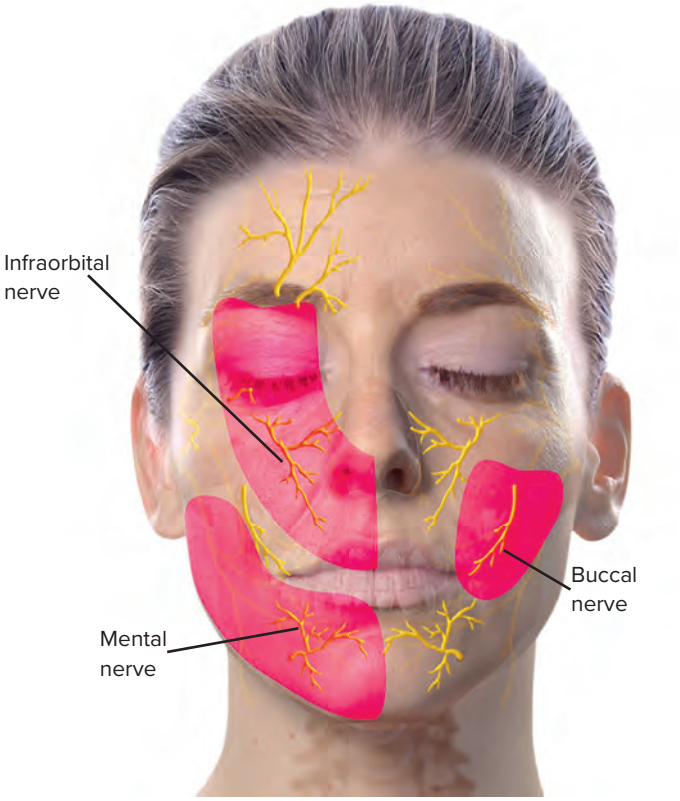

FIG 2-6 Sensory nerves of the face. As most dentists know, the distal portion of the inferior branch of the infraorbital nerve services the upper lip; however, the superior branches of the nerve service the medial cheek, lateral nose, and lower eyelid. Similarly, the mental nerve services the lower lip, but the distal portion of the buccal nerve services the corners of the lips. The infraorbital and mental nerves stretch vertically from the mandible to the supraorbital notch located along the upper border of the orbit. These nerves are detectable roughly 2.5 cm lateral to the midline of the face. The infraorbital foramen can be reached about 1 cm inferior to the infraorbital bony margin, whereas the mental foramen can be detected 1 cm above the mandibular margin.

INJECTABLE ANESTHESIA

Administering anesthesia injections is obviously within the scope of every dentist's daily practice. However, because the target of the anesthesia is the facial nervous system rather than the oral cavity, the dentist should thoroughly review the anatomy of the face, with special emphasis on the innervation location of each injection site in the facial nervous system network (Fig 2-6).

Complications from injections range from patient anxiety and fainting to bruises, infections, and allergic reactions. Toxicity from the anesthetic is almost nonexistent because of the low doses given, but accidental injections to nerve or blood vessels could lead to nervous system or cardiovascular system toxicity, with possible serious results (eg, respiratory distress, cardiac arrest; Box 2-1).[1]

Local infiltration and ring blocks are the two most common methods of administering injectable lidocaine in small doses (0.5 to 6.0 mL). Local infiltration of a solution of 0.1-mL buffered lidocaine with epinephrine is used for most of the procedures covered in this text (Figs 2-7 and 2-8). It usually requires a series of 3 to 6 subcutaneous injection sites, which should raise the skin slightly but not dimple it. The maximum dose that should be given to an adult according to body weight is 4.5 mg/kg for lidocaine without epinephrine and 7 mg/kg for lidocaine with epinephrine.[9] Patients who are especially anxious or who have a low pain threshold for needle injections can be preemptively treated with any of the noninvasive anesthetic techniques described earlier. Alternatively, the clinician can apply a topical anesthetic about 15 minutes prior to treatment.

BOX 2-1 Complications associated with injectable anesthesia

- Bruising
- Infection
- Nerve injury
- Allergic reactions
- Lidocaine toxicity of the central nervous system
- Lidocaine toxicity of the cardiovascular system
- Epinephrine adverse response

FIG 2-7 Locations for local anesthetic infiltration in preparation for basic dermal filler treatment.

FIG 2-8 Locations for local anesthetic infiltration in preparation for advanced dermal filler treatment.

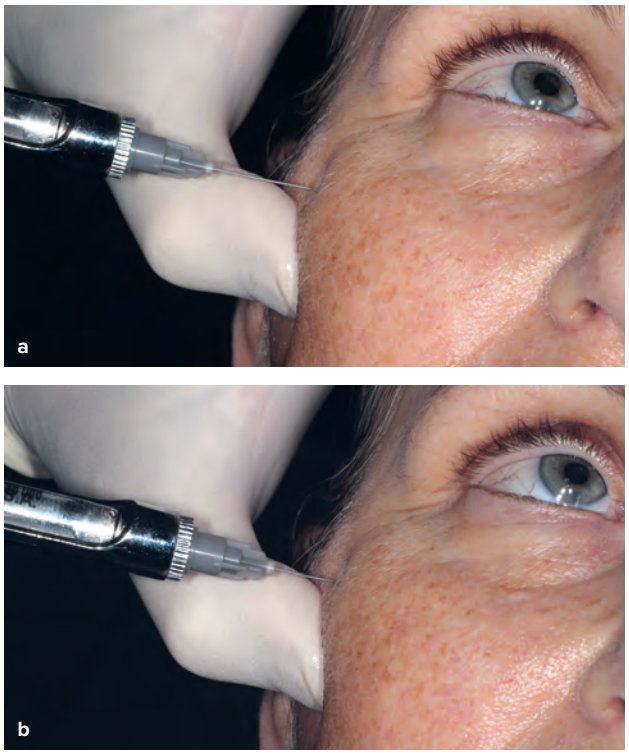

FIG 2-9 *(a and b)* Administration of local anesthetic for dermal filler injection in the tear trough region.

Local infiltration method

An 18-gauge, 1.5-inch needle is used to draw 1.0 mL buffered 2% lidocaine-epinephrine into a 1.0-mL syringe; the needle is then removed and replaced with a 30-gauge, 0.5-inch needle (unless otherwise directed). After the injection site has been cleaned with alcohol, 0.1 mL of the solution is injected at a time (Fig 2-9). Subsequent injections are administered on both sides of the face in accordance with the complexity of the site. Compression of the injected solution away from the treatment site can help reduce edema.

Ring blocks

Overview

Certain areas of facial dermal treatment, such as the lips and perioral region, are particularly sensitive to skin alteration when anesthesia is applied. To minimize or eliminate anesthesia distortion in these areas, many clinicians prefer the ring block administration method to achieve a stronger anesthesia effect using shorter, small-gauge needles. The

FIG 2-10 Ring block method for corners of lips. The *white dots* denote the locations where 0.1 mL lidocaine-epinephrine is injected.

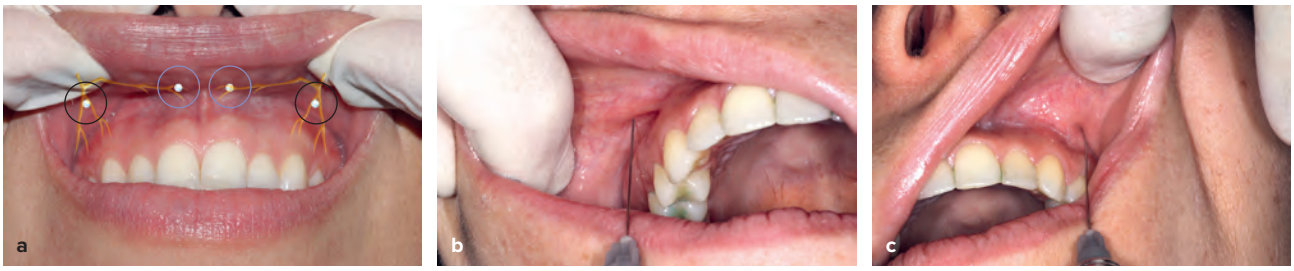

FIG 2-11 *(a to c)* Ring block method for upper lip. The *black circles* denote the locations where 0.5 mL lidocaine-epinephrine is injected, and the *blue circles* denote the locations where 1.0 mL lidocaine-epinephrine is injected.

gingivobuccal margin slightly beneath the submucosa is the typical injection site for lip ring blocks. However, if the treatment area requires the distal portions of the inferior branches of the infraorbital and mental nerves, the injections are made much deeper below the submucosa along the maxilla (for the infraorbital nerve) and mandible (for the mental nerve).

A total of 1.2 mL of buffered or unbuffered lidocaine 2% with epinephrine 1:100,000 solution is applied intraorally via four injections to establish the ring block in the lower or upper lip. Because it is more sensitive, the upper lip should be pretreated at the injection sites with a topical anesthetic gel such as 20% benzocaine. The corners of the lips are barely affected by such ring blocks; therefore, a single injection of 0.1 mL lidocaine-epinephrine solution should be administered in each corner (Fig 2-10).

Upper lip method

The patient should be placed in a 60-degree upright position, with the chin tilting upward. The upper lip is lifted to expose the gingivobuccal margin (Fig 2-11a). Topical benzocaine gel can be applied for 1 minute to anesthetize the injection points of the margin between the frenum and maxillary canines. A 30-gauge, 0.5-inch needle is inserted beneath the mucosa at an angle that is directed toward the pupil superiorly and parallel to the maxilla. Once the needle is advanced nearly its full length, 0.5 mL lidocaine solution is injected. If the solution does not flow smoothly, the needle may have been angled too superficially, placing the solution in the dermis. Once the needle is removed, the injected lidocaine should be compressed superiorly, toward the infraorbital foramen.

Next, local infiltration is applied to the corners of the lips (Figs 2-11b and 2-11c). In each corner, the needle tip is inserted slightly beneath the mucosa, and 0.1 mL lidocaine is injected, followed by compression. The clinician then moves to the opposite side of the patient and repeats the injections previously made contralaterally. A period of 5 to 10 minutes is usually sufficient for the anesthesia to take effect. Absence of sensation should be confirmed before the dermal filler procedure is initiated. An additional 0.5 mL of anesthetic solution can be administered at the maxillary canine injection site.

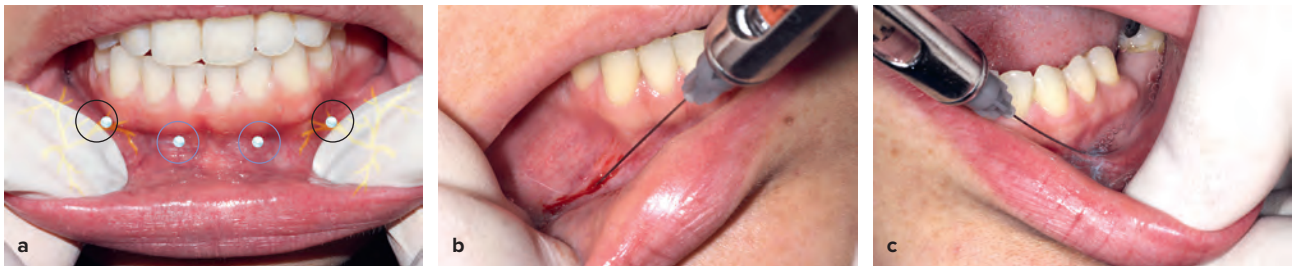

FIG 2-12 *(a to c)* Ring block method for lower lip. The *black circles* denote the locations where 0.5 mL lidocaine-epinephrine is injected, and the *blue circles* denote the locations where 1.0 mL lidocaine-epinephrine is injected.

Lower lip method

As with the upper lip ring block, the patient should be placed in a 60-degree upright position with the chin tilting upward. The lower lip is lifted to expose the gingivobuccal margin slightly lateral to the mandibular first premolar (Fig 2-12a). This time, the needle is directed toward the mental foramen, parallel to the mandible, and the same precautions against superficial injection should be exercised as in the upper lip area. Compression of the lidocaine solution, this time toward the mental foramen, should be applied after the injection. Next, a second injection is made slightly lateral to the frenulum of the lower lip (Figs 2-12b and 2-12c). The tip of the needle is inserted just beneath the mucosa, and 0.1 mL of the solution is injected, followed by compression of the site once the needle is removed.

The clinician then moves to the opposite side of the patient and repeats the injections for the contralateral side of the lower lip. Additional lidocaine can be applied at the mandibular first premolar if needed.

CONCLUSION

Local anesthesia is a critical component of an esthetic practice just as it is a dental practice. Although they do not receive formal training in esthetic dermal filler treatment in dental school, dentists have extensive experience in pain control and are experts on the musculature and anatomy of the face. Most dentists will find this knowledge invaluable for mastering the various methods of administering anesthesia prior to dermal filler treatment, some of which they perform in their everyday dental practices.

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3

DERMAL FILLER SELECTION

A cardinal rule in dentistry also applies to esthetic facial rejuvenation with fillers: Product selection is key to achieving successful results. Yet, there are dozens of filler products for practitioners to choose from, including some autologous agents. A survey of the dermal filler landscape, including a brief history of its evolution, will give the novice esthetic practitioner a bird's-eye perspective of how the field developed, along with a ground-level understanding of how to quickly navigate the market and make informed choices.

DERMAL FILLER CLASSIFICATIONS

Dermal fillers can be classified in terms of longevity, biodegradability, and mechanism of action.

Longevity

Facial dermal fillers are usually described as short-acting, long-acting, or "permanent," but there is wide latitude in how these terms are defined. Generally speaking, a *short-acting* filler can be expected to last up to 1 year, a *long-acting* filler up to 2 years, and a filler labeled as *permanent* (an obvious misnomer) for 5 years or more.[1,2] In most discussions, duration of effect of a given product is a relative concept that makes reference to other products as the standard of comparison.

Biodegradability

Biodegradability, which has a major impact on a product's longevity, is another classification that strays into gray territory.[3,4] A

BOX 3-1 Properties of the ideal dermal filler

Safety
- Nonimmunogenic
- Noncarcinogenic
- Nonteratogenic
- Noninfectious

Efficacy
- Long-term benefit
- Natural feeling
- Nonmigratory
- Reproducible results

Practicality
- Cost-effective
- Easy to use
- FDA-cleared
- Removable or reversible
- Long shelf life

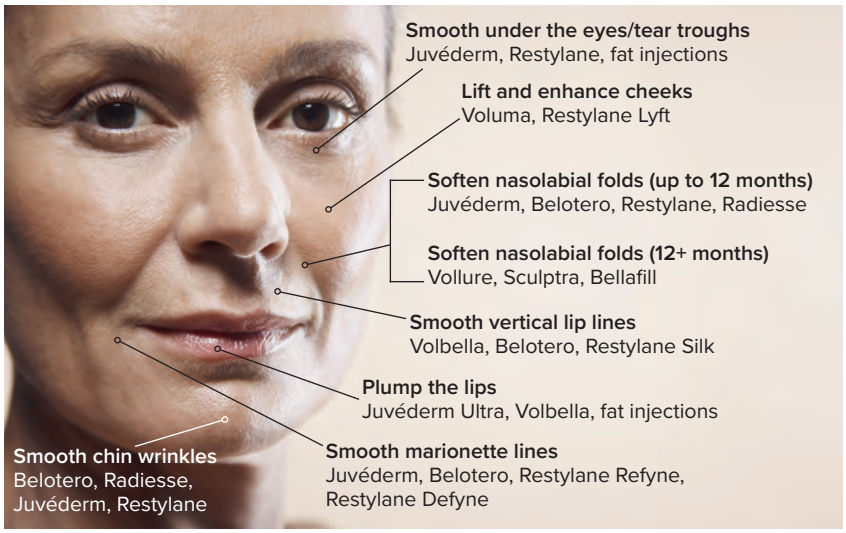

FIG 3-1 Dermal filler products have been FDA cleared for specific treatments but are often used off-label in other areas of the face. (Adapted from the American Society of Plastic Surgeons.[10])

product or agent can be labeled as *(1)* a biodegradable filler, *(2)* a filler with biodegradable particles, or *(3)* a nondegradable filler. *Biodegradable* fillers are fully reabsorbed by the body and are consequently short-lived. Fillers with *biodegradable particles* act by stimulating a response in the body to produce its own collagen before resorbing, which results in a longer-lasting effect. *Nondegradable* fillers are dual-acting: They induce a foreign-body reaction that stimulates the deposition of new collagen, but the nondegradable particles ultimately become permanently integrated into the connective tissue of the skin.

Mechanism of action

As the discussion of biocompatibility suggests, fillers can also be classified according to their mechanism of action.[5,6] In this category, a distinction is made between a *volumizer*, which is a filler that achieves its effect by taking up space (giving added importance to the amount of product injected), and a *stimulator*, one that in some way induces the body to produce new collagen. Again, some products fit neatly into one of these two categories, while others fall somewhere in between.

As with dental treatments, a one-size-fits-all approach to facial augmentation will not yield optimal results. As dermal filling options continue to expand and evolve, the clinician must understand the unique properties and characteristics of each product and apply that knowledge to developing an individual treatment plan for each patient. Box 3-1 lists the qualities of an ideal filler product in terms of its safety, effectiveness, and convenience.[7–9] The remainder of this chapter explains how each agent available is classified and measures up to the qualities of an ideal filler. For convenience, the discussion proceeds from short-acting to long-acting to permanent fillers, which—not coincidently—corresponds to the order in which they evolved.

As in dentistry, many products are used off-label by experienced dermatologists; the present discussion is restricted to those that have been cleared by the U.S. Food and Drug Administration (FDA) for specific facial cosmetic indications (Fig 3-1 and Table 3-1).[10]

TABLE 3-1 **Dermal fillers approved by the FDA for use in the United States**

Trade name (manufacturer)	Year approved	Approved uses
Hyaluronic acid		
Restylane Lyft (Galderma)	2018	Deep dermis to superficial subcutis injection for correction of moderate to severe facial folds and wrinkles; subcutaneous to supraperiosteal injection for cheek augmentation and midface deficiencies; subcutaneous injection for correction of volume deficit in the dorsal hand.
Restylane Refyne (Galderma)	2016	Mid-to-deep dermis injection for correction of moderate to severe facial wrinkles and folds.
Restylane Defyne (Galderma)	2016	Mid-to-deep dermis injection for correction of moderate to severe deep facial wrinkles and folds.
Restylane Silk (Galderma)	2014	For lip augmentation and dermal implantation and for correction of perioral rhytids.
Restylane (Galderma)	2003	Mid-to-deep dermis injection for correction of moderate to severe facial wrinkles and folds.
Revanesse Versa (Prollenium)	2018	Mid-to-deep dermis injection for correction of moderate to severe facial wrinkles and folds.
Revanesse Versa Plus (Prollenium)	2018	Mid-to-deep dermis injection for correction of moderate to severe facial wrinkles and folds (+ lidocaine).
Teosyal RHA 2 (Teoxane)	2017	Mid-to-deep dermis injection for correction of moderate to severe dynamic facial wrinkles and folds.
Teosyal RHA 3 (Teoxane)	2017	Mid-to-deep dermis injection for correction of moderate to severe dynamic facial wrinkles and folds.
Teosyal RHA 4 (Teoxane)	2017	Deep dermis to superficial subcutaneous tissue injection for correction of moderate to severe dynamic facial wrinkles and folds.
Juvéderm Vollure XC (Allergan)	2017	Mid-to-deep dermis injection for correction of moderate to severe facial wrinkles and folds.
Juvéderm Volbella XC (Allergan)	2016	Injection into the lips for lip augmentation and for correction of perioral rhytids.
Juvéderm Voluma XC (Allergan)	2013	Deep subcutaneous and/or supraperiosteal injection for cheek augmentation for correction of age-related volume deficit in the midface.
Juvéderm Ultra (Allergan)	2006	Mid-to-deep dermis injection for correction of moderate to severe facial wrinkles and folds, and lip augmentation.
Juvéderm Ultra Plus (Allergan)	2008	Mid-to-deep dermis injection for correction of moderate to severe facial wrinkles and folds.
Belotero Balance (Merz North America)	2011	Injection into facial tissue to smooth wrinkles and folds, especially around the nose and mouth.

TABLE 3-1 *(CONT)* **Dermal fillers approved by the FDA for use in the United States**

Trade name (manufacturer)	Year approved	Approved uses
Poly-l-lactic acid (PLLA)		
Sculptra Aesthetic (Galderma)	2009	Injection into facial tissue for correction of shallow to deep nasolabial fold contour deficiencies and other facial wrinkles.
Calcium hydroxyapatite (CaHA)		
Radiesse (Merz North America)	2006	Subdermal injection for correction of moderate to severe facial wrinkles and folds.
Radiesse Plus (Merz North America)	2006	Subdermal injection for correction of moderate to severe facial wrinkles and folds (+ lidocaine).
Polymethylmethacrylate (PMMA) microspheres		
Bellafill (Suneva Medical)	2006/2014	Injection into facial tissue for correction of moderate to severe facial wrinkles and folds. In 2014, it was also cleared for moderate to severe pitted atrophic facial acne scars.

SHORT-ACTING FILLERS

The two materials in this category are collagen and hyaluronic acid, both of which are natural components of human tissue.

Collagen

Introduced in the 1970s, injectable fillers made of bovine collagen were the first products to be FDA cleared to smooth the appearance of lines and wrinkles associated with facial aging. Because of public anxiety about the safety of animal-derived products, they became obsolete when human-derived collagen fillers reached the market a few years later. The addition of lidocaine boosted the popularity of collagen fillers, and they would remain the gold standard for the next 20 years.

Human-derived collagen fillers are nonantigenic, safe, and fast-acting, and they require no downtime. The collagen resorbs quickly, however, limiting the duration of their effect to only 3 months. By the late 1990s, this rapid resorption rate sealed their fate, and collagen fillers went the way of other popular 1980s trends like big hair and shoulder pads. Collagen dermal fillers are no longer being manufactured, although even today it is not uncommon for some patients to ask for them by name.

During the same period, neurotoxins were being used to relax and soften the wrinkles caused by the contraction of facial muscles—with excellent results. This breakthrough led to recognition of the different etiologies of the lines formed by movements of expression and the grooves in the skin resulting from a loss of volume associated with aging.[11] The former can be temporarily paralyzed with botulinum toxin injections (which is a subject for another time), whereas age-related wrinkles can be smoothed only by restoring the lost volume. This recognition spurred development of new fillers made from a variety of materials.

Hyaluronic acid

Hyaluronic acid (HA) is the most popular class of filler in the United States, for several reasons[10,11] (Fig 3-2). HA fillers are easy to handle and provide natural-looking results with little downtime. They also boast an important safety advantage over other types of fillers in that they can be immediately and safely reversed with hyaluronidase, making them especially favored by inexperienced clinicians.

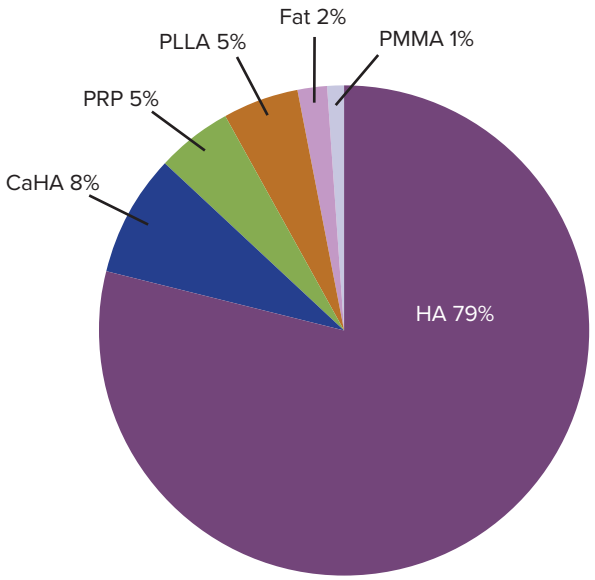

FIG 3-2 Percentage of filler procedures performed in the United States in 2018 by agent used. The total number of procedures was 2,676,970. (Source: American Society of Plastic Surgeons.[10]) CaHA, calcium hydroxyapatite; PRP, platelet-rich plasma; PLLA, poly-l-lactic acid; PMMA, polymethylmethacrylate.

FIG 3-3 Restylane was the first HA filler to be cleared by the FDA in 2003. In the time since, this manufacturer has launched several other formulations, and today Restylane is the second-best-selling filler in the United States. Restylane Refyne treats mild to moderate lines and wrinkles, while Restylane Defyne is for moderate to severe smile lines. Both fillers last up to 12 months. Restylane Silk was the first HA dermal filler to be approved for lip injection via cannula. It is a smoother, lighter injection that produces fuller and more accentuated lips. Restylane Lyft is a heavier, more concentrated mixture for the back of the hands and face that adds lift and volume to the cheeks.

HA was the first filler agent to achieve the definitive rejuvenation effects on static lines and grooves that botulinum toxins have on dynamic lines. Produced naturally by the body and found in high concentrations in the skin, HA binds collagen and water together to provide hydration and augmentation. Like collagen fillers, HA is naturally biocompatible, but it resorbs at a significantly slower rate. Because of its excellent moisture-retention capacity, HA is a key ingredient in many high-end skin care products on the market today.

The first commercially available HA fillers—of which there are many (Figs 3-3 to 3-7)—were FDA cleared in 2003, and in 2018 they accounted for 77% of all dermal filler sales in the United States.[10] Juvéderm (Allergan), which is available in several different formulations, is the undisputed market leader, followed by Restylane (Galderma) and Belotero Balance (Merz North America). HA filler products differ in terms of their rheologic and physicochemical properties (eg, degree of HA concentration, particle size, consistency, viscosity, hardness, degree of water solubility, cross-linking technology), which play an important role in HA filler selection, location and plane of injection, and clinical outcomes. In general, more concentrated products with a greater degree of cross-linking (a manufacturing

FIG 3-4 Revanesse Versa (and Versa+) is engineered to minimize swelling and to maintain balance with the water content of the surrounding skin tissue. It is intended for the treatment of lines and folds in the lower face and for adding volume to the lips. Because it will neither increase nor decrease the water in the skin, Versa can help clinicians avoid over- or undertreatment in the area of injection.

FIG 3-5 The Teosyal RHA line of HA products includes the first resilient HA fillers dedicated to facial dynamics. RHA 2, 3, and 4 have malleability properties to avoid resistance to facial movement. RHA 2 is designed for filling dynamic moderate wrinkles such as nasolabial folds, malar deficiencies, and glabella wrinkles. RHA 3 is designed for filling deep wrinkles in areas such as the nasolabial folds and vertical lip lines. RHA 4 is designed to increase volume in extended areas such as the cheeks, upper cheeks, and contours of the face.

FIG 3-6 Juvéderm offers a number of different formulations in its line of HA products, and the company outsells all other brands of dermal fillers in the United States. Vollure is best for treating wrinkles and fine lines in the lower third of the face (nasolabial folds and marionette lines), whereas Voluma is designed to correct age-related volume deficits in the midface (malar region and tear troughs) and chin areas. Volbella restores volume, contour, and symmetry to the lips and smooths perioral rhytids. Ultra XC and Ultra Plus XC both target moderate to severe facial wrinkles and folds in the midface, though Ultra Plus XC has a larger particle size and thus a longer duration of action (9 months vs 12 months). The Juvéderm family of products all contain lidocaine to reduce patient discomfort.

FIG 3-7 Belotero Balance is formulated with a lower viscosity than many of the other HAs, making it suitable for perioral rhytids, tear troughs, and atrophic scars. It is FDA approved for the correction of moderate to severe facial wrinkles and folds.

process used to slow resorption rate) provide increased longevity, but they have on occasion been associated with a higher risk for inflammation and nodule formation (Table 3-2).[12–14] In addition, a higher G' (elasticity) means a stiffer gel and a deeper injection plane, and conversely a lower G' indicates a softer gel and a more superficial plane of injection.[3] Skin quality, degree of skin laxity, and anatomical location are some of the clinical factors that must be considered when selecting a product. Understanding the rheologic properties of the various HA products can make esthetic enhancement safer and more predictable.

LONG-ACTING FILLERS

This category includes commercial products made of poly-l-lactic acid (Fig 3-8) and calcium hydroxyapatite (Fig 3-9) as well as cells harvested from the patient's own fat and blood tissues.

Calcium hydroxyapatite

Commonly employed in dentistry as a bone grafting substitute, calcium hydroxyapatite (CaHA) was FDA cleared as a dermal filler agent in 2006. Unlike its predecessors, CaHA fillers provide immediate volume replacement while also stimulating a response in the body to produce

TABLE 3-2 **Concentration of hyaluronic acid in commercial HA dermal filler products**[12,13]

Filler name	Hyaluronic acid concentration (mg/mL)	G′ (elastic modulus) (Pa)	Duration of effect (m)
Teosyal RHA 2	23	144	9–18
Teosyal RHA 3	23	184	12–18
Teosyal RHA 4	23	298	12–24
Restylane Lyft	20	545	12
Restylane Refyne	20	47	12
Restylane Defyne	20	260	12
Restylane Silk	20	344	6
Revanesse Versa	25	130	6
Juvéderm Ultra XC	24	76	9
Juvéderm Ultra Plus XC	24	148	12
Juvéderm Vollure XC	17.5	273	18
Juvéderm Volbella XC	15	159	12
Juvéderm Voluma XC	20	307	18–24
Belotero Balance	22.5	41	6

Pa, Pascals.

FIG 3-8 Sculptra Aesthetic is the only dermal filler made of poly-l-lactic acid (PLLA), a synthetic polymer, that has been cleared by the FDA and is sold in the United States. It is intended for soft tissue augmentation and correction of shallow to deep skin depressions and contour deficiencies. Unlike most of the other dermal fillers, the effects of Sculptra are not apparent until about 4 weeks after the initial injection.

FIG 3-9 Radiesse and Radiesse (+) are the first and only FDA-cleared calcium hydroxyapatite dermal fillers sold in the United States. Radiesse is indicated for midface and lower face wrinkles and folds and lasts for about 1 year.

its own collagen, resulting in a longer-lasting effect. CaHA is nonallergenic and inherently biocompatible, and it has a well-established safety profile. When used as a dermal filler, CaHA usually lasts for a minimum of 1 year before it is fully resorbed by the body.

Currently, only one CaHA dermal filler product is FDA cleared for use in the United States. Radiesse (Merz North America) consists of 30% synthetic CaHA microspheres suspended in a 70% aqueous carboxymethylcellulose gel carrier. The soluble carrier distributes the CaHA microspheres and gradually dissipates, while the microspheres induce neocollagenesis via fibroblast activation. Radiesse has a high G' and is highly viscous compared to other dermal fillers, a property that allows it to remain in place when it is injected and not migrate.[6] In 2009, a protocol for mixing Radiesse with lidocaine was approved by the FDA. This formulation significantly increases patient comfort during the injection process.

Poly-l-lactic acid

Poly-l-lactic acid (PLLA) is a synthetic polymer that is probably familiar to most readers as a key component of Vicryl sutures (Ethicon). Indeed, polylactides have a long history of safe use in a number of biomedical pins, plates, and screws, in addition to sutures. First FDA cleared as a dermal filler in 2009, PLLA is unique among commercially available fillers in a number of ways.[15] First, PLLA is not a volumizer in the technical sense because it does not achieve its effect by taking up space. Its singular mechanism of action is the stimulation of neocollagenesis, which means that it restores but does not replace lost volume. Consequently, its full effects are gradual, requiring 3 to 4 injections at least 4 to 6 weeks apart. However, many patients continue to see improvement 2 years after the initial injection.

Second, the injection protocol is less convenient and more technique-sensitive than that of other fillers. The freeze-dried PLLA powder must be reconstituted in sterile water at least 24 hours before the scheduled injection in order to form a suspension. To ensure a uniform concentration, PLLA should be injected at room temperature to avoid the risk of an uneven response. Also, because the effects of the filler are delayed, it is essential not to overcorrect, which puts patients at increased risk of developing minute palpable nodules at the injection site that can last as long as 1 year.[16] Over time, the PLLA microparticles are metabolized by the body and expelled as carbon dioxide.

Sculptra Aesthetic (Galderma) is the only PLLA dermal filler available in the United States. It is primarily indicated for broad dermal correction rather than smoothing individual rhytids and is contraindicated in and around the lips. With regard to the procedures described in this text, Sculptra is ideal for augmentation of the malar areas and the chin.

Autologous fat

Encouraged by publicity of the broad versatility of stem cells, more patients are choosing fat harvested from their own body as a dermal filler over commercial options. Autologous fat transfer (AFT), also known as *lipofilling*, is a low-risk procedure that offers a number of advantages that many patients find attractive. First, fat grafts not only have an immediate volumizing effect on grooves and wrinkles, but stem cells that exist in the fat tissue are a rich source of growth factors that stimulate new collagen production. Second, most patients are delighted to be relieved of the extra fat around their abdomen or thighs. Third, because the filler consists of the patient's own cells, the risk of an allergic reaction is nonexistent. So far, however, most studies report disappointing long-term outcomes, mostly because of unpredictable resorption of up to 70% of the volume of the fat graft.[17,18] Furthermore, there is strong disagreement among clinicians as to the ideal method for harvesting and handling the fat grafts.[18] Therefore, its long-term results are variable and unpredictable.

Allofill (Biologica Technologies) is an off-the-shelf fat allograft that is available for patients who wish to avoid the pain, cost, and recovery time associated with the harvesting of autologous fat through liposuction. It offers all the benefits of AFT minus the guarantee of nonimmunogenicity, as it is sourced from donated tissue.

Platelet-rich plasma

Another autologous dermal filler option, platelet-rich plasma (PRP) offers all the benefits of lipofilling but without the drawbacks associated with fat graft harvesting.[19] Commonly used in dental (and other) surgical procedures to promote healing, PRP is inherently biocompatible and delivers an abundance of stem cells and other growth

FIG 3-10 Application of PRP through a needleless syringe following microneedling therapy.

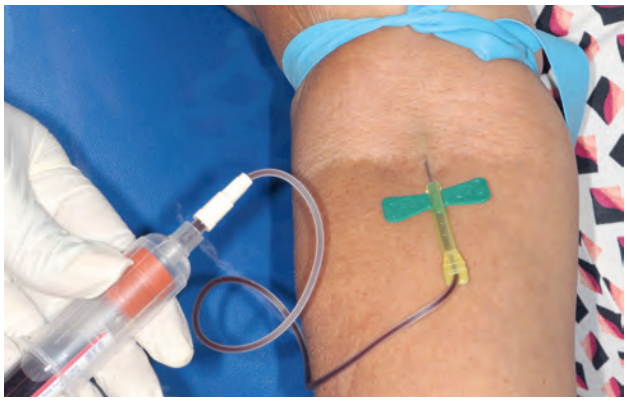

FIG 3-11 PRP requires a venipuncture to draw the patient's blood but eliminates the cost of using a commercial product.

factors. Because it requires only a simple venipuncture procedure, it is significantly less painful, less invasive, and less expensive to harvest than autologous fat (Figs 3-10 and 3-11). Adding PRP to facial lipofilling can reduce recovery time and improve the overall esthetic outcome.

PERMANENT FILLERS

The "holy grail" among dermal filler manufacturers is a product that boasts the safety profile of HAs but without resorption, and promises a permanent (5+ years) improvement in facial appearance. Today, only one agent has been shown to approach that ideal.

Polymethylmethacrylate

To date, the only "permanent" filler material approved by the FDA is composed of polymethylmethacrylate (PMMA), a nonbiodegradable, biocompatible, synthetic polymer that is also used in various medical materials and devices, including dental prostheses. A PMMA dermal filler is made of tiny microspheres carried in a collagen gel. When injected, it initiates a foreign-body reaction that eventually leads to the production of new collagen. The collagen carrier provides immediate volume and lift in the short term, while the nonbiodegradable PMMA microspheres have a long-term "bulking" effect.[20]

Bellafill (Suneva Medical) was the first (and so far only) PMMA dermal filler to be FDA cleared (under a different

FIG 3-12 Bellafill is a unique, dual-acting dermal filler indicated for deep folds in the midface and lower face and to treat moderate to severe pitted atrophic facial acne scars. Composed of sterile PMMA microspheres suspended in a purified bovine collagen gel carrier, it works by adding both immediate lift from the collagen and long-term (up to 5 years) volume correction from the production of new collagen supported by the microsphere matrix. Because it contains bovine collagen, a skin test is required before use.

trade name) for the correction of folds and wrinkles (Fig 3-12). It consists of 20- to 50-µm microspheres of PMMA suspended in a bovine collagen gel carrier, which acts as a glue, preventing the microspheres from clumping and allowing for new tissue ingrowth. Because the collagen is derived from an animal source, skin allergy testing is required 4 weeks prior to treatment. The collagen carrier is absorbed within 1 month of injection and replaced by the patient's connective tissue within 3 months.[21] The inherent downside to a "permanent" filler is that it is less forgiving when mistakes are made or complications arise.

CONCLUSION

Understanding the active components in dermal fillers and their properties allows clinicians to make informed decisions about the products that are currently available and new ones on the horizon. Obviously, clinical factors are equally important. When selecting a dermal filler product, key factors include treatment area, degree of volume loss, and longevity. Furthermore, the rheologic properties of each dermal filler material narrow its applicability. In general, a thinner, more supple filler is used for minor rhytids, lips, scars, and frown lines, while a structure-oriented filler is best for high-volume-loss rhytids, chins, and malar regions. All of these qualities are discussed in detail in later chapters, which cover the step-by-step injection procedures, beginning with the esthetic consultation.

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4

PREVENTING, AVOIDING, AND MANAGING COMPLICATIONS

Novice and experienced clinicians alike must be constantly alert to the potential for adverse outcomes when administering cosmetic dermal filler injections. Most adverse effects result from *(1)* improper injection technique, *(2)* patient hypersensitivity to the filler material, or *(3)* a reaction at the injection site. Although the vast majority of these are minor and self-limiting, catastrophic events are known to occur in rare cases. While not all complications are preventable, most can be avoided.

In 2018, more than 2.5 million soft tissue filler procedures were completed in the United States.[1] Because there is no formal mechanism in place for tracking them, it is impossible to determine the rate at which complications occurred.[2–4] A 2017 article published in *JAMA Facial Plastic Surgery* identified 1,748 dermal filler–related adverse events that were voluntarily reported to the U. S. Food and Drug Administration (FDA) during the 2-year period from 2014 to 2016.[4] Swelling and infection were the most common complications, and vascular compromise—in some cases resulting in tissue necrosis and/or blindness—was the most severe. The authors concluded that while most of the complications reported were not clinically significant, the potential for serious life-changing outcomes must be clearly communicated to patients preoperatively through the informed consent process.[4]

This chapter presents the known complications from dermal filler injections according to their time of onset (Box 4-1).[5] *Immediate-onset* events are defined as those that occur in the first 24 hours of the procedure. *Early-onset* events occur 24 hours to about 4 weeks after the procedure. Finally, *delayed-onset* events are those that develop after 4 weeks but sometimes not until months or even years after the procedure.

BOX 4-1 Commonly reported adverse events by time of onset

Immediate	Early	Delayed
• Bruising/ecchymosis • Erythema • Edema • Hypersensitivity/ angioedema • Vascular occlusion/ compromise	• Infection • Delayed hypersensitivity • Papules/nodules • Hyperpigmentation • Dysesthesia/paresthesia/ anesthesia	• Chronic infection • Biofilm • Foreign-body granuloma

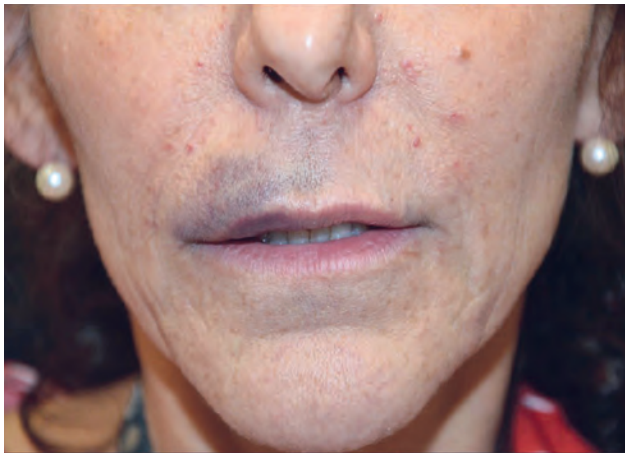


FIG 4-1 Bruising after injection with hyaluronic acid filler. (Reprinted with permission from Levy and Emer.[6])

IMMEDIATE-ONSET COMPLICATIONS

Injection site reactions

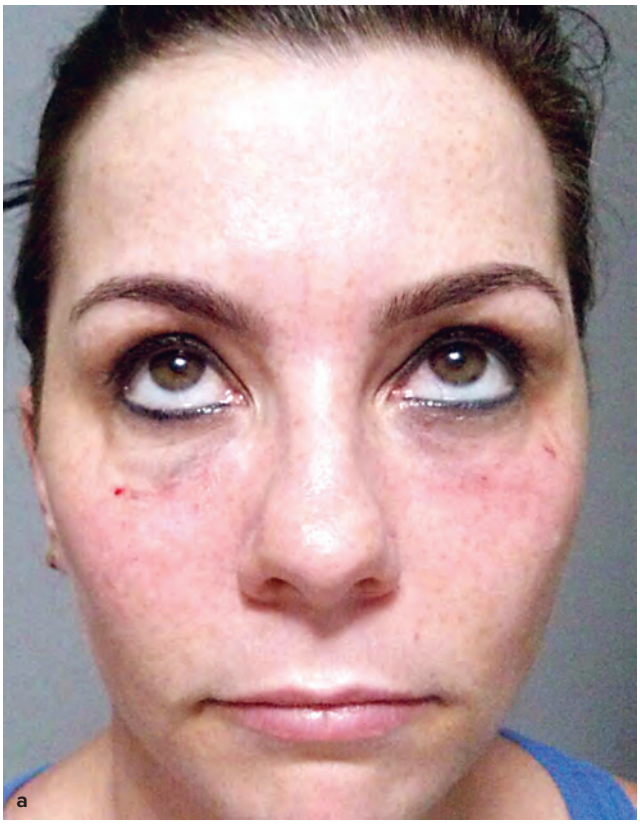
Bruising, erythema, and tenderness are all common injection site reactions that occur immediately following the skin puncture but resolve quickly[2,4,6] (Fig 4-1). Bruising has been shown to increase when injections are made in the dermal and immediate subdermal planes using fanning and threading techniques.[7,8] Bruising and ecchymosis can be minimized by applying slow and gentle pressure on the syringe during each injection, using the smallest gauge needle that can safely deliver the filler, or using a blunt cannula.[7] Anticoagulation medications such as nonsteroidal anti-inflammatory drugs and vitamin and herbal supplements should be discontinued for at least 1 week before dermal filler therapy.[8] Applying ice or a cold compress along with gentle but firm pressure immediately after the procedure can also help reduce the amount of bruising that occurs. Swelling and edema are normal reactions, but they are known to be more severe with some dermal filler agents. In the *JAMA* study, swelling was the most commonly reported adverse sequela of all hyaluronic acid (HA) fillers.[4] Lumps and bumps that form immediately at the injection site are most likely the result of either overfill or superficial injection of filler and usually can be dispersed with gentle massage.[5] If the condition persists, the skin can be nicked, and excess filler can be aspirated. If the filler is in a deeper plane, hyaluronidase should be injected to disperse it.[9,10]

Edema

Swelling and edema are normal responses to the trauma of injection, and they occur with all fillers.[4,8] Severity usually depends on the amount of material injected and the injection technique used. Postinjection edema presents immediately or within a few hours of the procedure and usually resolves within 1 week. Steps to limit edema include the use of small-gauge needles, slow injection of small amounts of filler, and a minimal number of puncture sites.

Hypersensitivity and angioedema

Some patients develop a hypersensitivity reaction to dermal filler injections, either after a single treatment or after multiple exposures.[7] Hypersensitivity to HA fillers is rarely reported, but the incidence increases significantly with other agents.[9,10] Because of the bovine collagen carrier used in Bellafill (Suneva Medical), a skin allergy test is required 4 weeks before treatment.[5,10] Symptoms of a hypersensitivity reaction include edema, erythema, pain, and itching (Fig 4-2). These symptoms usually manifest within minutes to hours of the injection[7] (Fig 4-3). Rapid onset of these



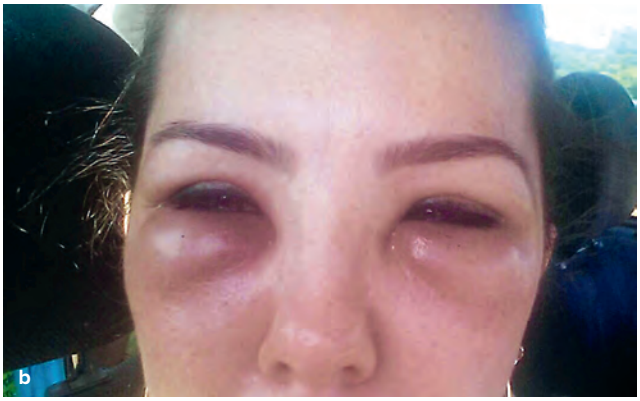


FIG 4-2 *(a)* Allergic edema that developed 1 hour after injection of filler into tear troughs. *(b)* Clinical appearance after 24 hours.

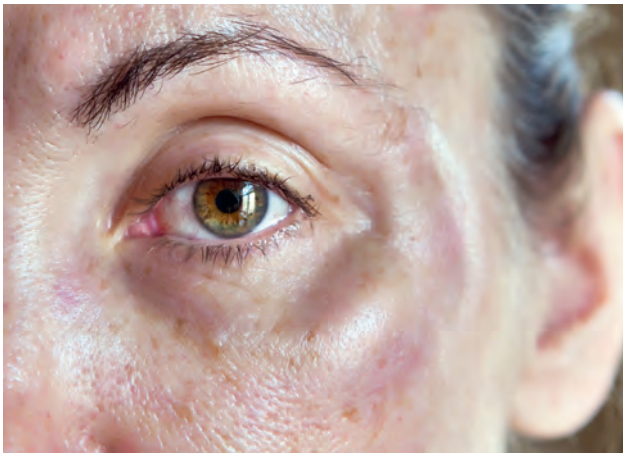


FIG 4-3 Hypersensitivity response that developed within 1 hour postinjection.

TABLE 4-1 Gell and Coombs classification of hypersensitivity reactions

Classification	Mediators	Examples	Onset
Type I	Antibody IgE	Anaphylaxis, angioedema	Immediate
Type II	Antibody IgG and IgM	Neutropenia, hemolytic anemia	Hours to days
Type III	Antibody IgG	Serum sickness	1 to 3 weeks
Type IV	T-cell lymphocytes	Contact dermatitis	Days to weeks

IgE, immunoglobulin E; IgG, immunoglobulin G; IgM, immunoglobulin M.

symptoms can become a medical emergency because of the potential for airway loss. Immediate recognition and attention are critical in such cases.

Angioedema is a result of an immunoglobulin E–mediated immune response to the dermal filler or anesthesia used (Table 4-1).[7] It can be severe and can last for several weeks. However, most cases resolve spontaneously within a few days, and those that do not will usually respond to antihistamines[8] (Fig 4-4). For persistent cases, oral steroids can be prescribed. The patient should be closely monitored to rule out possible infection.

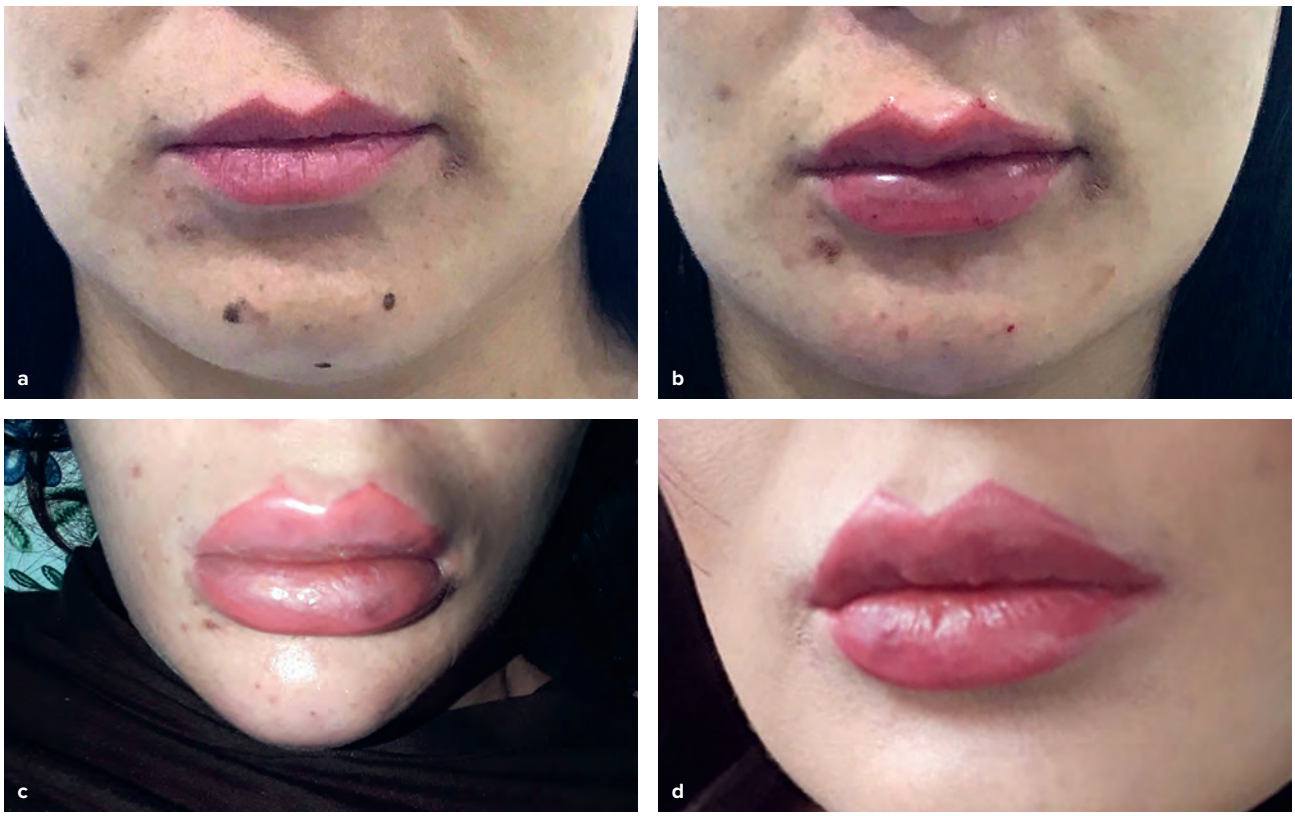


FIG 4-4 *(a)* Patient undergoing chin augmentation, lip volumization, and lip micropigmentation. No reaction a few minutes after treatment. Note the black spots on the chin marking the areas of injection. *(b)* Allergic reaction to filler. *(c)* Clinical appearance after 24 hours. *(d)* Final appearance after treatment of the complication.

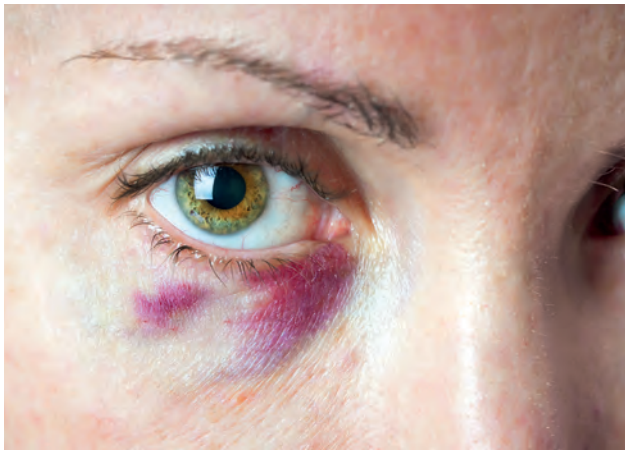


FIG 4-5 Bruising that developed within 1 hour of filler injection to the tear trough region, likely from partial vascular occlusion. The patient experienced no long-term complications.

Vascular occlusion/compromise

Vascular or arterial occlusion is a serious acute event indicated by extreme pain and blanching or other changes in skin color during or immediately following the injection[3,7–9,11] (Fig 4-5). Although rare, this complication can result in dermal necrosis (Fig 4-6), irreversible blindness, and stroke. To avoid these potential outcomes, immediate recognition and action by the clinician are imperative.

Vascular occlusion is caused by injection of filler into an artery.[3,9] When this happens, an embolism is formed, preventing the flow of blood through the artery. Vascular occlusion can also occur as a result of compression of the filler material in direct contact with the vessel wall or administration of an injection too quickly or deeply.[7,9]

When vascular occlusion or compression is suspected, it is critical to stop the injection immediately and begin treatment aimed at promoting blood flow to the affected area.[3,8,9] First, the site should be covered with a warm compress

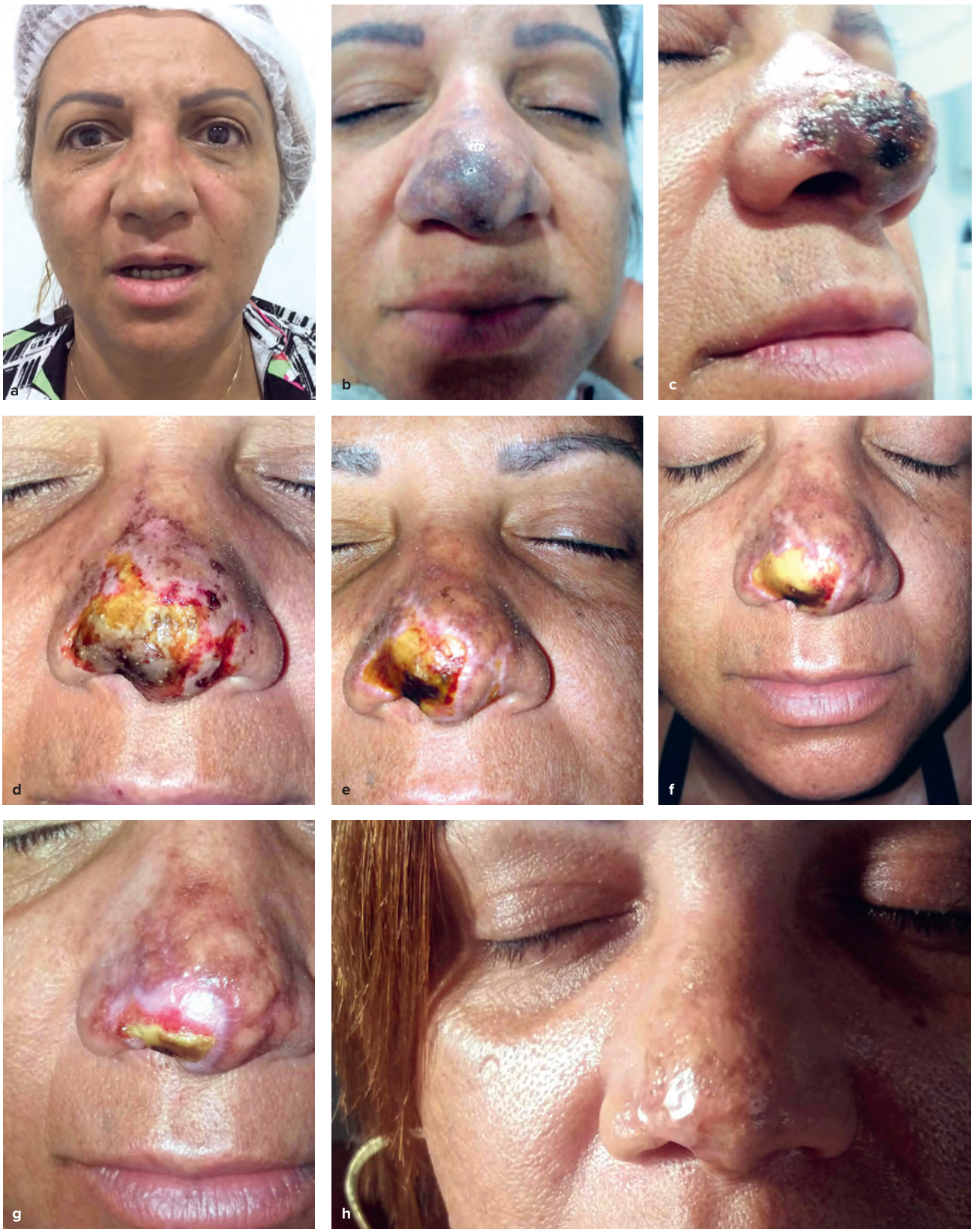


FIG 4-6 *(a)* The patient underwent filling of the nasal dorsum and tip to smooth the contour. Clinical appearance of the region immediately after application. *(b)* Superficial necrosis of the skin caused by ischemia. *(c)* Evolution of the ischemic process. *(d)* Clinical appearance after debridement and cleaning with saline. *(e)* Early stage of repair following application of fibrinase plus chloramphenicol every 8 hours. This medication promotes chemical debridement of the lesions and prevents infection. *(f and g)* Evolution of the repair. *(h)* Final resolution of repair of the skin. A small sequela can be observed.

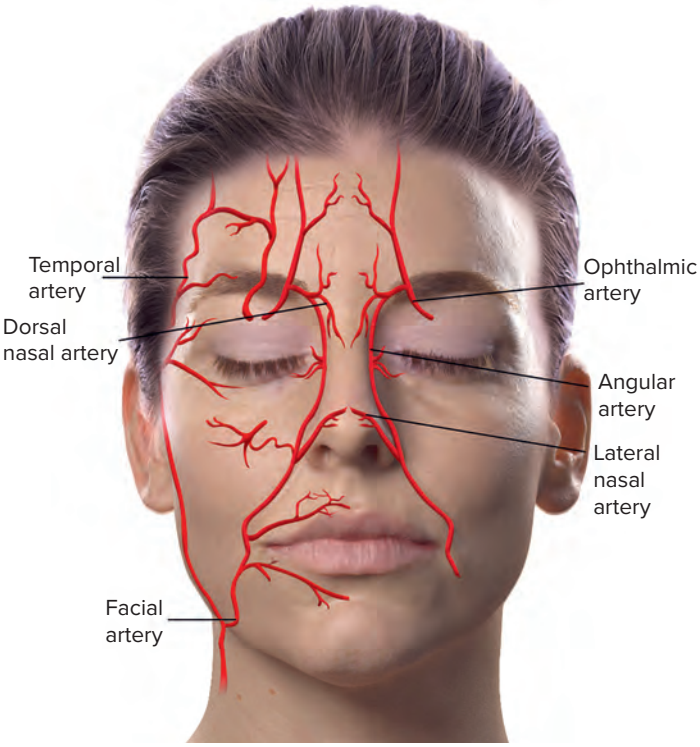


FIG 4-7 Arteries of the face.

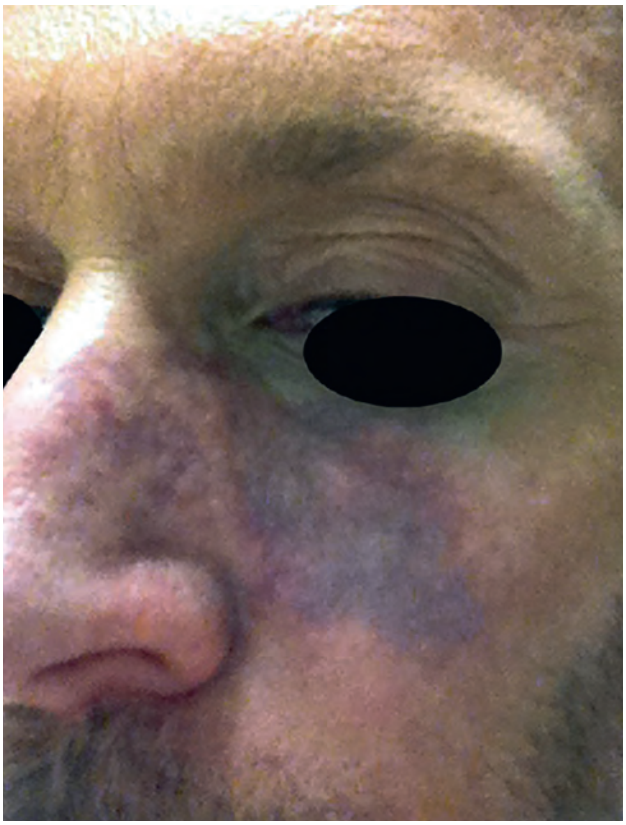


FIG 4-8 Soft tissue ischemia can become a bluish discoloration, which may appear like a large bruise. (Reprinted with permission from Hwang.[14])

BOX 4-2 Recommendations for preventing vascular complications*

- Use a delicate retrograde injection technique (see chapter 7).
- Always inject the filler slowly, applying light pressure on the syringe plunger.
- Inject small amounts at a time (ie, < 0.1 mL), at several injection points.
- Use a microcannula for deep injections and for very viscous products.
- Use fine needles only for superficial injections.

*Adapted from Sito et al.[13]

and gently massaged to try to disperse the material.[3,8,9] A 2% nitroglycerin paste should be applied to the area to promote vasodilation; the patient's vital signs must be monitored when using vasoactive compounds. Regardless of the type of filler used, hyaluronidase should be injected diffusely all over the affected area as soon as possible to reduce edema and potentially decrease pressure to the vessel.[2,12] Any vascular complication requires close monitoring and extended care with treatment aimed at dissolving the product, facilitating blood flow, and promoting vasodilation.

The areas that are at increased risk of vascular injury are those in the path of the facial, nasal, temporal, and ophthalmic arteries[13] (Fig 4-7). Occlusion of the retinal branch of the ophthalmic artery can result in immediate and irreversible blindness. A recent meta-analysis found that in a majority of cases, occlusion of the ophthalmic artery was due to injections in the nose (Fig 4-8),[14] whereas occlusion of the retinal artery was most often the result of injections in the glabella.[13] Another meta-analysis found that the most common injection site associated with necrosis was the nose, followed closely by the nasolabial folds, whereas the glabella was the injection site most often associated with blindness.[2]

A thorough understanding of facial vascular anatomy and a careful injection technique are critical factors in avoiding vascular complications. Box 4-2 lists recommendations for reducing this risk.[13]

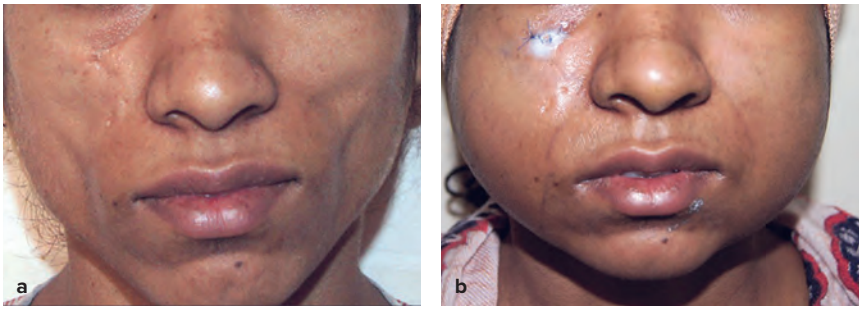


FIG 4-9 *(a)* Patient with bilateral loss of facial contour. *(b)* Postoperative edema and infection seen. (Reprinted with permission from Marwah et al.[17])

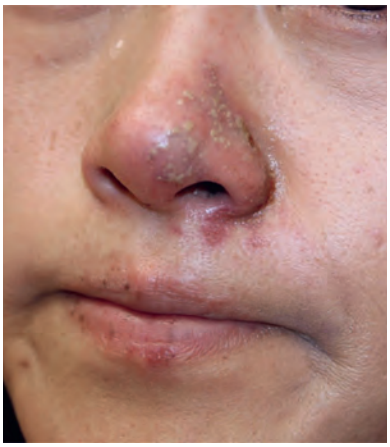


FIG 4-10 Dermal filler injection leading to herpes virus reactivation. (Reprinted with permission from Funt and Pavicic.[7])

EARLY-ONSET COMPLICATIONS

Infection

Any procedure that breaks the skin poses a risk of infection. Early-onset infections following dermal filler injections can be categorized as either acute or chronic.[15,16] Acute infections usually present within a few hours to a few days of the injection. Symptoms include erythema, tenderness, warmth, and swelling at or around the injection site; pain; the presence of nodules or pustules; and possible systemic fever[15,17] (Fig 4-9). Chronic infections have many of the same features, but they generally present 2 weeks or more after the injection and have a more generalized effect.[16] In a differential diagnosis, it is important to distinguish an infection from an inflammation caused by a hypersensitivity response, because the management of these complications is very different.[15] Warmth, pain, fever, and abscess formation are symptoms generally not associated with an inflammatory response.

Most early low-grade infections are due to common pathogens found on the skin—namely *Streptococcus pyogenes* and *Staphylococcus aureus*—that are introduced into the injection site.[5,18] Chronic infections can involve atypical mycobacteria that lead to biofilm growth and lie dormant until activated by injury or other incursion.[19] These infections can become much more serious and develop into abscesses or granulomas.

Management depends on the severity of the infection. For mild cases, an antibiotic regimen of ciprofloxacin, clarithromycin, or amoxicillin plus clavulanic acid for 10 days to 2 weeks is usually effective.[8,18] Abscesses that do not respond to oral antibiotic therapy can be aspirated and cultured to identify the pathogen and an appropriate antibiotic.[19] Chronic infections may require additional treatment, including prolonged or intravenous antibiotics.[18] Purulent abscesses may call for incision and drainage, injection of hyaluronidase, intralesional steroid injection, or surgical excision as a last resort.

Proper skin preparation is critical to avoiding infections.[18,20] There are a number of commercial antiseptic solutions available, including 10% povidone-iodine, 70% isopropyl alcohol, and povidone-iodine with 70% ethyl alcohol, and they have been shown to be equally effective.[21] Patients with an ongoing infection, whether in the area to be injected or in close proximity, should have their treatment delayed until the infection has resolved. Many authors report that dermal filler injections can lead to reactivation of herpes virus infections (Fig 4-10),[5,7,15,18] although some reject the idea.[8,10] Patients with a history of cold sores may benefit from a prophylactic regimen of valacyclovir (1 g) for 3 to 4 days prior to treatment and continuing for 3 to 4 days afterward.[8] As an added precaution, when treatment includes the lips, the lips should be injected last in all patients.

BOX 4-3 Recommendations for maintaining sterile technique and avoiding infections*

- Have an assistant present sterile packages for opening, including syringe, gauze, and other materials.
- Wear a mask.
- Have the patient wear a surgical cap or a headband.
- Instruct the patient not to wear makeup on the day of the procedure.
- If the patient arrives wearing makeup, make sure it has been thoroughly removed.
- Always disinfect the entire face and not just the area to be treated.
- Wear sterile gloves when using a cannula.
- Change gloves any time they have been in contact with the mucosa.
- The clinician and patient should both wash their hands thoroughly prior to the procedure.
- If treating the lips, leave them until the end of the procedure.
- Periodically inspect the needle and make sure it is not blunt.

*Adapted from Urdiales-Gálvez et al.[8]

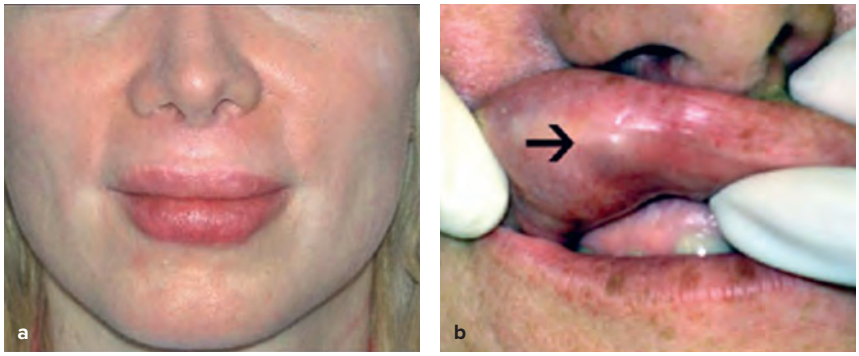


FIG 4-11 *(a)* Erythematous indurated papules on the outer and *(b)* inner lip weeks after HA filler injection (Restylane, Galderma). (Courtesy of George Anastassov. Reprinted with permission from Levy and Emer.[6])

Most infections are believed to result from a break in sterile technique.[13] Box 4-3 lists approved methods for preparing the patient and the materials/armamentarium used in the procedure to avoid infections.[8]

Hypersensitivity

An early-onset hypersensitivity reaction is characterized by induration, erythema, and edema that develops more than 24 hours but less than 3 months after dermal filler injection.[18] The symptoms can persist for several months. Unlike an immediate-onset reaction, this type of hypersensitivity reaction is cell mediated rather than antibody mediated and is classified as Type IV (see Table 4-1).[7]

Early-onset hypersensitivity reactions do not respond to antihistamines and require removal of the allergen.[7] Hyaluronidase should be used to dissolve HA fillers.[18] Other types of fillers may respond to steroid therapy, but those that do not require surgical excision.[7]

Papules and nodules

Lumps and bumps are extremely common complications of dermal filler injection.[2,18] Papules that form a few days or weeks after dermal filler injection generally arise in areas of thin tissue and are asymptomatic[6] (Fig 4-11). Nodules that are painful, red, and tender usually suggest the likelihood of a concomitant infection. All nodules require careful assessment to be designated as noninflammatory, inflammatory, or infectious and so a diagnosis can be established.

Most early-onset papules are noninflammatory in origin and result from either the injection of too much filler material, the injection of filler material too superficially, or the wrong choice of material for the site being treated[18,22] (Fig 4-12). Elimination of these papules requires breaking them up using a 25-gauge needle and then firm massage to disperse them.[22] Muscle activity in the days following the injection can also cause the filler to clump together into

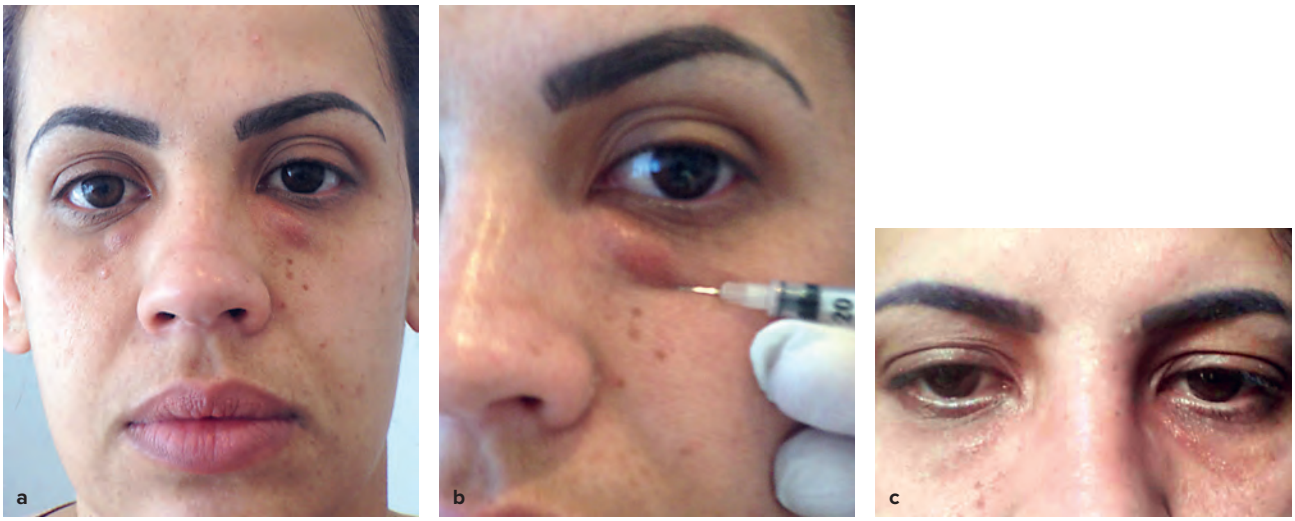


FIG 4-12 *(a)* Lumps caused by the injection of excess filler material that was also the wrong density for tear trough treatment. *(b)* Hyaluronidase was used locally to dissolve the filler. *(c)* Clinical appearance after 30 days.

larger nodules that, when persistent, may require incision and drainage. If an HA filler was used, hyaluronidase can be injected into the nodule or lump to dissolve it.

Nodules that are identified as infectious require antibiotic therapy. Depending on the preference of the clinician, a 10-day to 2-week course of ciprofloxacin, clarithromycin, or amoxicillin plus clavulanic acid should be prescribed. Abscesses that do not respond to oral antibiotic therapy can be aspirated and cultured to identify the pathogen and allow for the selection of an appropriate antibiotic.

Careful attention to material selection and injection technique will prevent the majority of early-onset papules and nodules.

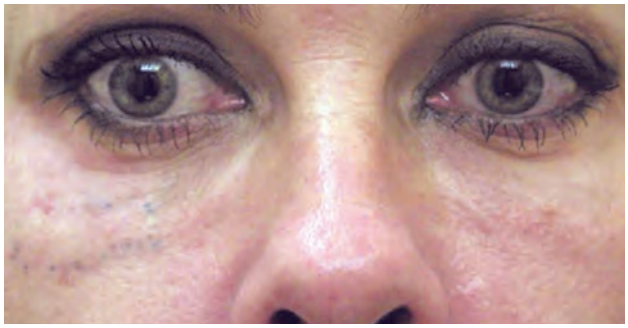


FIG 4-13 Tyndall effect. (Courtesy of M. Cantisano-Zilkha. Reprinted with permission from Hwang.[14])

Hyperpigmentation

Postinflammatory hyperpigmentation is a relatively common reaction to trauma to the face.[18] Although it occurs in all skin types, patients with darker skin tones (Fitzpatrick skin types IV, V, and VI) are especially predisposed to this complication.[7,16,18] In most cases, the skin returns to its normal color without intervention. In patients with persistent postinflammatory hyperpigmentation, a bleaching agent such as topical hydroquinone (2%–8%) and tretinoin is the first line of treatment.[7,18] Daily use of a high-spectrum sunscreen is also advised.[7,18] Resistant cases can be treated with chemical peels. If that fails, intense pulsed light or laser therapy is the next step.[7]

Although postinflammatory hyperpigmentation cannot be prevented, its effects can be minimized by limiting injury to the skin.[7] In susceptible patients, restricting the number of skin punctures by using the fanning injection technique when appropriate is recommended.[7]

When HA filler is placed too superficially into the dermis, it appears through the skin as a blue hue known as the *Tyndall effect*[14,18,20] (Fig 4-13). When this happens, hyaluronidase should be injected into the site to dissolve the filler material.[10,18,20] If that fails to resolve the discoloration, a small-gauge needle can be used to nick the skin and release the filler material.[7]

Dysesthesia, paresthesia, and anesthesia

Inadvertent injury of a nerve during dermal filler injection is a rare complication.[7,8] Pain and/or sensory deficits can be transient or permanent depending on the amount of damage sustained. There are several ways in which a nerve can be traumatized during a dermal filler procedure: by direct puncture or needle laceration, injection of filler into the nerve, compression of the nerve by the filler material, or aggressive massage that pushes filler into the nerve foramina. In each of these cases, the injury is reversible, and sensation should return over several weeks.[7]

Transection of a small sensory nerve can result in anesthesia in the area of the nerve. This injury also is reversible, and sensation should gradually return within several months.[7] The damage caused by the complete transection of a nerve, however, is permanent.[7] When this happens, pain and numbness are reportedly most common in the areas innervated by the infraorbital nerve.[7,8] Treatment involves injection of small amounts of the corticosteroid triamcinolone at the infraorbital foramina and dissolution of the filler with the use of lidocaine or sterile saline.[7]

A thorough knowledge of facial anatomy structures is critical for any clinician who administers facial dermal fillers, combined with the clear understanding that the location of nerves and other vessels can vary widely in individual patients.

DELAYED-ONSET COMPLICATIONS

Chronic infection

Chronic infection that develops weeks or months after a dermal filler procedure is uncommon. Symptoms typically include erythema, warmth, edema, pain/tenderness, swelling, and other sequelae accompanying a systemic response to infection. Nodule or abscess formation sometimes occurs, appearing as a firm, mildly tender mass with or without fluid. Left untreated, chronic infection can lead to sepsis in immunocompromised patients.[7,8] The infection may be bacterial, fungal, or viral in origin, and mycobacteria or some other atypical organism should be suspected.[15] A differential diagnosis must be conducted to rule out a hypersensitivity reaction, as steroids should never be prescribed to treat an infection.[15,16]

Management should begin with a bacterial culture and clinical assessment to identify the source of the infection and establish an effective therapeutic regimen.[7,15,18,19] Abscesses require incision and drainage.[7] Until the pathogen has been identified and a sensitivity report obtained, it is advisable to begin empirical treatment with an antibiotic that covers atypical mycobacteria, such as clarithromycin, 500 mg twice daily, combined with ethambutol or rifampicin.[8]

Inflammatory nodules

Biofilm

Biofilm is a delayed reaction that can arise from a low-grade chronic infection that is antibiotic-resistant. All fillers, but especially longer-lasting agents, are potential surfaces for biofilm formation.[2] Many bacterial species form biofilms; once formed, they become more antibiotic-resistant over the course of time.[7,8] These complex groups of bacteria can lie dormant for months or years until activated by trauma (such as a second dermal filler procedure).[7,9,19]

Biofilm can cause a local or a systemic infection, a granulomatous reaction, or an inflammatory response.[7,9,19] These conditions are difficult to diagnose and treat.[8,9,19] If a red, indurated area appears at any time after treatment, a biofilm should be suspected. Moreover, any persistent inflammatory condition that fails to improve with therapy, or an inflammatory nodule that recurs after resolution, may also indicate a biofilm.

Antibiotic treatment using a broad-spectrum agent, such as quinolones and macrolides, is the first line of treatment.[2,7,9] Standard culturing techniques usually fail to identify biofilms; techniques such as real-time polymerase chain reaction, pyrosequencing, fluorescent in situ hybridization, or ultrasound may be required to identify the organisms.[9] Hyaluronidase can be injected if an HA filler was used.[2,7] Removal of the filler will reduce the postinflammatory potential of the biofilm.[7] If a long-term indurated area persists and these treatments fail, referring the patient to a physician is strongly recommended.

Biofilms are a rare complication of dermal filler injections.[7] To avoid them, several precautions should be taken to minimize risk. These include thoroughly cleaning the entire face before treatment, avoiding injections into previous filler or traumatized tissue, and aggressive treatment of all postprocedure infections.

Foreign-body granuloma

The body's response to a foreign body that cannot be broken down is to encapsulate it in monocytes and macrophages that secrete cytokines and other inflammatory products.[7,8,15] These granulomas appear as red papules, nodules, or ulcerated/nonulcerated plaques that grow firmer over time.[7,15] Granulomatous reactions to dermal fillers typically do not develop until months or years after the material was injected, and they are extremely rare.[7,8,15]

Hyaluronidase can be used to treat granulomas that develop in reaction to HA fillers.[7,8] For other fillers, injection of corticosteroid into the lesion is the first-line treatment.[7,15] When that fails, 5-fluorouracil (5-FU) can be added to the corticosteroid.[7,15] Surgical excision is required for granulomas that are unresponsive to other therapies.[7,8,15]

CONCLUSION

Because cosmetic dermal filler treatment is an elective procedure not covered by insurance, patients often have high expectations and a low tolerance for unexpected or adverse results, no matter how minor. Complications take an emotional toll on the patient and the clinician alike and can damage or destroy relationships that were years in the making.

Dermal filler injections are safe and effective when properly administered, and the vast majority of complications are mild and transient. Most serious complications occur because of an improper injection technique, poor understanding of the facial vascular anatomy, or both. Preventing and avoiding complications requires a detailed understanding of facial anatomy, careful patient screening, proper product selection appropriate for the site being treated, and the use of appropriate injection techniques.

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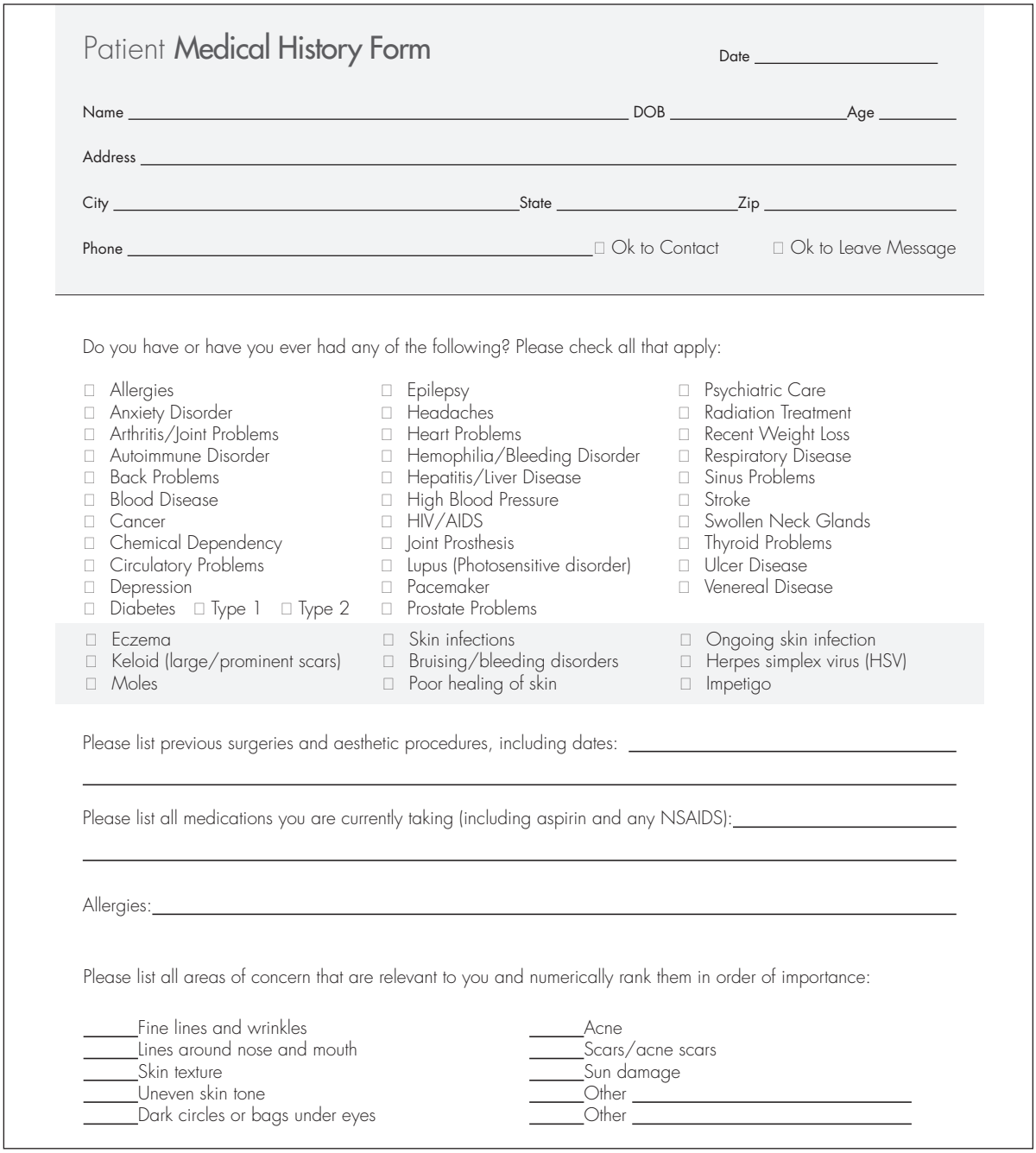
5

ESTHETIC CONSULTATION AND TREATMENT PLAN

The esthetic consultation is a comprehensive history and screening process that lays the foundation for the esthetic treatment plan. The clinician's primary objectives are to determine which procedures would best serve the patient's needs and to develop a treatment plan tailored to the patient's medical and cosmetic history. For the patient, the purpose of the consultation is to ascertain whether the treatment they are seeking will be safe, effective, and affordable.

A cardinal rule of any successful esthetic practice is to avoid treating the wrong patient. To fully appreciate the wisdom behind this rule, the clinician need only break it one time. Consequently, in the initial consultation, the clinician must establish a protocol for evaluating candidates not only in terms of their medical but also their psychologic fitness to undergo facial augmentation therapy. Appropriate candidates for soft tissue augmentation are patients who have realistic expectations about esthetic outcomes, harbor no illusions about how it will impact their life, agree to comply with all pretreatment and posttreatment directives, and commit to all necessary follow-up appointments. Finally, the clinician must be confident that the patient understands all of the dermal filler injection procedures.[1,2]

Once satisfied that the patient is a good candidate for dermal filler injections, the clinician must educate him or her regarding treatment options, factors affecting the outcomes, likely duration of the results, and any possible adverse events. Each part of the esthetic consultation should be completed prior to treatment for every patient. This includes not only new patients but long-term dental patients who are well-known to the practice, as the motivation for seeking facial rejuvenation treatment can be vastly different from that for seeking dental treatment.



Patient **Medical History Form**

Date _____

Name _____ DOB _____ Age _____

Address _____

City _____ State _____ Zip _____

Phone _____ ☐ Ok to Contact ☐ Ok to Leave Message

Do you have or have you ever had any of the following? Please check all that apply:

☐ Allergies	☐ Epilepsy	☐ Psychiatric Care
☐ Anxiety Disorder	☐ Headaches	☐ Radiation Treatment
☐ Arthritis/Joint Problems	☐ Heart Problems	☐ Recent Weight Loss
☐ Autoimmune Disorder	☐ Hemophilia/Bleeding Disorder	☐ Respiratory Disease
☐ Back Problems	☐ Hepatitis/Liver Disease	☐ Sinus Problems
☐ Blood Disease	☐ High Blood Pressure	☐ Stroke
☐ Cancer	☐ HIV/AIDS	☐ Swollen Neck Glands
☐ Chemical Dependency	☐ Joint Prosthesis	☐ Thyroid Problems
☐ Circulatory Problems	☐ Lupus (Photosensitive disorder)	☐ Ulcer Disease
☐ Depression	☐ Pacemaker	☐ Venereal Disease
☐ Diabetes ☐ Type 1 ☐ Type 2	☐ Prostate Problems	

☐ Eczema	☐ Skin infections	☐ Ongoing skin infection
☐ Keloid (large/prominent scars)	☐ Bruising/bleeding disorders	☐ Herpes simplex virus (HSV)
☐ Moles	☐ Poor healing of skin	☐ Impetigo

Please list previous surgeries and aesthetic procedures, including dates: _____

_____

Please list all medications you are currently taking (including aspirin and any NSAIDS):_____

_____

Allergies:_____

Please list all areas of concern that are relevant to you and numerically rank them in order of importance:

_____Fine lines and wrinkles	_____Acne
_____Lines around nose and mouth	_____Scars/acne scars
_____Skin texture	_____Sun damage
_____Uneven skin tone	_____Other _____
_____Dark circles or bags under eyes	_____Other _____

FIG 5-1 Medical history form.

MEDICAL HISTORY AND SKIN ASSESSMENT

The medical history collects information about the general overall health of the patient as well as any prior or current skin-related conditions (Fig 5-1). The patient should be asked to identify all current and past medical conditions such as diabetes, high blood pressure, cancer, HIV/AIDS, or hepatitis, as well as any autoimmune diseases. The patient is also asked to report any allergies or allergic reactions, including sensitivity to lidocaine and sulfa medications, and to provide a list of all current prescription medications and over-the-counter drugs taken on a regular basis. The patient must provide a

Do you regularly sunbathe, use tanning booths, or apply tanning creams? ☐ YES ☐ NO
If yes, when was the last time you did any of the above? _____

Have you ever had dermabrasion or a chemical peel? ☐ YES ☐ NO
If yes, what was the date of your last treatment? _____

Are you currently using, or have you ever used Retin-A? ☐ YES ☐ NO
If yes, when did you start? _____ When did you stop? _____

Are you currently using, or have you ever used Accutane? ☐ YES ☐ NO
If yes, when did you start? _____ When did you stop? _____

Are you currently taking any antibiotics? ☐ YES ☐ NO
If yes, which one? _____

Do you have any skin conditions? ☐ YES ☐ NO
If yes, please specify: _____

Do you have, or have you ever had vitiligo (loss of skin pigment)? ☐ YES ☐ NO
If yes, how has it been treated? _____

Do you ever get cold sores, canker sores, or herpes eruptions? ☐ YES ☐ NO
If yes, how has the condition been treated? _____

Do you form keloids (extra large/prominent scars)? ☐ YES ☐ NO

Do you currently smoke? ☐ YES ☐ NO
If yes, how many packs per day? _____ How many years? _____

Do you drink alcohol? ☐ YES ☐ NO

Are you pregnant or planning to become pregnant? ☐ YES ☐ NO

Are you currently breastfeeding? ☐ YES ☐ NO

Please understand that our practice is strictly limited to cosmetic procedures. You understand and acknowledge that we do not examine or treat you for malignancy (cancer) or non-cosmetic skin abnormalities. Skin cancer is an extremely serious (potentially fatal) condition and must be treated immediately. You should be examined on a regular basis by a dermatologist, and you should bring any concerns regarding skin changes or skin cancer to the attention of a dermatologist immediately.

BY YOUR SIGNATURE BELOW, YOU ACKNOWLEDGE THAT YOU HAVE READ AND FULLY UNDERSTAND THE CONTENTS OF THE FOREGOING.

Patient Signature _____ Date _____

FIG 5-1 *(CONT)* Medical history form.

history of any localized skin-related conditions that might contraindicate dermal filler treatment, such as eczema, keloid scarring, moles, skin infections, bruising/bleeding disorders, and poor healing of skin. Any patient with an ongoing skin infection in the treatment area or in close proximity to it—such as herpes simplex virus (HSV) or impetigo—should not be treated.[1–3]

The medical history should include generic esthetic questions related to how the patient's skin generally reacts to injury (eg, does it darken or lighten?), their tanning and sun exposure practices, and their hair-removal routines, all of which can affect treatment timing and product selection. The patient should then be asked to report any other specific esthetic conditions that can have an impact on

FIG 5-2 Pretreatment and posttreatment photographs are an important part of the medical record. They are invaluable for tracking treatment outcomes and can protect the clinician in legal disputes. *(a to c)* Patient's face at rest. *(d to f)* Patient's face while smiling.

treatment decisions, including skin cancer, photosensitivity disorders, or facial scarring.

To complete the medical history, the clinician should evaluate the quality of the patient's facial skin, assessing it for the presence of nevi, rosacea, or other skin irregularities that could lead to complications after filler injection. This is also the time to take pretreatment photographs. These pictures should be well-focused and standardized, as they may be used for initial assessment, communication, and legal documentation purposes.[1–5] For clarity and accuracy, these images should be taken in a well-lit room, without magnification or flash, and with the patient seated in an upright position, as gravitational force affects the appearance of wrinkles and folds. Photographs should be taken of the full face at 0 and 45 degrees (right and left), both with the patient at rest and smiling (Fig 5-2). The same series should be taken at the end of treatment and at periodic follow-up appointments.

ESTHETIC CONSULTATION

Cosmetic history

Knowing the details of any prior elective cosmetic treatment can give the clinician some important clues about the patient's esthetic expectations and may raise a red flag (more on that later). Therefore, the patient should be asked to document any prior elective cosmetic procedures, when they were performed, and by whom. These include but are not limited to all of the following procedures[1–3]:

- Facial plastic surgery
- Threading or surgical lifting of the lids, brows, or face
- Dermal filler, autologous fat, or botulinum toxin injections
- Superficial facial treatments such as the following:
  - Topical chemical applications
  - Microdermabrasion
  - Chemical peels

FIG 5-3 During the patient interview, the clinician should try to understand the patient's motivations for seeking treatment and whether their expectations are realistic.

FIG 5-4 As part of the screening process, the patient should examine their face in a mirror and point out areas of concern.

  - Laser resurfacing
  - Dermal microneedling
- Nonablative laser, flash lamp, or radiofrequency therapy

For each procedure, the patient should indicate whether the outcome was satisfactory and, if unsatisfactory, what was the reason? Did the patient experience any adverse effects from these treatments? The answers to all of these questions can help the clinician form a clearer picture of the patient's motivations for seeking treatment.[1]

Red flag history

The clinician must determine whether the patient harbors unrealistic expectations regarding esthetic treatment and/or has undergone one or more esthetic treatments they considered unsatisfactory. Such a history may reveal personality and psychologic factors that the clinician must be aware of in order to avoid undertaking unnecessary treatment as well as to promote patient satisfaction with their esthetic outcome.[1]

Ideally, the clinician should develop a screening process that disqualifies patients with notable psychologic or emotional conditions, such as body dysmorphic disorder, personality disorder, or polysurgical addiction[1,2] (Fig 5-3). Throughout the consultation, the clinician should be paying careful attention to the patient's body language as well as listening to the words they use to describe their situation, their motivation, and their concerns.[1] Ask the patient questions about their lifestyle, including their alcohol intake, whether and how much they smoke (tobacco or marijuana), their use of nonprescription drugs, their sleep patterns, and so on.

As part of this screening process, the clinician should conduct a specific type of facial examination: With the patient holding a mirror, ask him or her to pinpoint areas of concern and expectations (Fig 5-4). The clinician should note in the history any peculiarities or anomalies associated with this facial review.

Social history

As most dentists know, concern with facial appearance is often triggered by recent or planned future social events. Therefore, any important upcoming events on the patient's social calendar should also be documented. The patient should be asked about upcoming social gatherings, such as a wedding or family reunion, or a significant personal encounter the patient is anticipating, so that appropriate accommodations can be made with regard to cosmetic treatment healing.

Esthetic analysis

Unlike patients seeking dermal filler treatment in a dermatology clinic or spa, it is probably best to assume that dental patients know little about minimally invasive esthetic

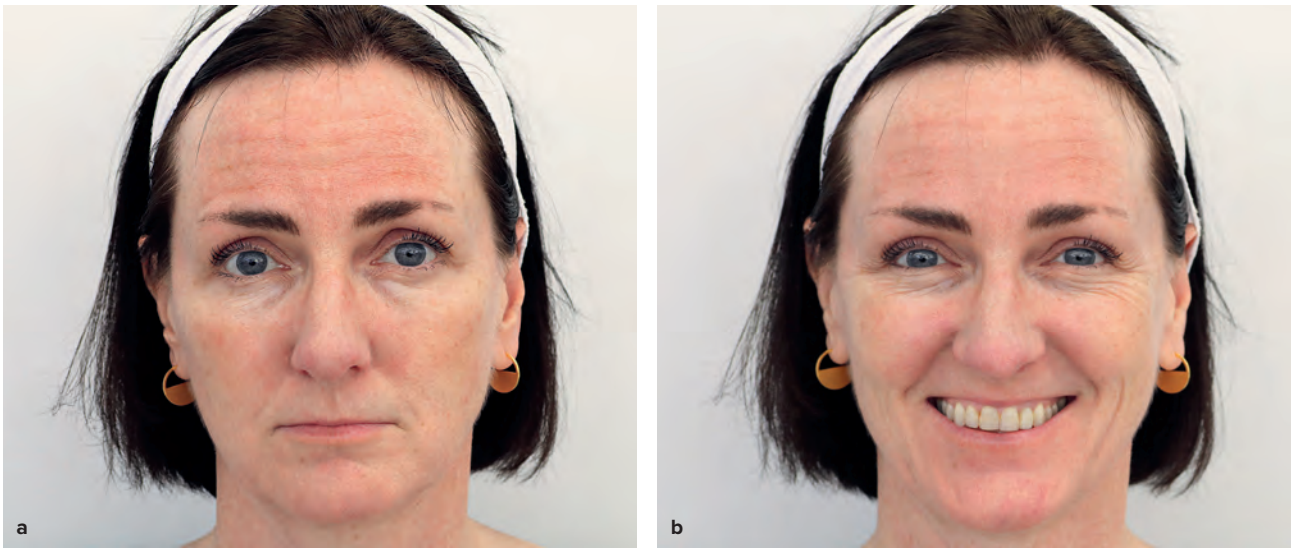


FIG 5-5 Static wrinkles versus wrinkles in repose. *(a)* Static wrinkles are caused by gravity, the loss of fat and collagen, and the loss of skin elasticity—in other words, the aging process. These types of wrinkles are visible regardless of the muscle action in the face. Dermal fillers are designed to smooth static wrinkles by replacing lost volume in the face and stimulating new collagen production in the body. *(b)* Lines in the forehead, "crow's feet" around the eyes, and lines or grooves between the eyebrows are types of wrinkles that are visible only during specific facial expressions. These dynamic wrinkles are the result of repetitive movement and generally cannot be smoothed or eliminated with dermal fillers. Instead, botulinum toxin can be used to temporarily paralyze the muscle that animates these types of wrinkles and make them disappear.

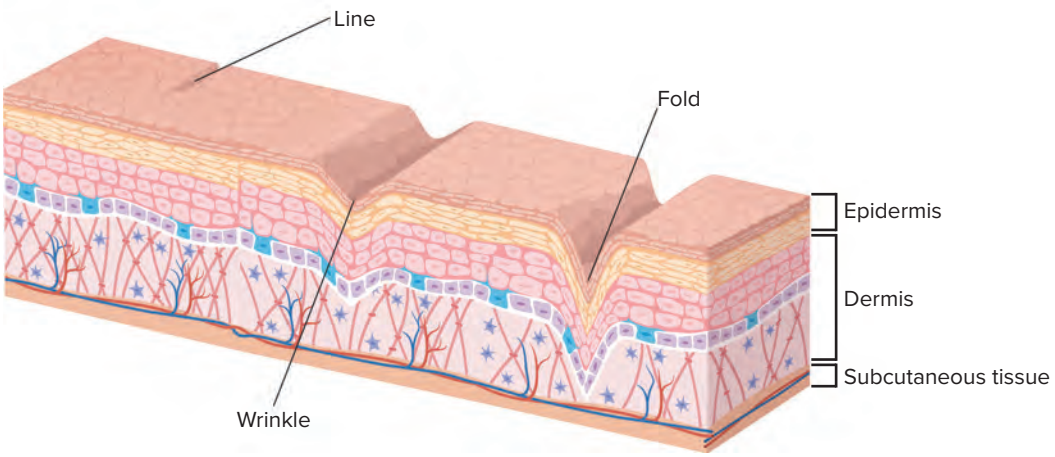


FIG 5-6 Age-related facial changes vary according to the depth of the depression within the mucosa or submucosa of the tissue. The degree of relative change to the skin is described in terms of lines, wrinkles, and folds. A *line* remains completely within the epidermis and does not approach the dermis of the skin. A *wrinkle* proceeds through the epidermis and extends to the dermis of the skin. A *fold* develops when the depression extends through the dermis and approximates the subcutaneous tissues. Factors that can affect the depth of the wrinkle include skin texture, the amount of subcutaneous fat, the water content of the skin, the distribution and ratio of collagen and elastic fibers, and biochemical changes in the connective tissue and interstitial spaces.

options or the targets of treatment. Before beginning the initial esthetic analysis, the clinician should briefly explain the differences between static and dynamic wrinkles (Fig 5-5) and the qualities that distinguish a wrinkle from a fold (Fig 5-6).

During the esthetic analysis, the patient and clinician will sit down together to examine the photographs taken of the patient's face. The patient is asked to point out any age-related signs that concern them, beginning in the upper third (hairline to eyebrows), then the midface (eyebrows to

Dermal Fillers **Aesthetic Treatment Planning**

Name _____ ID# _____

Allergies _____ Date _____

Score	Description
4	Extreme: Extremely deep and long folds, detrimental to facial appearance; 2- to 4-mm visible V-shaped fold when stretched; unlikely to have satisfactory correction with injectable implant alone
3	Severe: Very long and deep folds; prominent facial feature; less than 2-mm visible fold when stretched; significant improvement is expected from injectable implant.
2	Moderate: Moderately deep folds; clear facial feature visible at normal appearance but not when stretched; excellent correction is expected from injectable implant.
1	Mild: Shallow but visible fold with a slight indentation; minor facial feature; implant is expected to produce slight improvement in appearance.
0	Absent: No visible fold; continuous skin line.

☐ Platelet Rich Plasma
☐ Juvéderm® Ultra Xc
☐ Juvéderm® Ultra Plus Xc
☐ Juvéderm® Voluma
☐ Juvéderm® Vollure Xc
☐ Juvéderm® Volbella Xc
☐ Radiesse
☐ Belafill
☐ Restylane® L
☐ Revanessa Versa
☐ Restylane® Lyft
☐ Restylane® Silk
☐ Restylane® Refyne
☐ Restylane® Defyne
☐ Sculptra® Aesthetic
☐ Belotero Balance
☐ Teoxane RHA 2
☐ Teoxane RHA 3
☐ Teoxane RHA 4

Treatment Area	Severity Score	Notes	Filler Type	Estimated Units
Nasolabial Folds				
Marionette Lines				
Mental Crease				
Chin Region				
Malar Zones				
Frown Lines				
Scars				
Perioral Lines				
Tear Troughs				
Lips				
Borders				
Lower Lip				
Upper Lip				
Philtrum				
Other				

FIG 5-7 Esthetic treatment planning form.

nose), and finally the lower third (nose to chin). The clinician or an assistant should note each concern in the chart using the wrinkle analysis portion of an esthetic treatment planning form (Fig 5-7).

Most people are unaware of small but measurable and noticeable increases in facial asymmetry that occur with aging. Asymmetry increases with age across all thirds of the face, but the changes are greatest in the lower two-thirds—from eyebrows to nose and from nose to chin.[1] It is important to point out this asymmetry during the facial analysis so the patient does not think it is caused by the dermal filler treatment.

Date Treated	Affix Lot Number Label	Area(s) Treated and Treatment Notes
		☐ Nasolabial Folds ☐ Malar Zones ☐ Lip Borders ☐ Marionette Lines ☐ Frown Lines Scars ☐ Lower Lip ☐ Mental Crease ☐ Perioral Lines ☐ Upper Lip ☐ Chin Region ☐ Tear Troughs ☐ Philtrum Notes
		☐ Nasolabial Folds ☐ Malar Zones ☐ Lip Borders ☐ Marionette Lines ☐ Frown Lines Scars ☐ Lower Lip ☐ Mental Crease ☐ Perioral Lines ☐ Upper Lip ☐ Chin Region ☐ Tear Troughs ☐ Philtrum Notes
		☐ Nasolabial Folds ☐ Malar Zones ☐ Lip Borders ☐ Marionette Lines ☐ Frown Lines Scars ☐ Lower Lip ☐ Mental Crease ☐ Perioral Lines ☐ Upper Lip ☐ Chin Region ☐ Tear Troughs ☐ Philtrum Notes
		☐ Nasolabial Folds ☐ Malar Zones ☐ Lip Borders ☐ Marionette Lines ☐ Frown Lines Scars ☐ Lower Lip ☐ Mental Crease ☐ Perioral Lines ☐ Upper Lip ☐ Chin Region ☐ Tear Troughs ☐ Philtrum Notes
		☐ Nasolabial Folds ☐ Malar Zones ☐ Lip Borders ☐ Marionette Lines ☐ Frown Lines Scars ☐ Lower Lip ☐ Mental Crease ☐ Perioral Lines ☐ Upper Lip ☐ Chin Region ☐ Tear Troughs ☐ Philtrum Notes
		☐ Nasolabial Folds ☐ Malar Zones ☐ Lip Borders ☐ Marionette Lines ☐ Frown Lines Scars ☐ Lower Lip ☐ Mental Crease ☐ Perioral Lines ☐ Upper Lip ☐ Chin Region ☐ Tear Troughs ☐ Philtrum Notes

FIG 5-7 *(CONT)* Esthetic treatment planning form.

The clinician's first priority is to determine whether the patient's and the clinician's perceptions are in agreement and to help the patient be realistic in what can be accomplished. A clinical assessment tool can add some much-needed objectivity to this process. Box 5-1 presents a list of conditions and circumstances that contraindicate dermal filler treatment.

BOX 5-1 Contraindications for dermal filler treatment

- History of anaphylactic reaction
- Severe allergies
- Sensitivity or allergic reaction to dermal filler products
- Use of Accutane (Roche) within the preceding 6 months
- Skin atrophy
- Poor healing
- Dermatosis in treatment area
- Uncontrolled systemic conditions
- Infections in treatment area
- Hypertrophic or keloid scarring
- Abnormal bleeding
- Pregnancy or breastfeeding
- Body dysmorphic disorder
- Unrealistic expectations

Wrinkle assessment

Assessing the severity of wrinkles is, by necessity, a subjective business; no commonly accepted anatomical or dimensional classification system has yet been created. There are, however, several wrinkle assessment tools available. The most well-known is the wrinkle severity rating scale (WSRS), which has been validated in several studies and is routinely employed by the U. S. Food and Drug Administration (FDA) in clinical trials of new dermal fillers (Table 5-1).[6,7] The WSRS is of limited value to practitioners, however, because it pertains only to nasolabial folds.

Simplified wrinkle assessment tool

The photonumeric scale presented in Table 5-2 is a simple clinical tool designed for novice esthetic clinicians to use as they calibrate their own judgment over time. It is intended to instill confidence in clinicians as they gain experience in assessing their patients' pretreatment conditions and posttreatment results and shaping their patients' expectations for improvement.

The simplified wrinkle assessment tool (SWAT) is a 5-point scale that can be used to classify the three earliest and most prominent signs of facial aging. It can be used both before and after treatment. The scale is correlated to select reference photographs showing progressive signs of facial aging in the form of nasolabial folds, marionette lines, and mental crease (Figs 5-8 to 5-10). The numbers indicate levels of progression of the condition.

TABLE 5-1 Wrinkle severity rating scale

Grade	Severity
Grade 1	No visible NLF. Continuous skin line.
Grade 2	Shallow but visible NLF with a slight indentation.
Grade 3	Moderate deep NLF. Visible at normal appearance.
Grade 4	Very long and deep NLF. Prominent facial feature. Less than 2-mm visible fold if stretched.
Grade 5	Extreme, deep, and long NLF. Between 2- and 4-mm V-shaped fold if stretched.

NLF, nasolabial folds.

TABLE 5-2 Simplified wrinkle assessment tool

Score	Name	Description
4	Extreme	Extremely deep and long folds, detrimental to facial appearance; 2- to 4-mm visible V-shaped fold when stretched; unlikely to have satisfactory correction with injectable implant alone.
3	Severe	Very long and deep folds; prominent facial feature; less than 2-mm visible fold when stretched; significant improvement is expected from injectable implant.
2	Moderate	Moderately deep folds; clear facial feature visible at normal appearance but not when stretched; excellent correction is expected from injectable implant.
1	Mild	Shallow but visible fold with a slight indentation; minor facial feature; implant is expected to produce slight improvement in appearance.
0	Absent	No visible fold; continuous skin line.

FIG 5-8 Marionette lines. *(a)* Score 0. *(b)* Score 1. *(c)* Score 2. *(d)* Score 3. *(e)* Score 4.

FIG 5-9 Nasolabial folds. *(a)* Score 0. *(b)* Score 1. *(c)* Score 2. *(d)* Score 3. *(e)* Score 4.

To use the SWAT, the clinician shows the reference photos to the patient and asks him or her to select the one that most closely corresponds to their own condition, beginning with nasolabial folds. If the clinician agrees with this assessment, it is noted in the chart. If the clinician disagrees, he or she explains the reasons why, and they move on. The discrepancy is noted in the chart as a potential red flag. The process is repeated for marionette lines and then for mental crease. While seeking to clinically determine the area and extent of volume loss requiring correction, the clinician should engage in an open dialog with the patient regarding their goals, expectations, and reasons for the cosmetic procedure.

Clinicians with no prior experience in facial augmentation procedures are strongly advised to limit their early practice to treating these three prominent signs of aging,

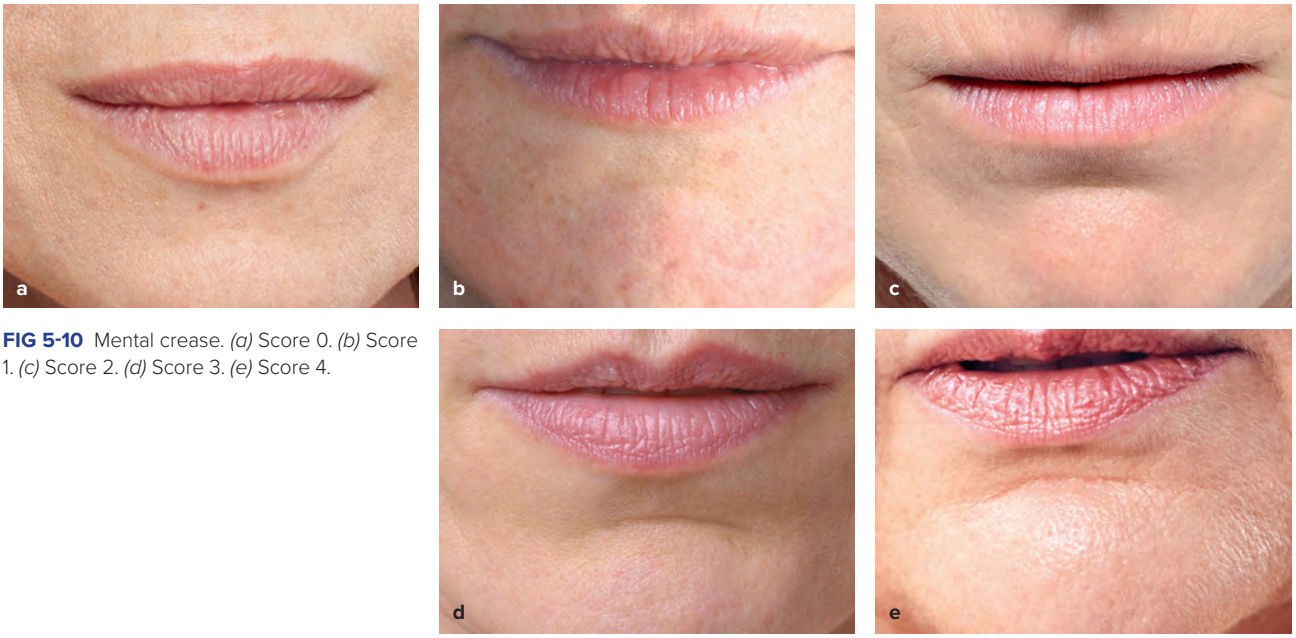


FIG 5-10 Mental crease. *(a)* Score 0. *(b)* Score 1. *(c)* Score 2. *(d)* Score 3. *(e)* Score 4.

which are covered in chapter 8, "Green-Light Procedures." After mastering these injection protocols—the proper angle and plane of injection, the amount of filler to dispense in one area, how to avoid lumps and bumps—and experiencing firsthand the unique characteristics of the various dermal filler products available, clinicians can begin to add "Yellow-Light Procedures" (chapter 9) and "Red-Light Procedures" (chapter 10) to their practice repertoire.

ESTHETIC TREATMENT PLAN

Using all of the information obtained in the medical history and esthetic consultation, the clinician develops a treatment plan that meets all of the patient's objectives. Once there is agreement between the clinician and patient about which areas to treat, the clinician makes decisions about which product or products to use and what quantity is needed. A patient's history of allergic reactions or prior cosmetic treatment may rule out some products from consideration. For many patients, cost can be an important factor in product selection, influencing the number of treatment sessions that can be planned and the intervals between them.

INSTRUCTIONS, SIDE EFFECTS, AND CONSENT

Pretreatment instructions

Pretreatment care plays a key role in achieving a satisfactory esthetic outcome. The patient should be instructed to discontinue the use of aspirin, nonsteroidal anti-inflammatory drugs, and vitamins or herbal supplements that have anticoagulant effects (eg, vitamin E and St John's wort) 1 week before treatment.[2] Any patient with a medical history that includes labial or facial herpes simplex or herpes zoster should receive prophylactic antiviral medication beginning 48 hours prior to treatment and continuing for 72 hours after treatment.[1,2] The patient should not consume alcohol for 2 days prior to treatment.

Immediate aftercare

After the procedure, swelling and bruising can be a concern. To minimize these effects, patients should be instructed to apply a covered ice pack to the treatment area(s) for approximately 10 to 15 minutes at 2-hour intervals during the first few hours after treatment, as needed. Swelling generally subsides in 1 to 3 days and bruising within 7 to 10 days of the procedure. For 1 week after treatment, the

FIG 5-11 Patients should be encouraged to use over-the-counter healing products to minimize swelling and bruising during the postoperative period.

patient should be advised to avoid all activities that might induce facial flushing, including the application of heat, consumption of alcoholic beverages, exercise, or tanning. The patient should also be instructed to avoid exposure of the treated area to excessive sun, heat, and ultraviolet light from lamps for approximately 24 hours or until the initial swelling has resolved. Acetaminophen can be prescribed for discomfort, and patients should be instructed to elevate the head overnight to help reduce swelling. Compression of the dermal filler, however, should not be advised.

Patients who have a history of extreme swelling at dermal filler injection sites can be instructed to take an over-the-counter antihistamine on the day of the procedure. Several over-the-counter products have been found to reduce swelling/bruising and to promote healing and are safe to take after treatment, such as *Arnica montana*, bromelain, copper peptide, vitamin A, vitamin C, vitamin K, and zinc (Fig 5-11).

Follow-up

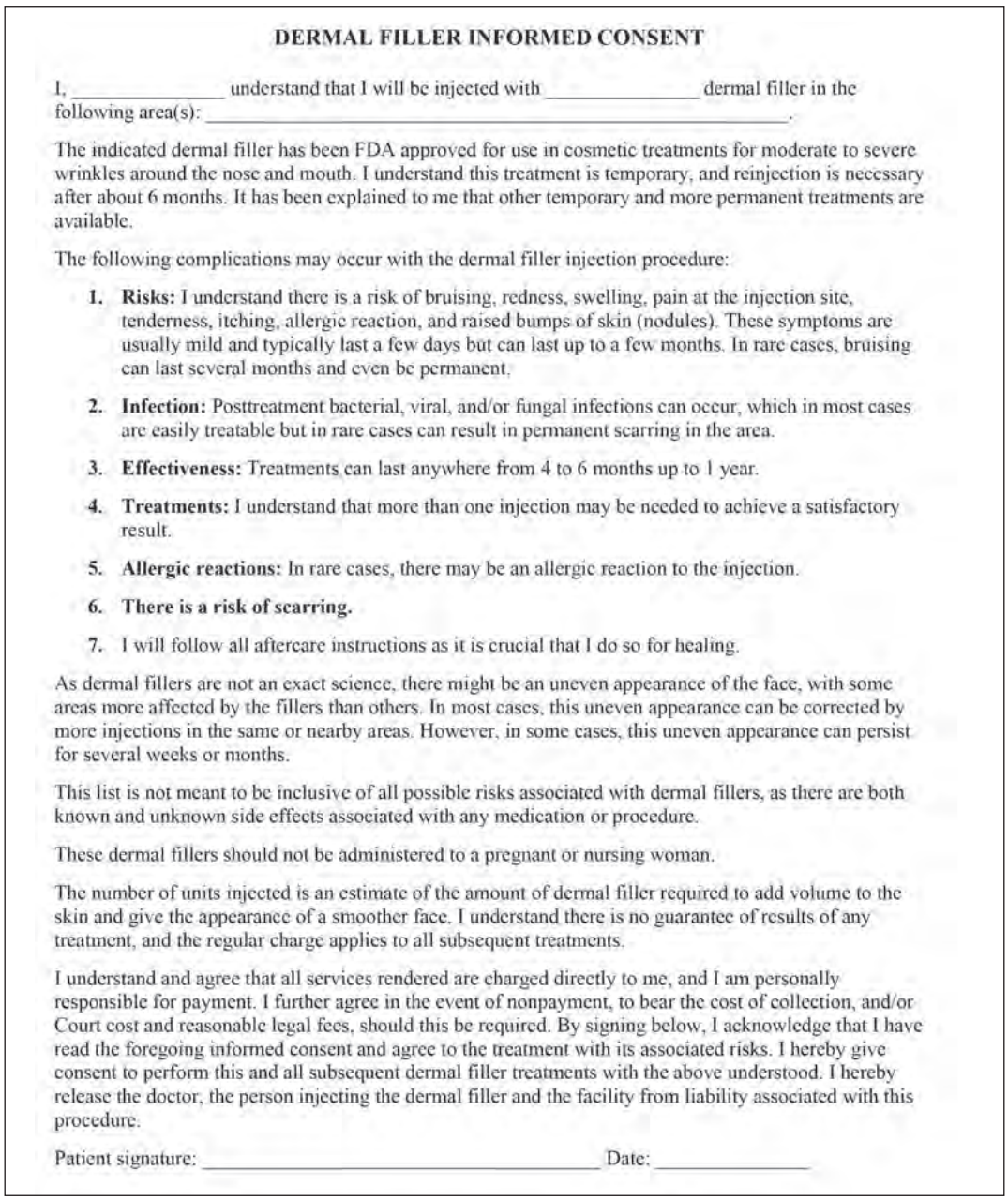
The patient should be given an estimate of how long the effects of dermal filler treatment should last. This calculation depends primarily on the agent used, but other patient-specific factors also need to be considered (eg, patient metabolism, facial-muscle movement in the treatment area, patient compliance with pre- and post-treatment directives). As clinicians gain more experience, they are able to answer this question with more authority, but until then it is best to adhere to guidelines provided by dermal filler manufacturers (see chapter 3). Many clinicians advise their new patients to begin with a shorter-acting agent to evaluate its cosmetic effects before committing to a longer-acting or permanent product.[2]

While the longevity of esthetic treatment results depends on a variety of factors, the immediate results are unmistakable, sometimes even during the procedure. Clinicians should assess patients approximately 1 month after treatment to document wrinkle and fold reduction and to make note of any erythema, swelling, tenderness, or bruising. Thereafter, the duration of the patient's results should continue to be monitored on a regular basis. This allows the clinician to recommend retreatment sooner rather than later to maintain improved facial esthetics most safely, conveniently, and economically for the patient.

Side effects and complications

Dermal fillers are generally well tolerated by patients. Most side effects, which can result from the procedure itself or the anesthesia given as part of the treatment, develop during or immediately after treatment, including pain/tenderness, bruising, swelling, lump or bump formation, and skin infection.[3] These are generally mild, localized, and likely to resolve within 14 days of treatment. More serious short-onset complications include nerve damage, vascular compromise, and retinal artery occlusion, which can lead to blindness. These complications are avoidable, rare, and often the result of improper injection technique.[3]

Late- and delayed-onset side effects include edema, hyperpigmentation, Tyndall effect, chronic infection, abscess or nodule formation, foreign-body granuloma, and



DERMAL FILLER INFORMED CONSENT

I, _____ understand that I will be injected with _____ dermal filler in the following area(s): _____.

The indicated dermal filler has been FDA approved for use in cosmetic treatments for moderate to severe wrinkles around the nose and mouth. I understand this treatment is temporary, and reinjection is necessary after about 6 months. It has been explained to me that other temporary and more permanent treatments are available.

The following complications may occur with the dermal filler injection procedure:

1. **Risks:** I understand there is a risk of bruising, redness, swelling, pain at the injection site, tenderness, itching, allergic reaction, and raised bumps of skin (nodules). These symptoms are usually mild and typically last a few days but can last up to a few months. In rare cases, bruising can last several months and even be permanent.
2. **Infection:** Posttreatment bacterial, viral, and/or fungal infections can occur, which in most cases are easily treatable but in rare cases can result in permanent scarring in the area.
3. **Effectiveness:** Treatments can last anywhere from 4 to 6 months up to 1 year.
4. **Treatments:** I understand that more than one injection may be needed to achieve a satisfactory result.
5. **Allergic reactions:** In rare cases, there may be an allergic reaction to the injection.
6. **There is a risk of scarring.**
7. I will follow all aftercare instructions as it is crucial that I do so for healing.

As dermal fillers are not an exact science, there might be an uneven appearance of the face, with some areas more affected by the fillers than others. In most cases, this uneven appearance can be corrected by more injections in the same or nearby areas. However, in some cases, this uneven appearance can persist for several weeks or months.

This list is not meant to be inclusive of all possible risks associated with dermal fillers, as there are both known and unknown side effects associated with any medication or procedure.

These dermal fillers should not be administered to a pregnant or nursing woman.

The number of units injected is an estimate of the amount of dermal filler required to add volume to the skin and give the appearance of a smoother face. I understand there is no guarantee of results of any treatment, and the regular charge applies to all subsequent treatments.

I understand and agree that all services rendered are charged directly to me, and I am personally responsible for payment. I further agree in the event of nonpayment, to bear the cost of collection, and/or Court cost and reasonable legal fees, should this be required. By signing below, I acknowledge that I have read the foregoing informed consent and agree to the treatment with its associated risks. I hereby give consent to perform this and all subsequent dermal filler treatments with the above understood. I hereby release the doctor, the person injecting the dermal filler and the facility from liability associated with this procedure.

Patient signature: _____ Date: _____

FIG 5-12 Patient consent form.

tissue necrosis. Chapter 4 is a comprehensive review of the potential adverse effects and complications of dermal filler treatment, their management, and how best to avoid them.

Because esthetic procedures are elective, patients generally have greater expectations for satisfying outcomes with less thought of what could go wrong. Therefore, it is imperative for the clinician and patient to discuss these potential outcomes candidly and in detail. The patient should be encouraged to raise as many questions and concerns as needed. Because most patients seeking injectable filler treatment are motivated by concern about their appearance, they may be inordinately upset by any side effects that are noticeable, even those that are common and resolve quickly.

Consent form

The consent form is a physical representation of the patient's commitment to, and understanding of, the professional responsibilities laid out by the clinician (Fig 5-12). By signing it, the patient acknowledges awareness not only of the benefits that can be derived from the procedure but also the risks and possible complications inherent in such treatments. The consent form should clearly outline all possible risks and complications, no matter how remote.

CONCLUSION

The esthetic consultation and treatment plan together establish the foundation for successful esthetic treatment. The sharing of information between clinician and patient engenders the degree of confidence that both parties need to meet the patient's esthetic goals and expectations. This process ensures that the patient is aware of the products the clinician will use to address the esthetic concerns, including amounts to be used and product costs. The procedure can be successful only when clinical skills are matched with patient satisfaction with cost, safety, convenience, and outcomes.

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6

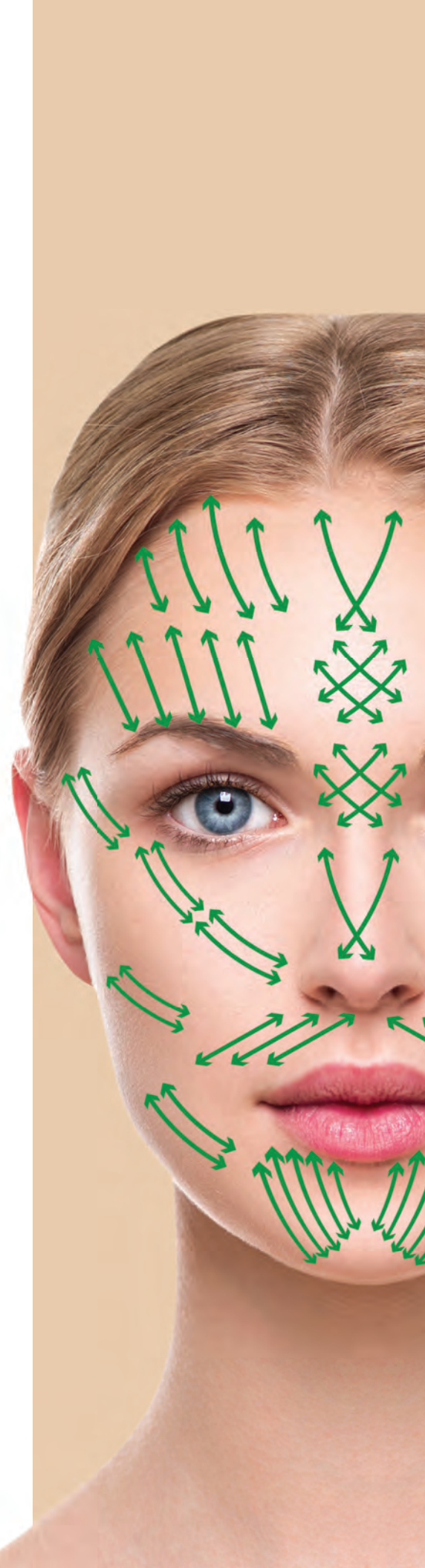
DERMAL MICRONEEDLING

Dermal filler injections and microneedling are complementary esthetic treatments: Whereas dermal fillers target specific age-related wrinkles and volume deficits, dermal microneedling restores firmness and elasticity to the entire face. Although it is a relatively new treatment option in cosmetic therapy, microneedling has become a popular alternative to more invasive procedures such as laser skin resurfacing and deep chemical peeling for skin rejuvenation and other dermatologic conditions.

Microneedling, also known as *collagen induction therapy*, delivers hundreds of tiny, invisible punctures to the top layer of facial skin. These microinjuries stimulate the body's natural wound-healing processes, leading to cell turnover and the production of new collagen and elastin. In addition, when topical serums such as platelet-rich plasma (PRP) or hyaluronic acid (HA) are applied to the skin immediately after microneedling, nutrients fill the channels created by the microneedling to enhance the production of healthy new skin.

The first documented microneedling device was invented by German dermatologist Ernst Kromayer, who first used it in 1905 to treat scars, birthmarks, and hyperpigmentation. Appropriately, it was fashioned from "rotary instruments … used in a dentist's engine."[1] Today, microneedling is used to treat a number of esthetic challenges, including hyperpigmentation, scars, wrinkles, ultraviolet damage, stretch marks, and hair loss.

This chapter describes the mechanism of action, applications, instrumentation, step-by-step procedures, and adverse effects of microneedling.



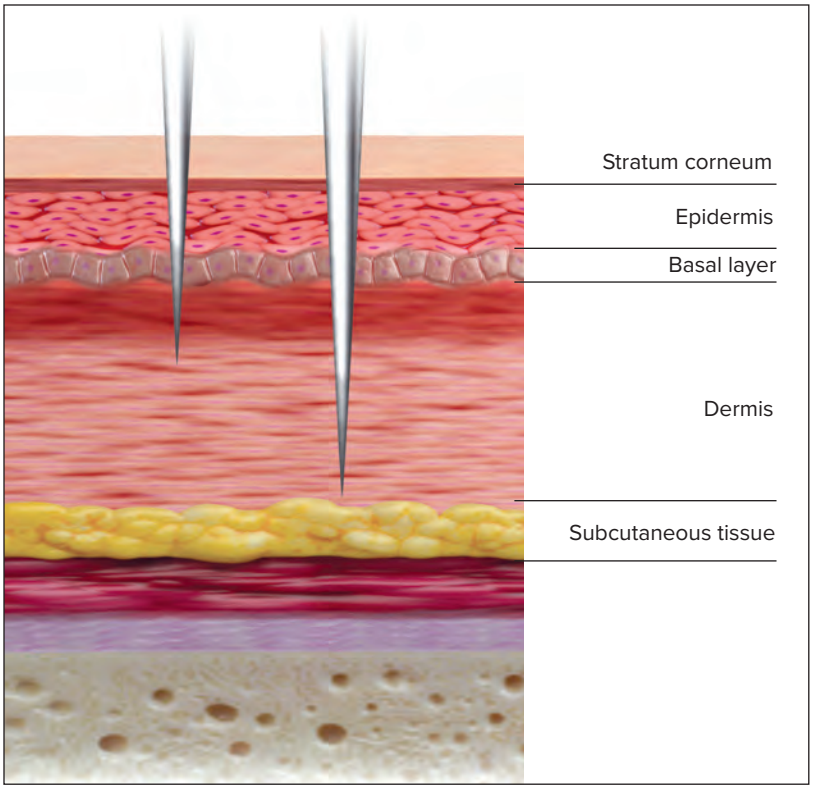


FIG 6-1 Each needle on the microneedle roller penetrates the skin at about 1.5 to 2 mm into the dermis.

MECHANISM OF ACTION

Microinjury and wound healing

A wound induced by trauma or surgery goes through the four biologic phases of classic wound healing: hemostasis, inflammation, proliferation, and maturation. Depending on the severity and type of wound, this process can take as long as 1 year and usually ends in the formation of a scar. Microneedling is a nonablative procedure that inflicts microinjuries on the skin to unleash an abbreviated form of the classic healing response in the body.

When performed correctly, microneedling creates approximately 200 punctures per square centimeter of facial skin. The microneedles penetrate 1.5 mm to 2 mm into the dermis (Fig 6-1); at this depth, the needles cut through the epidermis but do not destroy it. Although the epidermis is only about 0.2 mm thick, it serves as the body's sole protection from the environment. Therefore, the epidermis, and particularly the stratum corneum, must remain intact.

There is minimal to no bleeding because the needle penetrates for just a few fractions of a second and only capillaries are punctured (Fig 6-2a). Nonetheless, this brief trauma elicits a mild inflammatory response, probably due to the release of histamine by mast cells. Researchers believe that each time the roller movement is repeated, the cells in the microchannels respond anew, temporarily putting them in an activated state. This leads to enhanced motility of epithelial and endothelial cells in the wounded area and subsequently stimulates gene expression of growth factors that facilitate healing.[2]

The inflammation phase (Fig 6-2b), evidenced clinically by erythema, begins during the procedure, peaks in about 4 to 6 hours, and usually lasts no longer than 48 hours. The proliferation phase starts immediately after microneedling and reaches its peak about 2 months later (Fig 6-2c). New type III collagen fibers integrate into the existing skin matrix without any trace of fibrotic tissue. Skin improvement is evident 3 to 4 weeks after a microneedling treatment. However, collagen maturation and transformation into type I collagen takes time, and healing never ends with the formation of a scar (Fig 6-2d).

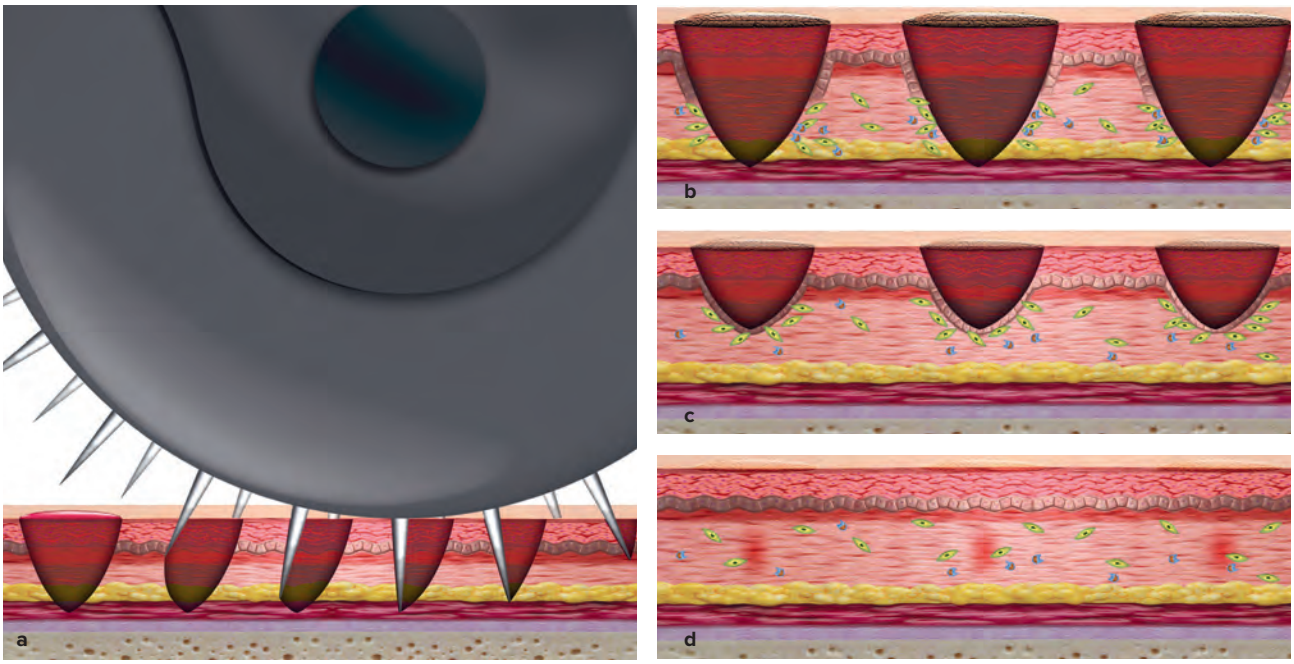


FIG 6-2 The four-stage wound-healing cycle. *(a)* Bleeding. Microneedles penetrate the epidermis, rupturing blood vessels and triggering a release of platelets. Blood clots are formed, and the bleeding stops. *(b)* Inflammation. White blood cells enter the tiny wounds to facilitate inflammation during vasodilation. Neutrophils and fibroblasts migrate into the area to clear bacteria and other debris. *(c)* Proliferation. Healing begins as granulation tissue—consisting of fibroblasts, inflammatory cells, new blood vessels, and collagen—grows across the surface of each wound, closing and protecting them. *(d)* Maturation. As tissue remodeling continues, additional collagen production increases the skin's strength and elasticity. However, because the wounds are superficial, no scars are formed.

APPLICATIONS

Wrinkles (rhytids)

Beginning around the age of 20 years, the skin loses approximately 1% of its collagen each year, less elastin is produced, and fewer glycosaminoglycan cells are formed. This leaves the skin thinner and more fragile as time passes (Fig 6-3). In other words, wrinkle formation is inevitable regardless of exposure to ultraviolet (UV) rays and other skin-damaging effects.

Multiple studies have demonstrated the effectiveness of reducing and softening facial rhytids through microneedling treatment.[3–5] In one study, perioral wrinkles improved by 2 points on the wrinkle severity rating scale following microneedling treatment.[5] Another study showed a significant increase in dermal collagen at the end of six treatment sessions, with the amount increasing cumulatively.[6]

Like some other skin rejuvenation therapies, such as skin peels and laser treatment, microneedling operates on the principle of wound induction in order to exploit the natural wound-healing response, as described previously. The

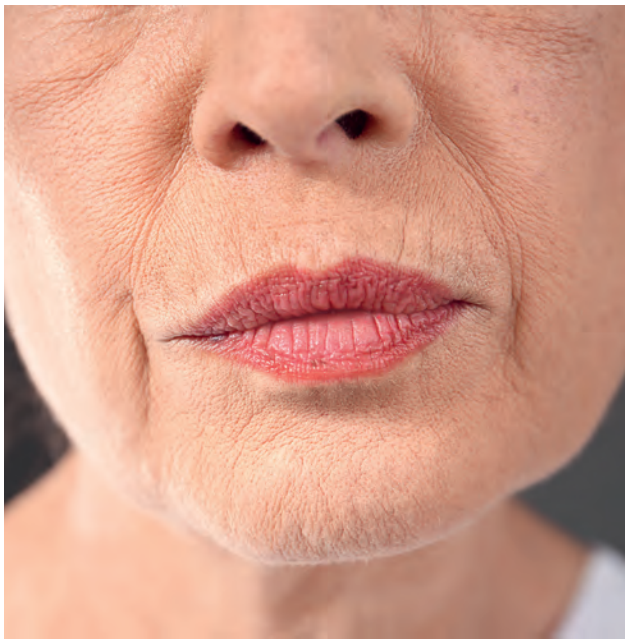


FIG 6-3 The skin in the lower third of the face is usually where the earliest and most prominent signs of aging appear.

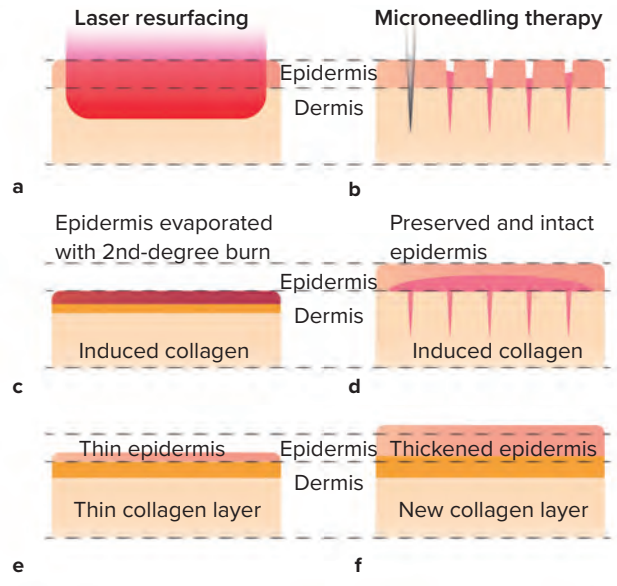


FIG 6-4 Comparison of the long-term effects of CO_2 laser resurfacing and microneedling therapy. *(a)* Heat from the laser destroys large areas in the epidermis. *(b)* With microneedling, microchannels preserve the vast majority of the epidermis while reaching deeper into the dermis. The microchannels close within minutes of the procedure. *(c)* Laser resurfacing requires significant downtime while the surface of the skin heals. *(d)* Microneedling channels heal within 24 hours and leave the epidermis intact. *(e)* The epidermis is permanently reduced, leaving the skin less protected and more sensitive to light. Collagen regeneration can take as long as 6 months. *(f)* After microneedling, epidermal density is increased, with more elasticity. Duration of collagen regeneration is 2 months maximum.

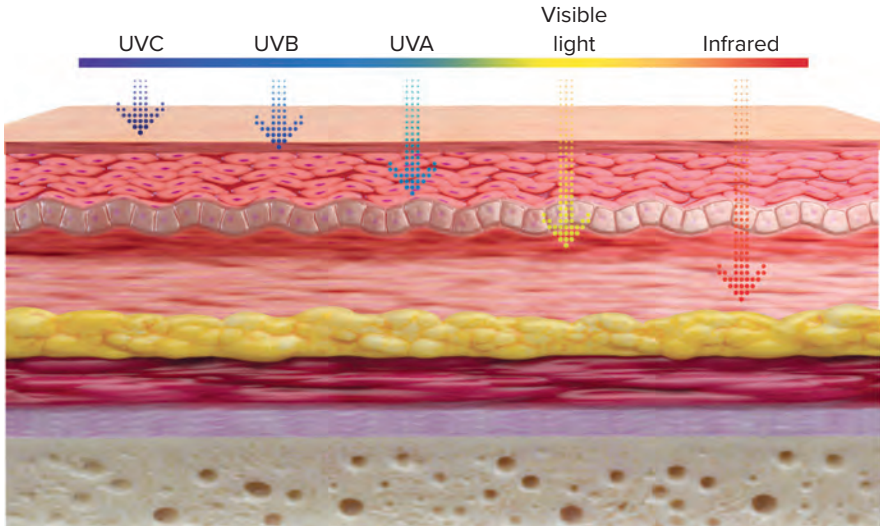


FIG 6-5 When light hits the surface of the skin, it causes no permanent damage. UV and high-energy visible light rays penetrate the epidermis and the dermis, producing more melanocytes. Light from different sources penetrates the skin at different depths.

important difference is that where other methods partially or completely destroy the epidermis—leaving it thinner, which allows fine wrinkles to show earlier—microneedling creates superficial wounds that induce an inflammatory response but do not destroy the epidermis (Fig 6-4). Smoothing and tightening of the skin are the net effect of the reorganization of collagen fibers and the production of more new collagen and elastin.

Hyperpigmentation

Ultraviolet (UVA and UVB) rays are the main cause of sun-induced skin damage, but high-energy visible light—that emitted by computers, cell phones, TVs, and fluorescent bulbs—also adds stress to and ages the skin. These light sources generate free radicals, which cause skin cells to produce enzymes that break down the collagen and elastin that give skin its plump, youthful appearance (Fig 6-5). Over time, this damage manifests as hyperpigmentation, beige or brown "age" spots, and melasma. Microneedling counters these effects by stimulating the production of new collagen and elastin. These new skin cells disperse the clustered melanocytes that form dark spots, lightening sun spots and reducing hyperpigmentation.

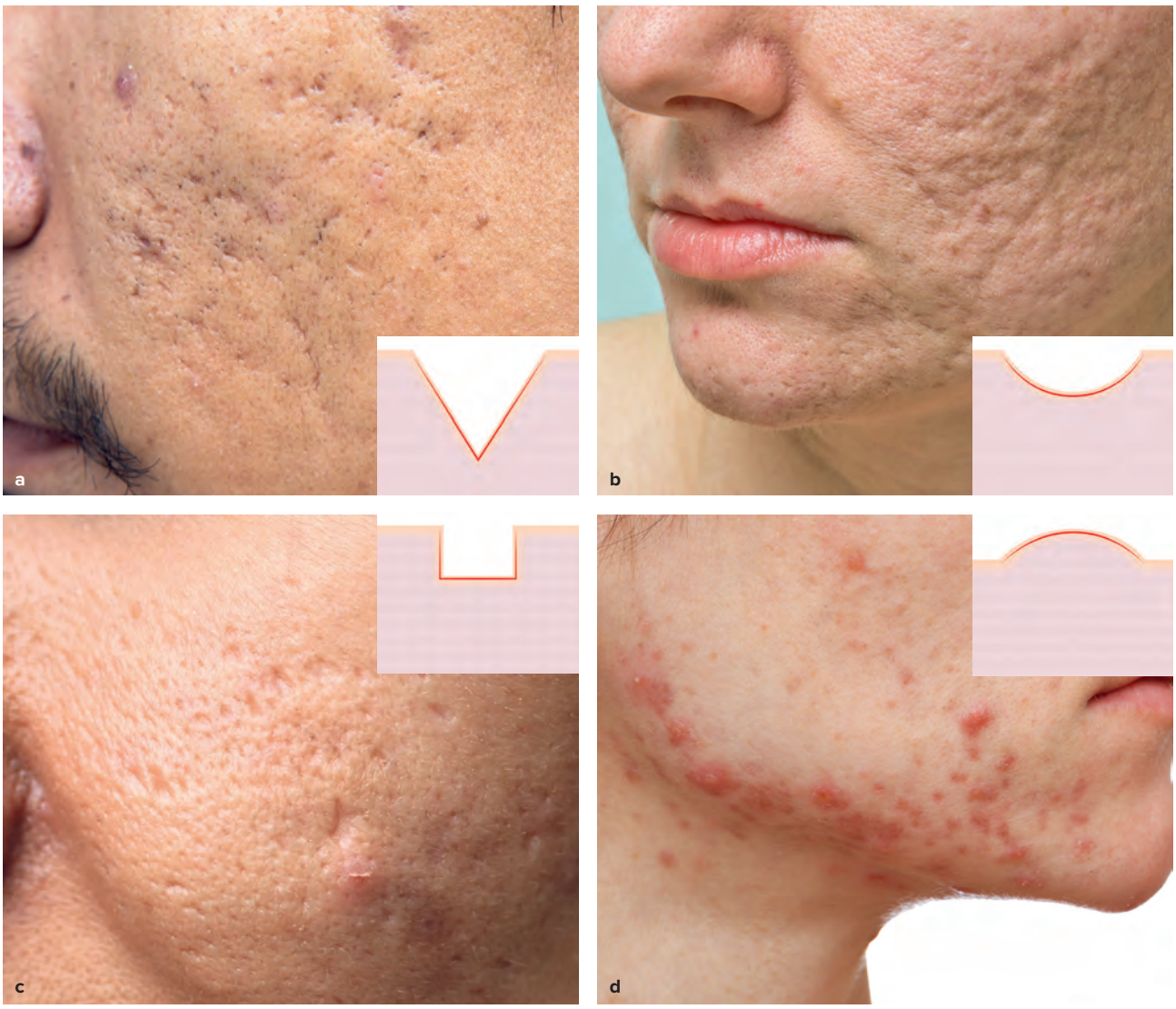


FIG 6-6 Differences in the architecture of atrophic and hypertrophic scars. Microneedling is a popular treatment choice among adults with post-acne scarring because of its relatively low cost and minimal invasiveness. It is more effective in improving boxcar and rolling patterns than ice pick scars. *(a)* Ice pick atrophic scar. *(b)* Rolling atrophic scar. *(c)* Boxcar atrophic scar. *(d)* Hypertrophic scar.

Scars

Scarring is the product of overexpression of collagen type I during the last stage of the wound-healing process. Scars develop different physical characteristics according to the amounts of collagen overexpressed (Fig 6-6).

An atrophic scar appears as a light or white sunken recess in the skin. This type of scar is most commonly associated with acne or chickenpox. Atrophic scars are further subclassified as ice pick, rolling, or boxcar in shape, based on their physical appearance. The results of clinical studies have demonstrated that microneedling therapy improves the appearance of rolling and boxcar scars more effectively than ice pick scars.[7]

A hypertrophic scar is red and appears to be raised above the surrounding skin. This type of scar will often develop as a result of a burn or traumatic injury. In multiple studies, microneedling produced improvements in the appearance of hypertrophic scars that were comparable to other mainstream treatment modalities, such as fractional laser, but with the advantage of a lower risk of side effects.[8]

More studies have been conducted on the effectiveness of microneedling for acne scarring than for any other condition. Clinical improvements ranging from 50% to 70% have

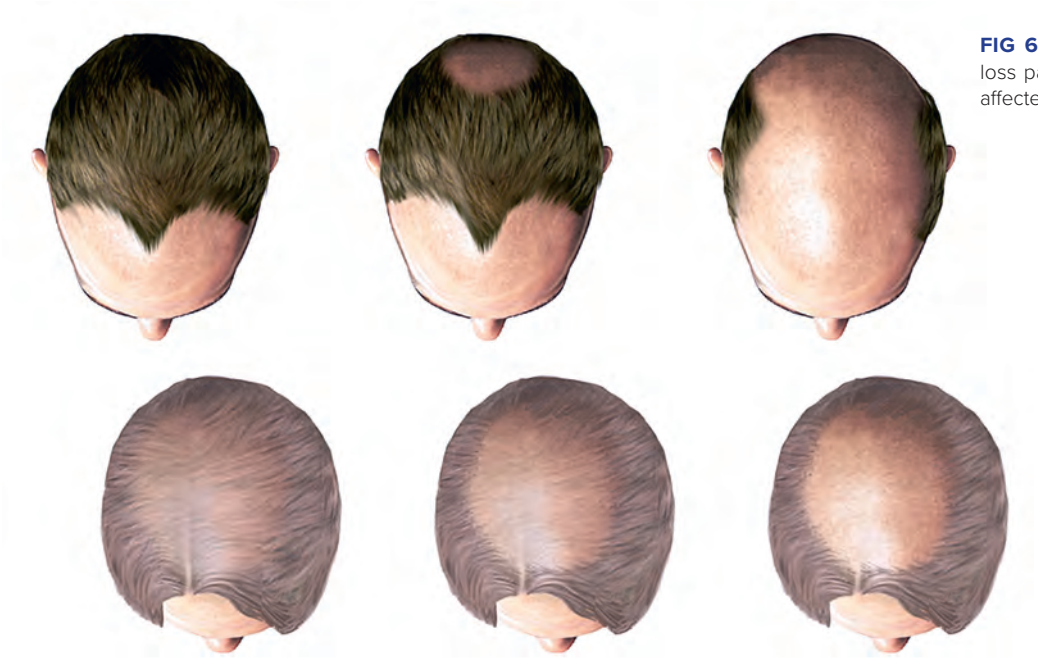


FIG 6-7 Differences in the hair loss patterns of men and women affected with AGA.

been reported following a typical protocol of 3 to 5 treatments at 2- to 4-week intervals.[6,9] These clinical results have also been substantiated by histologic skin changes.[10] Microneedling improves the appearance of scars not only by stimulating the regeneration of new collagen but also by disrupting the parallel pattern in which the collagen fibers are laid down.

Hair loss

The most common form of hair loss in adults is androgenetic alopecia (AGA), also known as male-pattern baldness. This condition is the result of a biochemical process that causes gradual reduction in the size of hair follicles. It is generally accepted that genetics influences the development of AGA, but the exact reasons some people are affected and others are not remains unclear. Contrary to conventional wisdom, AGA affects women as well as men, although the effect is slightly different (Fig 6-7). In men, the hairline at the temple regresses, followed by loss of hair at the top of the head, and eventually all of the hair over the central scalp is lost. In women, hair loss is more diffuse but is usually worse along the central scalp, and all of the hair is not typically lost.

The conventional therapy for AGA is topical minoxidil, a potassium channel blocker that causes hair regrowth via vasodilation. The efficacy of this treatment, which both prevents hair loss and promotes new hair growth, ranges from 30% to 60%. Microneedling has been found to induce hair regrowth in adults with AGA through stimulation of stem cells and activation of growth factors, which in turn stimulate the dermal papillae. In addition, various studies have demonstrated that the application of topical minoxidil or PRP following microneedling is superior to either of these therapies alone.[11–13] In one study, mean hair count increased from 226 at baseline to 317 after 12 weeks of treatment with microneedling plus minoxidil compared to an increase from 201 to 218 in the minoxidil alone group.[13] Eight months later, all patients in the microneedling group reported a sustainable response.

CHOOSING A MICRONEEDLING DEVICE

As the popularity of microneedling has increased over the past 5 years, the number of microneedling vendors and devices has also proliferated, making the process of selecting an appropriate device confusing and difficult. The following guidelines should help.

Rollers versus pens

Some manufacturers and authors argue that a micropen model is superior to the microroller in performance. We disagree. In our experience, the dermal roller is both more efficient and more effective than the pen. For optimal collagen renewal, the skin should be needled as densely as possible.[14] Because of the action of the roller, the needle penetrates the skin at an angle and then goes deeper as the roller turns (Fig 6-8). At the end of the rotation, the needle is extracted at the converse angle, so the microchannels reflect the path of the needle as it rolls into and then out of the skin. This action creates tiny holes of about four cells in diameter, but many of these cells are merely divided rather than being cut through. As the needle holes become more dense, the needles will slip into existing holes, so there is no risk of overtreatment.[14] To achieve this level of density using a pen would obviously require a great deal of attention and care, not to mention the enormous amount of time it would add to the procedure.

FIG 6-8 The authors prefer a roller over a pen device because the rotating action creates more microchannels and thus more density, and the procedure takes considerably less time than with a pen.

Professional versus consumer models

A majority of the products advertised on the internet are intended for consumer use. The key difference in these devices is the length of the needles. Medical-grade dermal needling devices have needles ranging from 0.2 mm up to 3.0 mm because they are designed to treat specific conditions, as described previously. Longer needles are not considered safe for consumer use because of concerns about infection risk and potential contraindications, among other factors. Most consumer models have needles of 0.2 to 0.3 mm in length. Like other mass-produced cosmetic tools, many of these rollers are made as cheaply as possible, which means that the needles may be prone to break off the barrel, or the barrel may become detached from the handle after a couple of uses. You will want a professional model that is designed for single use to eliminate any risk of patient cross-contamination, but choose one with needles made of high-quality surgical steel or titanium and a comfortable grip.

Needle count and length

Dermal rollers come in all sizes and shapes, with needles ranging from a single-row cluster of 24 to a multi-row cluster of 540. The number of rows is mostly a matter of personal preference, but keep in mind that some patients have very small facial features that will be challenging to navigate with a broad microneedling roller. However, the most important factor to consider is the length of the needles. As noted previously, a variety of needle lengths are available. Figure 6-9 illustrates how deeply each standard

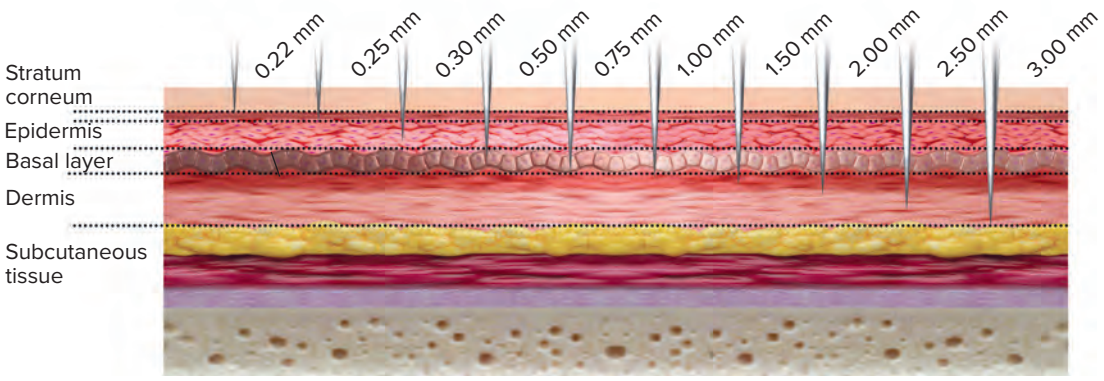


FIG 6-9 Microneedling rollers are available with needles in a range of lengths designed for different applications. A roller with needles of 1.0 mm is safe to use on most patients and penetrates deeply enough to stimulate collagen production without permanently damaging the epidermis.

needle length penetrates into the epidermis and dermis. For the average patient who presents for general anti-aging treatment of the face, choose a needle length no shorter than 0.5 mm and no longer than 1.5 mm to avoid reaching the dermis. When treating hair loss, use a shorter roller with needles ranging from 0.2 to 0.3 mm, whereas for deep scar tissue you may need a longer needle, up to 2.0 mm.

TOPICAL ADJUNCTS

To amplify the regenerative effects of microneedling, PRP or HA is applied topically immediately after the procedure, where it is absorbed through the created microchannels to reach the epidermal and dermal layer of the skin.

Platelet-rich plasma

Many dentists are familiar with PRP, which was first developed by Dr Arun Garg and Dr Robert Marx in the early 1990s in their efforts to improve bone graft handling and for other oral surgery applications. Its use quickly spread from dentistry to medicine, and today PRP and its numerous incarnations are used off-label in a myriad of indications.[15] The global PRP market is projected to grow to $4.5 billion over the next 5 to 10 years.[16]

PRP works by stimulating the proliferation of mesenchymal stem cells and fibroblasts, which secrete HA and type I collagen. When applied topically following microneedling treatment, PRP has been shown to improve skin texture, color homogeneity, elasticity, and firmness.[12] The adjunctive use of PRP with microneedling is low-cost, minimally invasive, and low-risk. For best results, the procedure should be repeated two to three times at intervals of 8 to 10 weeks.

PRP is created by drawing the patient's blood, centrifuging it, and concentrating the blood's rich assortment of growth factors. This simple procedure is performed chairside and requires minimal investment by the clinician.

Hyaluronic acid

HA is a natural component of skin and the principal molecule involved in skin moisture. A key cause of aging in skin is the marked disappearance of epidermal HA, which results in dehydration, atrophy, and a gradual loss of elasticity.[17] Commercially available as both a topical and a dermal filler, hyaluronic acid has virtually no risk for allergic reaction. Topical HA serum can replenish moisture to the skin following microneedling to improve the appearance of fine lines and wrinkles.

ANESTHESIA

Microneedling treatment with needles of 2 mm or shorter is associated with minimal pain, and the procedure can be carried out under topical anesthesia, two key factors in its popularity among patients.[18] A variety of anesthetic creams are readily available for this purpose. The authors, however, prefer to use a compounded BLT formula composed of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% dimethyl sulfoxide (DMSO) in a Lipoderm (Professional Compounding Centers of America) base. DMSO is added to the standard formula not only for its anti-inflammatory effects, but also because of its capacity to rapidly and easily penetrate the skin. This formula can be ordered from any compounding pharmacy (Fig 6-10). Most patients who undergo microneedling under topical anesthesia report experiencing little to no pain during the procedure.[19]

Treatments involving the use of needles that are longer than 2 mm require careful consideration of the most effective type of anesthesia to use, particularly in sensitive facial areas such as near the eyebrows, nose, and upper lip. Generally, dental blocks should be used in the perioral region and any other extremely sensitive areas.

Patients should be instructed not to take any nonsteroidal anti-inflammatory drugs (NSAIDs) before a treatment procedure due to their coagulating effect. The use of an oral analgesic 1 hour before the procedure is permitted, however. Valtrex (GlaxoSmithKline) can be used prophylactically by patients who are subject to getting cold sores as a result of microneedling.

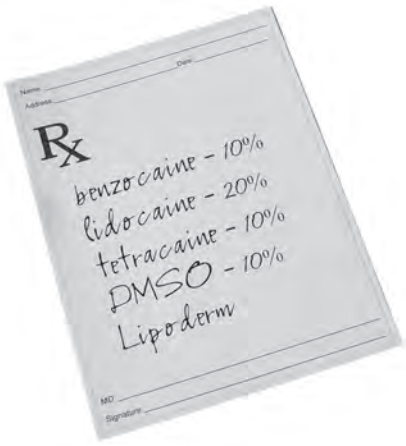


FIG 6-10 Any compounding pharmacy can prepare a topical anesthetic composed of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base. DMSO is added to the standard formula not only for its anti-inflammatory effects, but also because of its capacity to rapidly and easily penetrate the skin.

MICRONEEDLING PROCEDURES

Clinical preparation

Before the procedure, make sure the patient has signed a consent for treatment and a complete set of patient photographs has been taken.

To begin, the patient's hair should be pulled back with a hair band or covered with a cloth cap. The patient's face should be thoroughly cleaned with an antiseptic cleanser and then wiped with alcohol. Do not use povidone. Next, a thin layer of topical anesthetic cream is applied over the treatment areas, keeping it away from the eyes. Although the onset of the anesthesia is typically less than 1 minute, it is important to wait 15 minutes for a complete numbing effect, which should then last for 30 to 60 minutes. After 15 minutes, the anesthetic cream should be wiped away and the skin should be cleaned once more.

The clinician should use eye protection during the treatment and when cleaning the needling device to prevent any contamination by the patient's blood.

Microneedling technique

To use the dermal roller, place it on the skin and gently move it back and forth in one pattern (vertical, horizontal, or diagonal) in short strokes. For example, place the roller at the top of the forehead and move it down and then up three or four times in a vertical direction. When you finish, lift it off the skin (dragging may leave tracks), set it down in an adjacent area of the face, and move it up and down again three or four more times in a vertical direction.

As noted earlier, the goal is to create as many microchannels as possible. To accomplish this without leaving any gaps, it is important to mentally divide the face into regions and then treat each region in a logical sequence. The authors recommend beginning treatment in the forehead area and moving clockwise to the patient's left cheek, followed by the chin, and ending with the right cheek area. The nose and philtrum areas are completed last. For each circuit, roll the device back and forth in only one pattern, as follows (Fig 6-11a):

1. *Vertical:* Figs 6-11b and 6-11c. Move the microroller forward and back in a vertical pattern, beginning at the right side of the forehead (on the clinician's left when facing the patient) and ending at the left side of the forehead. When you have finished the forehead, continue the vertical pattern on the patient's left cheek, then move to the chin (Fig 6-11d), and end with the right cheek area (Fig 6-11e).
2. *Horizontal:* Figs 6-11f and 6-11g. Move the microroller from side to side in a horizontal pattern, beginning at the right side of the forehead and ending at the left side of the forehead. When you have finished the forehead, continue the horizontal pattern on the patient's left cheek, then move to the chin (Fig 6-11h), and end with the right cheek area (Fig 6-11i).
3. *Diagonal (left to right):* Fig 6-11j. Move the microroller in a diagonal pattern, from top left to bottom right from the clinician's point of view, beginning on the top right side of the forehead (the clinician's left when facing the patient) and ending on the bottom left side of the forehead (the clinician's right). When you have finished the forehead, continue the vertical pattern on the patient's left cheek, then move to the chin, and end with the right cheek area (Fig 6-11k).
4. *Diagonal (right to left):* Fig 6-11l. Move the microroller in a diagonal pattern, from top right to bottom left, beginning on the top right side of the forehead and ending on the bottom left side of the forehead. When you have finished the forehead, continue the vertical pattern on the patient's left cheek, then move to the chin (Fig 6-11m), and end with the right cheek area.

FIG 6-11 *(a)* Four circuits of the face are completed in vertical, horizontal, diagonal left to right, and diagonal right to left directions. The nose and philtrum area are then treated. *(b and c)* Move the roller up and down in a vertical pattern, beginning in the forehead region. *(d)* Vertical direction on the chin. Use short, light strokes. *(e)* The vertical circuit is completed with the patient's right cheek. *(f and g)* To start the next circuit, apply the roller in a horizontal pattern, using short strokes. *(h)* Horizontal direction on the chin. *(i)* The horizontal circuit is completed with the patient's right cheek.

5. *Nose/philtrum areas.* Treat these areas in the same manner, beginning with a vertical pattern and ending with a diagonal pattern.

Deep-line wrinkles can be laid flat by stretching the skin with the thumb and fingers before roller application. These areas should be treated more deliberately to reflect the patient's desired outcomes. On completion of the entire

FIG 6-11 *(CONT)* *(j)* Finish by applying the roller in a diagonal pattern, both left top to bottom right and vice versa. *(k)* Diagonal top left to bottom right on the right cheek. *(l)* Diagonal top right to bottom left, starting with the forehead as with the other circuits. *(m)* Diagonal top right to bottom left on the chin.

face, one final circuit should be made, moving the roller in the direction away from the inner face to encourage lymph drainage. Similarly, these final strokes should move away from the nose when treating that area.

Always roll with a controlled motion and gentle pressure. When firm pressure is put on the skin during application of rolling devices, histamines are released. This histamine response often results in increased superficial reddening of the skin that may be present for several hours after the treatment. The use of a vibrating roller is not recommended because it can cause this condition to be much more severe.

Normal saline should be used to wash away the flow of blood in the needling area. Dried blood prevents nutrients from entering the skin and inhibits timely healing. During the procedure, the clinician can stop to clean the roller as necessary, taking care not to damage the needles. Because the needling channels remain open for no more than 15 minutes, a topical adjunct (HA or PRP) should be applied to the treated areas immediately after microneedling is completed.

POSTTREATMENT PROCEDURES

Although serum may ooze from the skin for up to 20 minutes after the procedure, bleeding should cease almost immediately. Bruising may persist. Once home, the patient should shower with tepid water for about 20 minutes, gently massaging and rinsing the treatment area to remove any fluids collected there. Bathing, which could cause contamination, is prohibited.

Erythema is the most noticeable side effect of the treatment (Fig 6-12), along with puffiness in the sensitive areas around the eyes, which may increase a day or two after treatment. Aggressive treatments with 3-mm-needle rollers or larger may also produce noticeable bruising. Nevertheless, many patients feel comfortable and confident enough the day after a microneedling procedure to resume their normal public activities. If necessary, mineral makeup can be applied, but regular skin care products should not be used for the first 48 hours after treatment. Sunscreen with a minimum SPF of 30 can be used beginning 1 day after the treatment but not earlier to prevent any potentially harmful ingredients from entering the exposed skin.

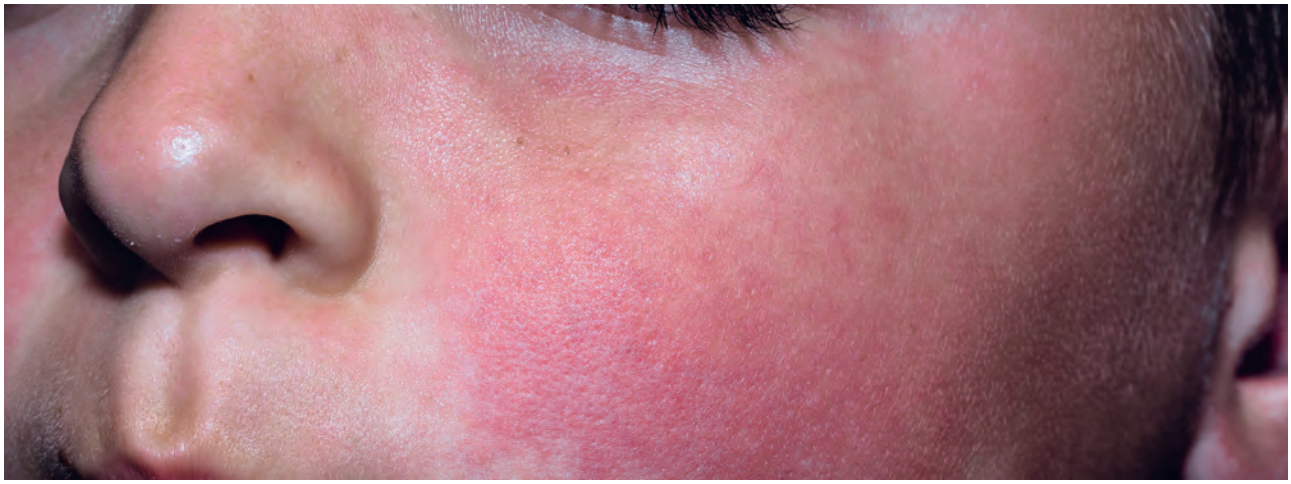


FIG 6-12 Erythema is the most noticeable side effect of the treatment. Additional side effects include puffiness around the eyes, and this may increase a day or two after treatment.

The patient should avoid direct sunlight for up to 1 month (one wound-healing cycle) after microneedling treatment.

After 3 to 5 days, the patient's skin will most likely feel dry and tight. This feeling can be relieved with moisturizers that contain ceramides. Vitamin A and topical omega-3 cream can be helpful in reducing inflammation, but toners with alcohol should be avoided. After several days, swelling will have disappeared along with most noticeable bruising, though flaky skin may persist. After 1 week, virtually no signs of the microneedling should remain. As early as several days after medical microneedling—once inflammation has decreased and based on the patient's comfort level—at-home rolling may be performed by patients who have vascular rosacea. For all other patients, the timing of additional clinical and/or at-home treatments should be based on the progression of natural healing that takes place after treatment. At least 1 month should pass before any more clinical microneedling is performed. Multiple sessions may be needed to treat age-related conditions and scarring, the latter at intervals of 8 to 10 weeks. However, the treatment plan should be based completely on the individual patient's conditions. Overtreatment can lead to higher contrasts between scar tissue and healthy skin and should be avoided.

SIDE EFFECTS AND COMPLICATIONS

Microneedling is a safe and noninvasive cosmetic procedure that has few reported adverse effects. The most common side effects are mild erythema, localized edema, and skin flaking, which usually resolve within 48 to 72 hours.[19]

CONCLUSION

Microneedling is a relatively low-cost and minimally invasive cosmetic procedure. Microinjuries induced by needle penetration in the skin stimulate regeneration of the dermis via the natural wound-healing response, which eventually results in the deposition of new collagen by fibroblasts.

Microneedling has many advantages over other traditional cosmetic procedures, such as laser resurfacing or skin peeling. It is noninvasive and does not damage the skin, and it can be performed using topical anesthesia, another feature that is attractive to patients. The technique is easy to master and requires only a few tools to perform, which minimizes the cost of the procedure. Most importantly, the procedure leaves the skin thicker, with more collagen and elastin.

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7

PLANES OF INJECTION AND INJECTION TECHNIQUES

The treatment protocols described in chapters 8, 9, and 10 require the clinician to master two basic skill sets. The first involves learning the various injection techniques and when to apply them. The second and more challenging skill involves learning how to recognize when you have reached the appropriate tissue plane to dispense the filler. This is very much an acquired skill, but there are some digital and visual cues that can help.

BASIC ANATOMY OF FACIAL SKIN

Briefly, human skin consists of three layers (Fig 7-1). The outermost layer is the epidermis, which protects the body from the external environment. It is composed mainly of cells and sensory nerves and relies on the dermis for both vascular and structural support. Averaging just 0.2 mm on the face, it is the thinnest of the three layers of the skin.

The dermis is located beneath the epidermis and accounts for about 90% of the skin's total thickness. The dermis houses all of the major structures, including blood vessels, hair follicles, and sweat glands, and stores most of the body's water supply. It is held together by collagen and elastin and provides blood-borne nutrients to the epidermis.

The hypodermis (or subcutaneous tissue), the innermost layer of the skin, consists of a network of collagen cells and fat, which insulates and protects the body. Blood vessels, nerves, and hair follicles also cross through the hypodermis, and it connects the dermis to the underlying fascia of the bones and muscles.

Recently, a group of researchers used 3D scanning technology to measure the depth of the dermis and the superficial fat in various areas of the face. The results showed that the average dermal

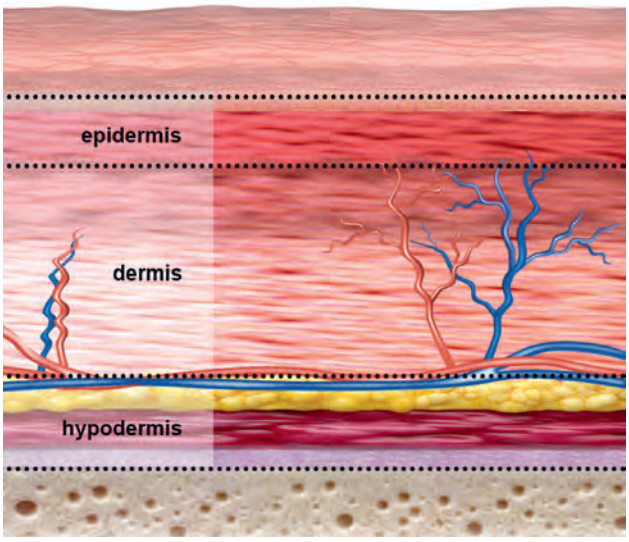

FIG 7-1 The three basic layers of skin.

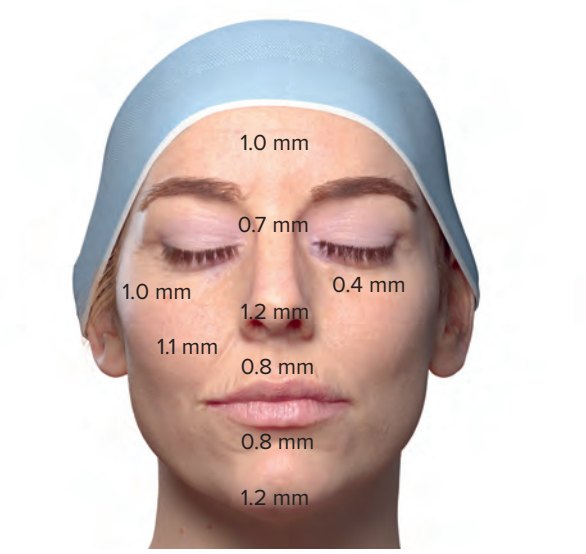

FIG 7-2 By age 50 years, facial skin becomes noticeably thinner.

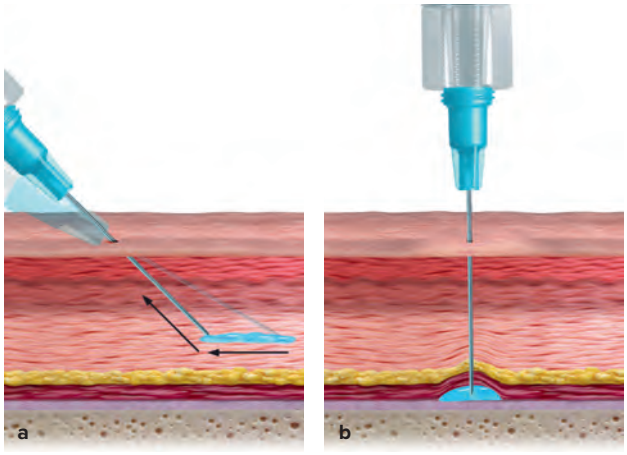

FIG 7-3 Dermal fillers are injected into different layers according to the desired outcome. Injections in the mid to deep dermis *(a)* are generally administered using the linear thread technique, whereas those in the hypodermis *(b)* are made with the depot technique.

thickness is 1.51 mm in the thinnest regions and 1.97 mm in the thickest ones. Average thickness was determined to be 1.70 mm in the forehead, 1.85 mm in the malar area, and 1.82 mm in the perioral region. The average facial superficial fat thickness ranged from 1.61 mm in the dorsum to 5.14 mm in the perioral region, where it was thickest.[1]

Male skin is characteristically thicker than female skin, but at about age 50 years, facial skin begins to thin as it loses elasticity, mostly because of reduced collagen production. Figure 7-2 displays the approximate depth of the dermis in various areas of the face in a middle-aged woman.

Dermal fillers are injected at various depths, from the superficial dermis to just above the periosteum, depending on the desired outcome (Fig 7-3). The mid to deep dermis is the target for most of the basic dermal filler treatments, whereas more advanced procedures, such as correcting contours in the malar region, call for supraperiosteal placement. The step-by-step procedures presented in this book include guidelines on how deeply to inject. Until they gain a certain amount of experience, clinicians should follow the recommendations of product manufacturers and experts. With practice and careful observation of how the tissue responds, the process will quickly become intuitive.

Depths can be determined during the injection process via digital sensitivity to the needle passing through the skin tissue, plunger pushback of the needle, and visibility of the needle tip and the response of the skin and subcutaneous tissues. Here are some clues:

- When the gray tip of the needle is visible and the skin blanches, it is too superficial and needs to be repositioned at a lower depth.
- The shape of the needle can still be discerned when it has reached the mid to deep dermis but not when it is in the subcutaneous plane.

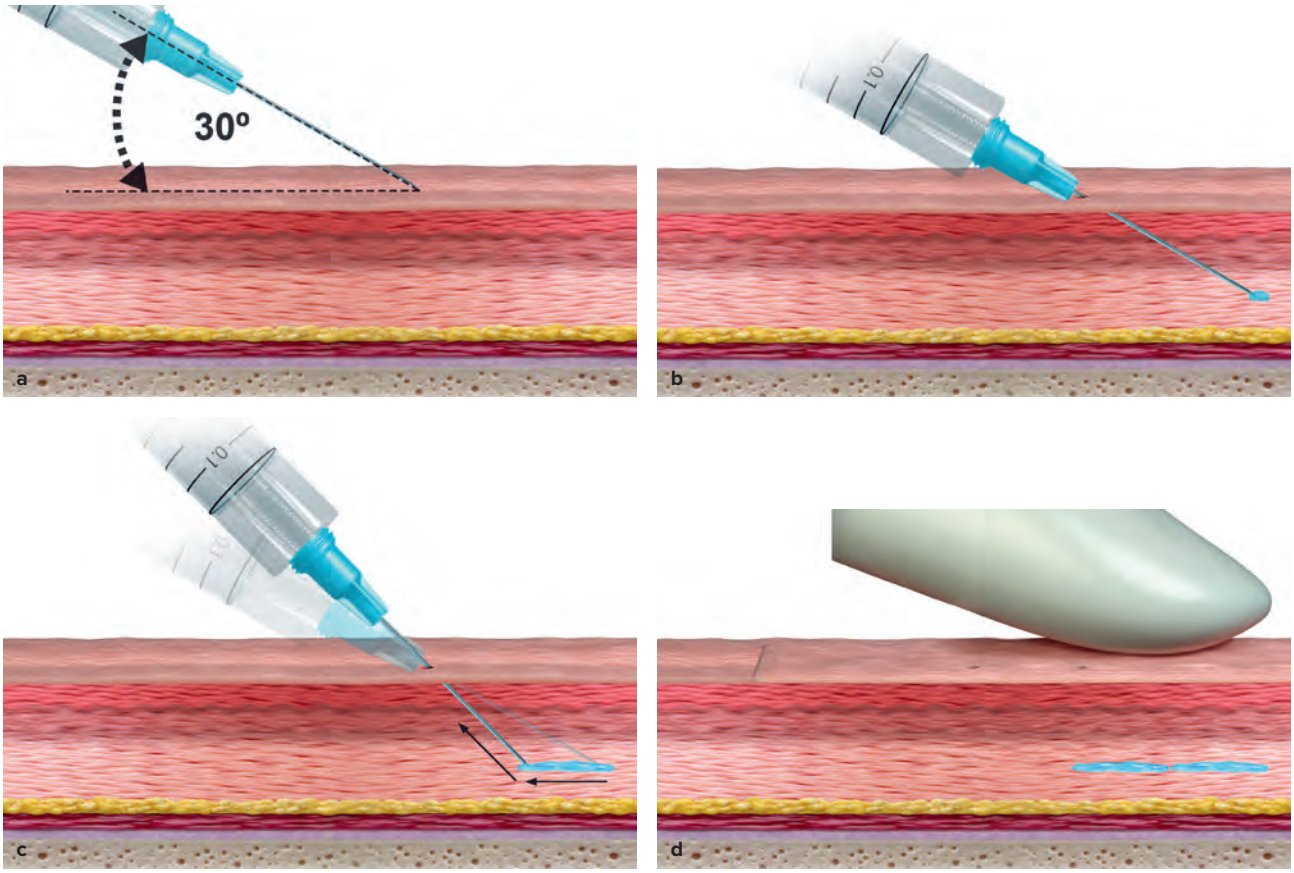

FIG 7-4 Linear thread technique. *(a)* The needle is inserted at a 30-degree angle to the appropriate depth. *(b and c)* The needle is slowly withdrawn as pressure is applied to the plunger. Filler product is dispensed in a smooth line. *(d)* The area should be massaged immediately after the injection.

- A palpable tap can be felt when the tip of the needle reaches the periosteum and bone.
- More resistance to plunger pressure is felt in the superficial to deep dermis than in the subcutaneous and supraperiosteal planes.
- When injecting into the dermis, placing downward pressure on the needle should cause the skin to dimple slightly.

INJECTION TECHNIQUES

The choice of injection technique depends on the site being treated. Employing the appropriate technique is necessary to obtain uniform coverage of the site and is critical to achieving an optimal outcome. Some procedures should only be performed with a blunt-tipped cannula instead of a syringe to mitigate the risk of arterial or venous occlusion, which can be a life-threatening complication.

Important: Always prime the needle before inserting it into the skin by extruding a small amount from the tip to make sure the material is flowing properly.

Linear threading

Linear threading is the most basic of all of the injection patterns used for filler product placement (Fig 7-4). In this technique, the full length of the needle is inserted at a 30-degree angle until it reaches the appropriate depth. As the needle is being withdrawn, firm and constant pressure is applied to the plunger to dispense filler product smoothly and evenly. The pressure on the plunger is not released until just before the needle is withdrawn from the skin. Immediately after the injection, the area is gently massaged to prevent any nodule formation.

This retrograde deposition technique creates a microchannel of filler material that is ideal for filling a nasolabial fold or smoothing a marionette line, and it serves as the basis for many of the other techniques.

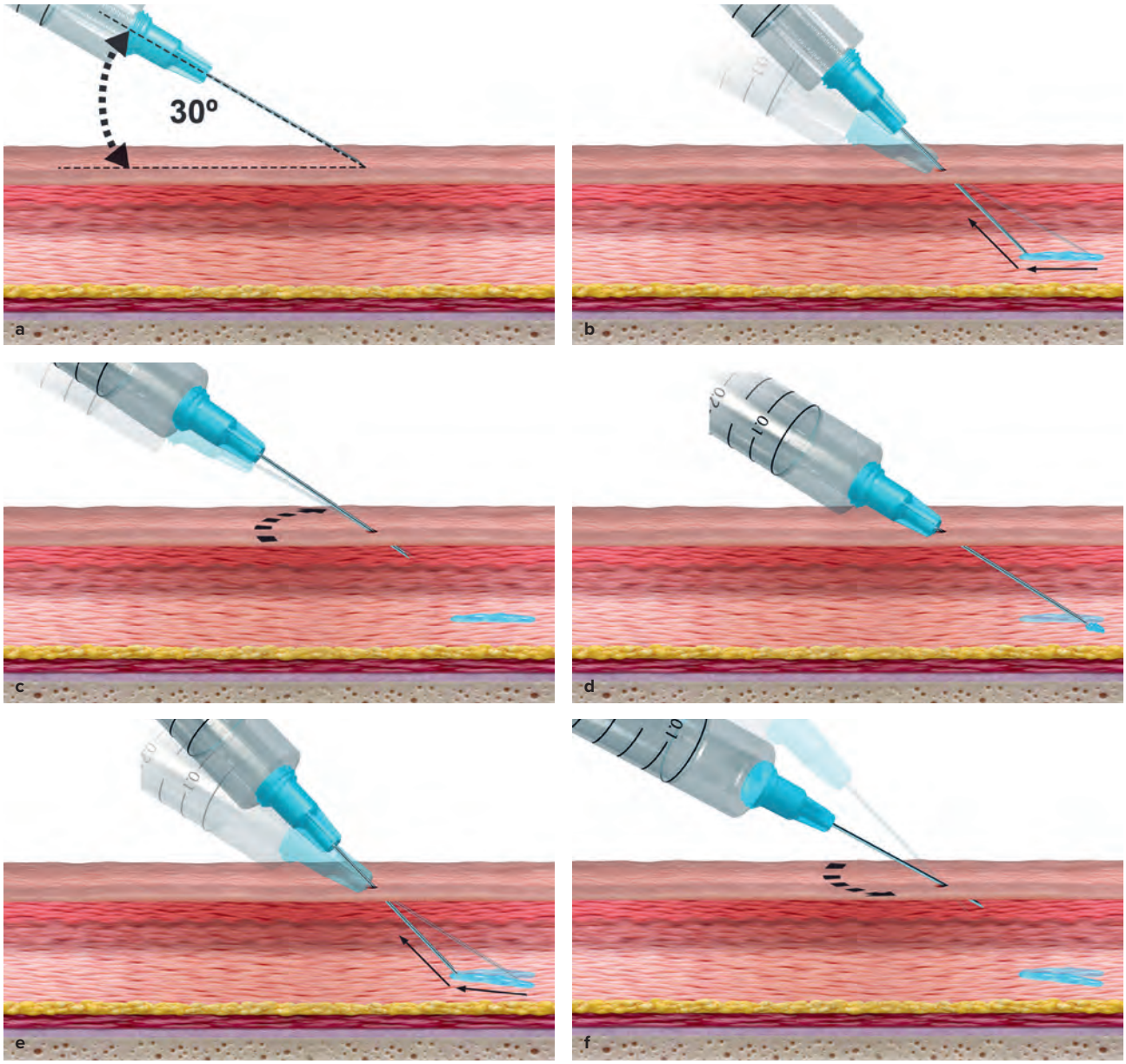

FIG 7-5 Fanning technique. *(a)* Insert the needle at a 30-degree angle to the desired depth. *(b)* Inject a linear thread of filler product, but do not fully withdraw the needle. *(c)* Redirect the needle inferiorly and medially at a small angle. *(d and e)* Inject a linear thread of dermal filler adjacent to the previous thread. *(f)* Without fully removing the needle, redirect it again, superiorly and distally, at a small angle.

Fanning

To visualize the fanning technique (Fig 7-5), imagine making a series of linear thread injections from a single central insertion point. Now think of this insertion point as the base of the "fan."

To perform this technique, the full length of the needle is inserted at the center of the site being treated. As the needle is being withdrawn, a microchannel of filler material is deposited (ie, a linear thread injection is made). At the end of the "thread," however, the needle is only partially withdrawn. Next, the syringe is rotated in a slight arc and then fully reinserted, and a second linear thread of material is deposited adjacent to the first one. This pattern is repeated once more, with the syringe rotated again in the same direction. After the third linear thread injection has been made, the syringe is rotated (again without fully withdrawing it) in the opposite direction (ie, medial to the first

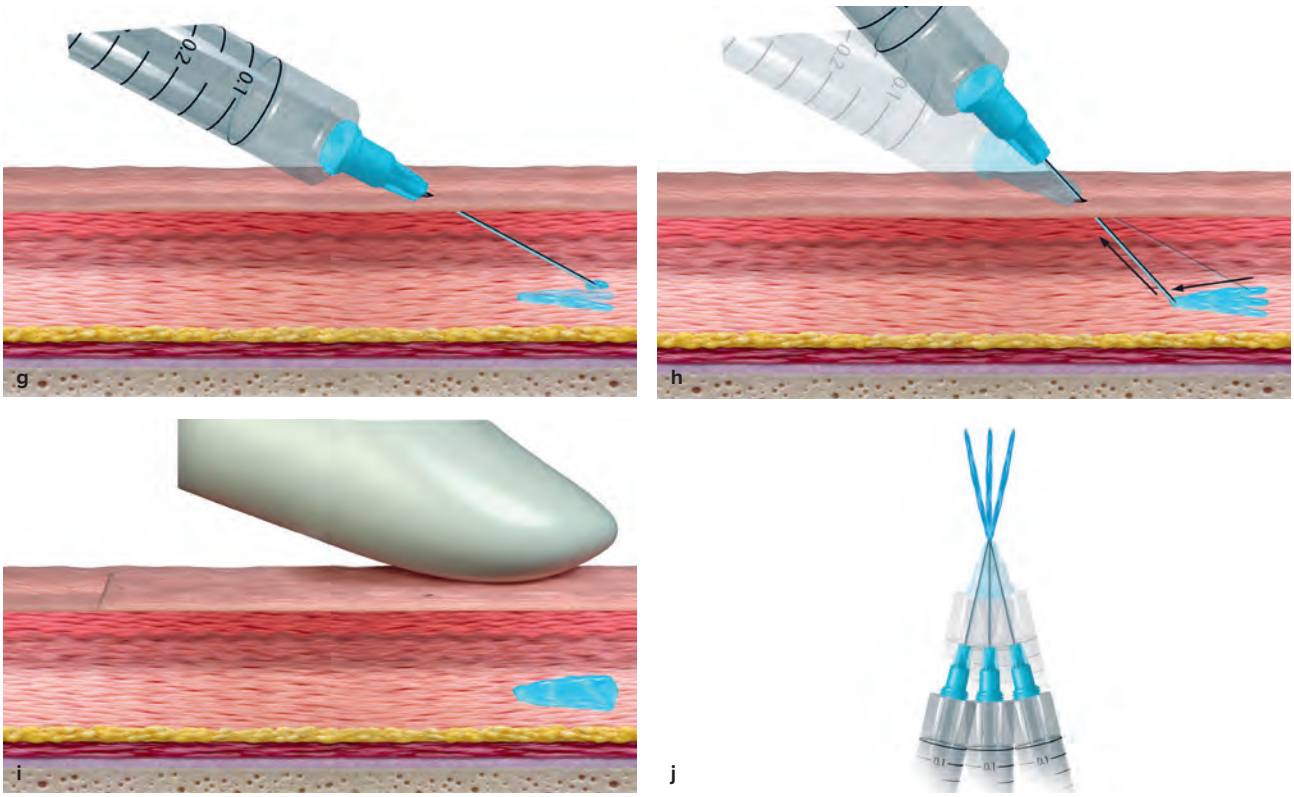

FIG 7-5 *(CONT)* *(g and h)* Inject dermal filler adjacent to the previous linear thread. *(i)* Firmly massage the area to ensure even distribution of the filler product. *(j)* With this technique, a single insertion point allows for contiguous coverage in a triangular or fan-shaped pattern.

linear thread), and two more linear threads of filler material are injected. Again, once the injection is completed, the area is massaged to ensure that the filler is spread evenly and that there are no clumps.

This triangular fan pattern calls for a single insertion point to improve patient comfort and allows contiguous coverage of the site. However, to prevent buildup of product at the single point of entry, it is important to stop injecting before the needle is partially withdrawn after each linear thread has been made.

Depot

Unlike the linear thread technique, which is designed to fill in or "lift" a visible wrinkle or fold, the depot injection (Fig 7-6) is used to modify the contour or to plump the tissue in an area such as the chin. Therefore, instead of injecting into the mid to deep dermis, the filler is injected into the supraperiosteal plane.

For this technique, the needle is slowly inserted all the way through the dermis and muscle until it gently touches the bone. When that tap is felt, the needle is withdrawn approximately 1 mm, and a bolus of filler is injected. The needle is then withdrawn. Additional depot injections are made accordingly until the desired volume enhancement has been achieved. Afterward, the injection site is gently compressed against the bone to smooth out any clumps.

When administering a depot injection, it is important to deposit the filler below the muscle. When filler is inadvertently injected into the muscle, it can become displaced as a result of normal movement of the facial musculature and compromise the esthetic outcome.

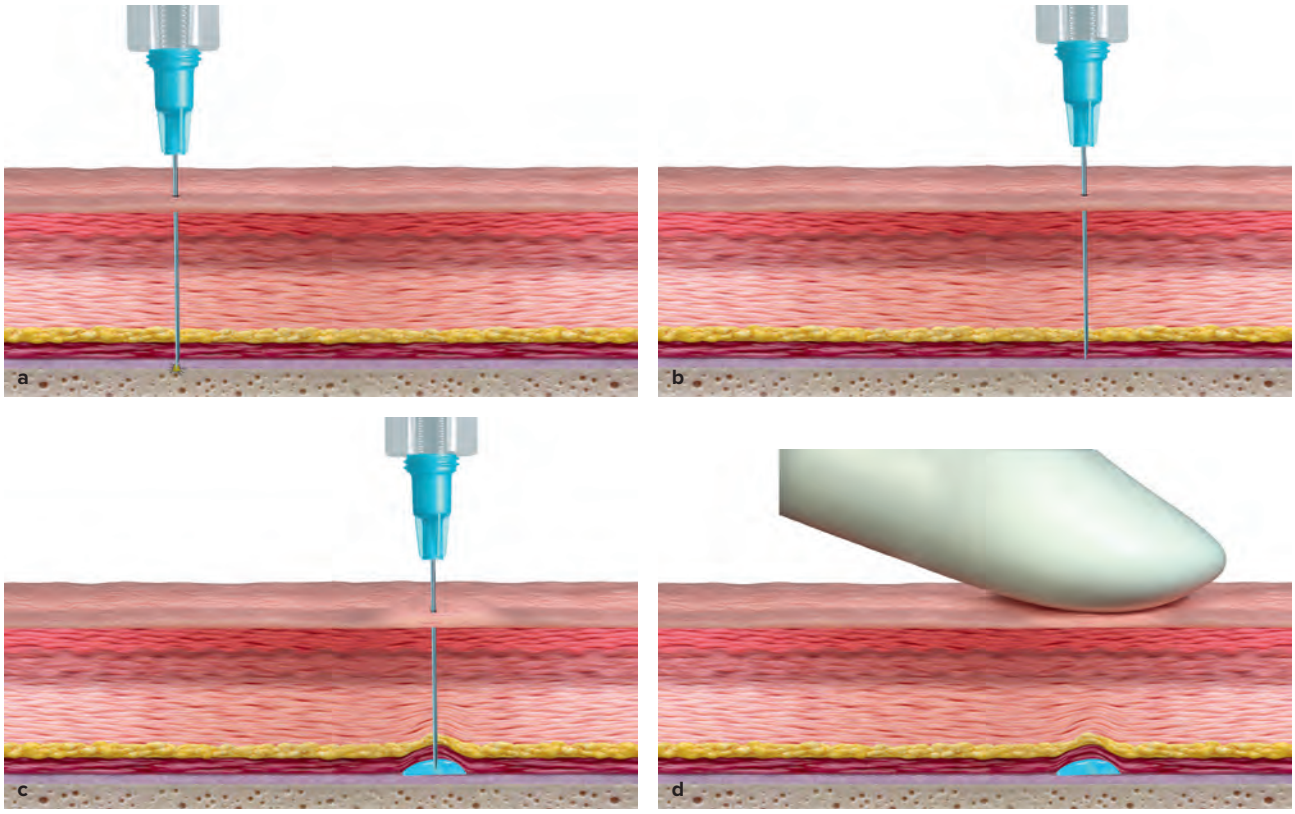

FIG 7-6 Depot technique. *(a)* The needle is inserted at a 90-degree angle until it touches the bone. *(b)* Once the bone is felt, the needle is withdrawn about 1 mm. *(c)* Filler is then injected until the volume enchancement is achieved. *(d)* The injection site is compressed.

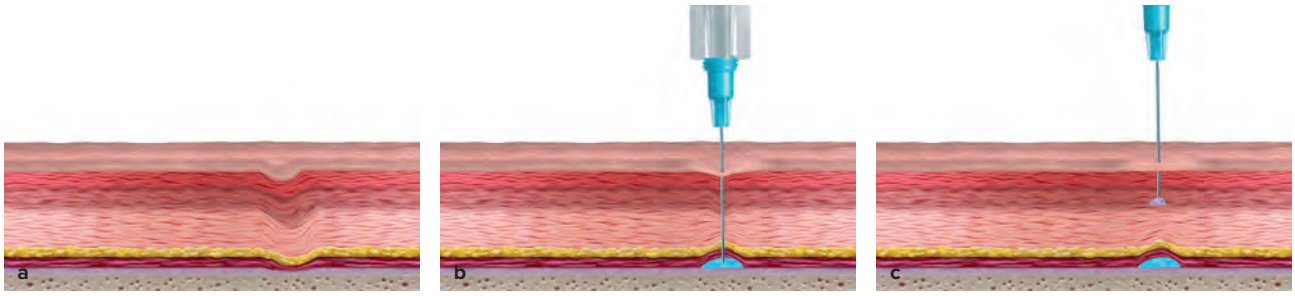

FIG 7-7 Layering technique. *(a)* Skin fold. *(b)* Deep volume loss is addressed by a filler designed for structural support. *(c)* Surface wrinkles are diminished via a more fluid and supple filler injected into the mid dermis.

Layering

Layering (Fig 7-7) is not so much an injection technique as a method of deploying the techniques described previously to achieve a specific outcome. It is used in sites where a larger volume of filler material is required, such as in the midface region.

This protocol calls for the injection of a filler with moderate to firm body into the mid to deep dermis to provide structural support, followed by the injection of a thinner and more malleable material into a more superficial plane to correct minor rhytids and wrinkles. This technique is used in chapter 10, which presents the more advanced or red-light procedures step-by-step.

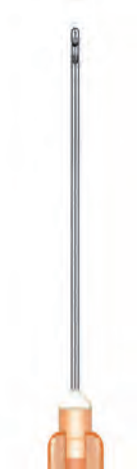

FIG 7-8 Microcannulas are recommended when treating the tear troughs.

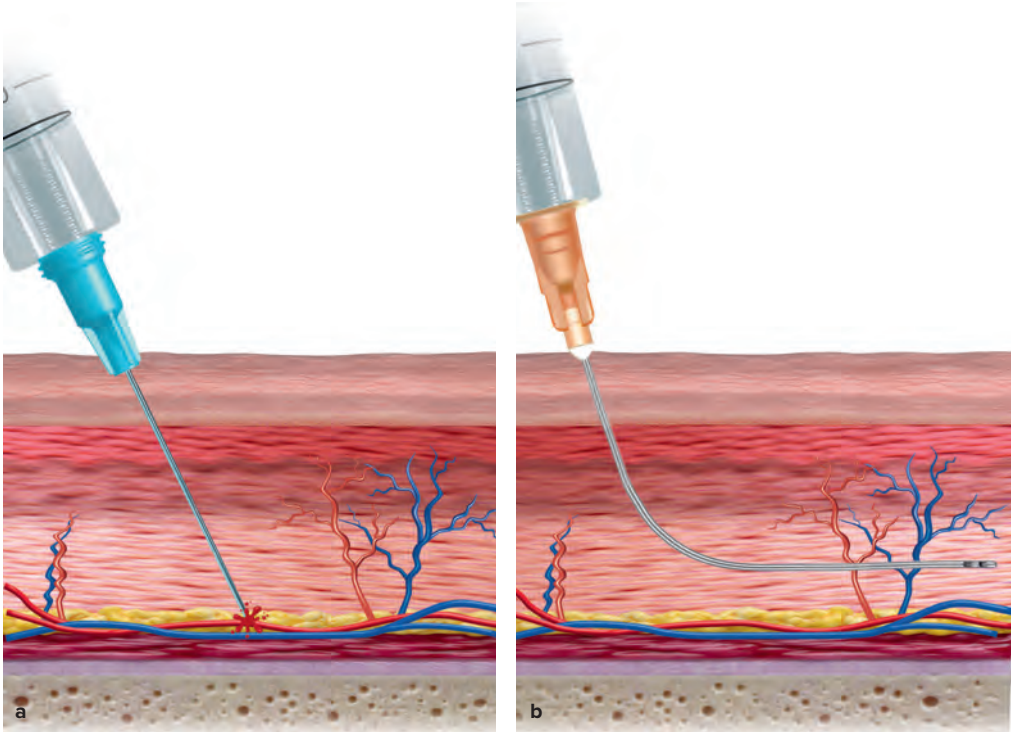

FIG 7-9 A microcannula can reduce the risk of injuring a blood vessel during an injection. *(a)* Injection with a needle. *(b)* Injection with a microcannula.

Cannula technique

In place of a hypodermic needle, a blunt-tip microcannula is strongly recommended for treating the tear troughs and other sites that pose an increased risk of vascular injury, including the glabella and nose. As discussed in chapter 4, vascular occlusion is caused by injection of filler into an artery. Although rare, this complication can result in dermal necrosis, irreversible blindness, and stroke.

The microcannula has several features that can help reduce this risk (Fig 7-8). Its blunt tip and flexible body limit the likeliness of transecting an artery or vein (Fig 7-9), and it dispenses filler through a side port rather than from the tip. In studies, the use of a microcannula in place of a needle has been shown to reduce bruising and swelling as well, and many patients report significantly less pain from the injection.[2–4] It also has the advantage of requiring only one needle stick to treat the entire area.

To use a microcannula, a skin nick incision is made with a needle that is slightly larger than the lumen of the cannula. The microcannula is then passed through the incision with one hand while the other hand guides it into the proper plane across the length of the treatment area. Filler is then deposited in a retrograde fashion as the microcannula is slowly withdrawn.

SUMMARY

The choice of injection technique depends on the defect being treated and its degree of severity. Linear threading, for instance, is effective for filling wrinkles and folds, but whether it should be applied in a fanning pattern depends on the size and severity of the defect. Similarly, depot injections are indicated to address a loss of volume, but they may need to be combined with a threading or fanning technique to smooth superficial lines or surface wrinkles.

BOX 7-1 Recommendations for preventing vascular complications*

- Use a delicate retrograde injection technique.
- Always inject the filler slowly, applying light pressure on the syringe plunger.
- Inject small amounts at a time (ie, < 0.1 mL), at several injection points.
- Use a microcannula for deep injections and for very viscous products.
- Use fine needles only for superficial injections.

*Adapted from Sito et al.[5]

TIPS

Dermal fillers have a gel consistency that requires greater pressure on the plunger to inject than most dentists are accustomed to. Because hyaluronic acid (HA) products provide the least plunger resistance, and also because they can be dissolved with hyaluronidase if necessary, they are an ideal choice for the beginner.

Avoid tracking filler in the epidermis by releasing the plunger prior to withdrawing the needle.

When injecting filler products, it is important to remember to use low injection pressure as well as small volumes per pass or area.

Box 7-1 provides a list of injection precautions.

CONCLUSION

Most dentists will quickly master the standard injection patterns described in this chapter. However, performing them correctly and knowing when to use them not only requires practice and experience, but also an understanding of how products of different viscosity coalesce and disperse when injected at different depths.

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4. Niamtu J 3rd. Filler injection with micro-cannula instead of needles. Dermatol Surg 2009;35:2005–2008.
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Section II: Step-by-Step Procedures

8

GREEN-LIGHT PROCEDURES

So-called green-light procedures have certain advantages for clinicians who are first learning and practicing their injection techniques. The areas targeted by these procedures—nasolabial folds, marionette lines, mental crease, and the chin—display some of the earliest signs of aging, so there is usually an abundance of patients seeking treatment for them. In addition, they are relatively easy to treat, and the outcomes of treatment are generally good.

This chapter is designed for dentists who are new to dermal fillers. In the pages that follow, each procedure is presented in multiple formats designed to make it easier for the clinician to *(1)* establish an understanding of how the procedure is performed, *(2)* visualize the execution of each step in the procedure, and *(3)* study the procedure as it is carried out in a clinical setting. On completion, novices will have the knowledge and confidence needed to begin offering green-light procedures to friends and family members, and then to their patients. Box 8-1 lists the general contraindications for dermal filler treatment, and Box 8-2 lists the supplies needed for the procedures discussed in this chapter.

BOX 8-1 General contraindications

- History of anaphylactic reaction
- Severe allergies
- Sensitivity or allergic reaction to dermal filler products
- Use of isotretinoin (Accutane, Roche) within the preceding 6 months
- Skin atrophy
- Poor healing
- Treatment area dermatosis
- An uncontrolled systemic condition
- Treatment area infection
- Hypertrophic or keloid scarring
- Abnormal bleeding
- Pregnancy or nursing
- Body dysmorphic disorder
- Highly unrealistic expectations

BOX 8-2 Basic supplies

- Alcohol pads
- Cotton-tipped applicators
- Handheld mirror
- Nonsterile gloves
- Nonwoven 3 × 3–inch gauze
- Surgical marker or white eyeliner pencil

NASOLABIAL FOLDS

Stretching from the nasal ala to the lip corners, nasolabial (or melolabial) folds are caused by loss of skin elasticity and soft tissue volume. Other causes include dermal atrophy, fat descending from the malar region, and hyperdynamic action of muscles in the midfacial region.

Indications and contraindications

- In some patients, deep nasolabial folds are the result of excessive contraction of lip levator muscles in smiling and may require concomitant botulinum toxin treatment of the levator labii superioris alaeque nasi muscle for optimal results.
- If malar augmentation is also indicated in a patient scheduled for nasolabial fold treatment, the former should be performed first because the restoration of midface volume can reduce the severity of nasolabial folds.
- Moderate to severe nasolabial folds can be treated using two types of filler in a layering technique: Deep volume loss is addressed by a filler designed for structural support, while surface wrinkles are diminished via a more fluid and supple filler.
- Hanging or extremely lax skin is a contraindication for dermal filler treatment and should be corrected with surgery.

Anesthesia and filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 0.6 mL)
- 30-gauge, 0.5-inch needle
- A topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% dimethyl sulfoxide (DMSO) in a Lipoderm (Professional Compounding Centers of America) base (optional)
- Suggested dermal fillers:
  - Juvéderm (Allergan)
  - Belotero (Merz North America)
  - Restylane (Galderma)
  - Radiesse (Merz North America)
  - Juvéderm Vollure (Allergan)
  - Sculptra Aesthetic (Galderma)
  - Bellafill (Suneva Medical)
  - Platelet-rich plasma (PRP)
- Suggested quantity of fillers:
  - Mild folds: 0.8 mL
  - Moderate folds: 1.6 mL
  - Severe folds: 2.4 mL

Precautions

- Pain sensitivity increases as the nose is approached.
- Reduction, not full effacement, is the goal of dermal filler treatment of nasolabial folds.
- All injections must avoid the lateral nasal artery, which supplies blood to the nose and is located 2 to 3 mm above the alar groove.
- **Caution:** Immediate or delayed white blanching or a violaceous reticular pattern on the nose or nasolabial folds is a serious sign of occlusion (ischemia) from an intravascular injection and requires immediate attention to prevent tissue necrosis (see chapter 4).

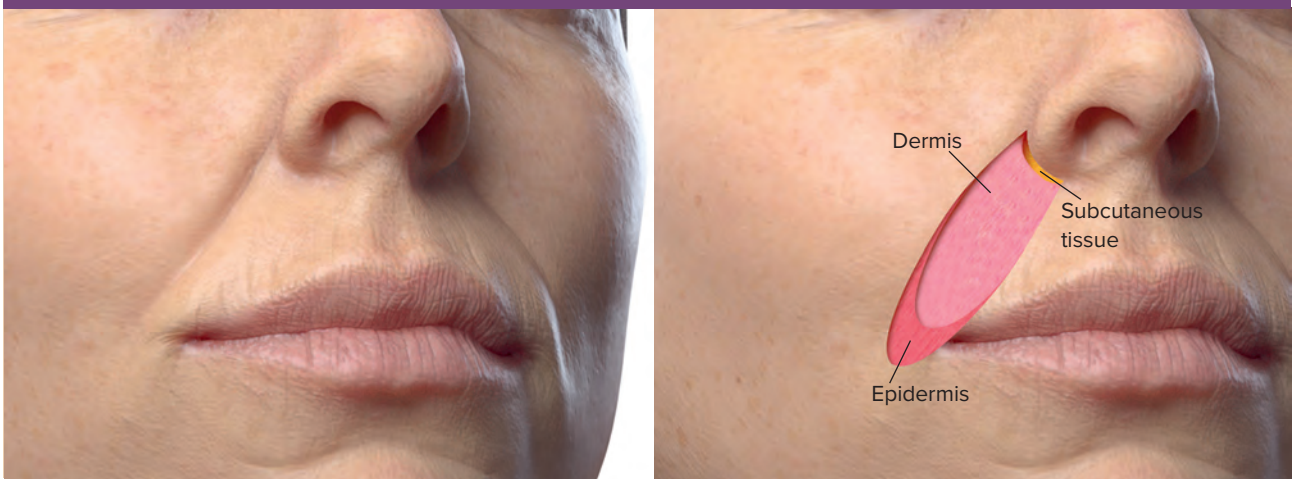
Anesthesia technique

Alcohol pads are used to clean the skin over and around the nasolabial folds in preparation for anesthesia, which is administered bilaterally. Beginning inferiorly, six 0.1-mL injections of buffered 2% lidocaine-epinephrine solution are given subcutaneously. Alternatively, a topical cream can be applied in patients who have low sensitivity to pain. Allow 5–10 minutes for the anesthesia to take effect.

Dermal filler injection technique

The patient is reclined at a 60-degree angle, and the folds are cleaned with alcohol. A 30-gauge, 0.5-inch needle is firmly attached to a prefilled dermal filler syringe to

FIG 8-1 Step-by-step procedure for nasolabial folds



STEP 1 **Administer anesthesia**

- Use alcohol to clean the skin over and around the nasolabial fold on one side of the face.
- Inject 0.1 mL buffered 2% lidocaine-epinephrine solution subcutaneously using a 30-gauge, 0.5-inch needle.
- Move to the other side and repeat.
- Allow 10 minutes for the anesthesia to take effect.

Each dot indicates 0.1 mL anesthesia.

withstand plunger pressure. The clinician primes the needle by extruding a small amount of filler from its tip. Standing on one side of the patient, the clinician injects filler inferior and medial to the fold by inserting the needle at a 30-degree angle to the hub, toward the ala. The needle is then slowly withdrawn as the clinician injects a linear thread of filler in the mid to deep dermis with steady plunger pressure. The second injection is administered in the same manner, about 1 cm superior to the first. A third injection, 1 cm above the second, uses the fanning technique to distribute filler evenly by redirecting the needle inferiorly and medially before being fully withdrawn. The fanning can be repeated if more filler is needed.

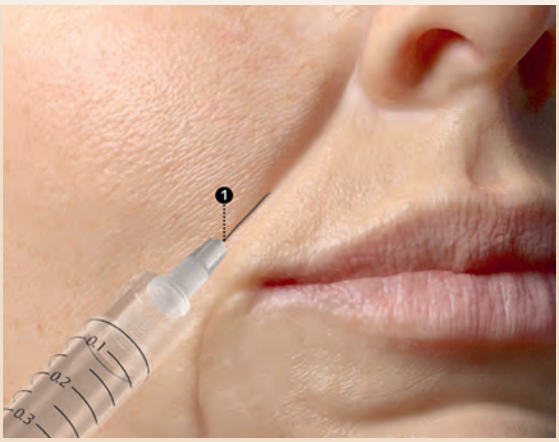
After moistening the skin with water, the clinician applies intraoral skin compression and/or stretches the skin between finger and thumb to even out the injected filler product. This often results in additional swelling/bruising. The clinician then moves to the other side of the patient and repeats the procedure on the contralateral fold.

Expected duration of results

- An additional dermal filler treatment (0.4 to 0.8 mL) may be required for static nasolabial folds.
- For dynamic folds, the additional treatment may be combined with botulinum toxin injections, particularly in cases of deep nasolabial folds.
- The longevity of the treatment results for nasolabial folds depends on the filler agent used, but averages approximately 6 to 9 months.

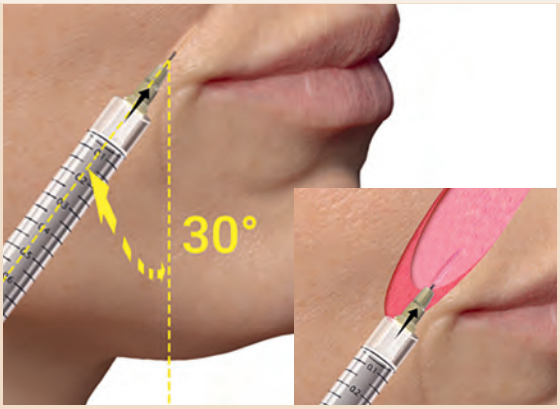
Figure 8-1 demonstrates the step-by-step technique for nasolabial folds, and Fig 8-2 demonstrates a case example.

STEP 2 Locate the first injection site

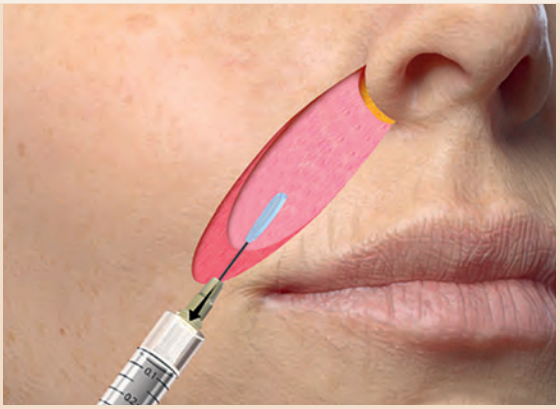


- Find the inferior aspect of the nasolabial fold.
- The first injection point will be made just medial to the fold line.

STEP 3 Make a linear thread injection

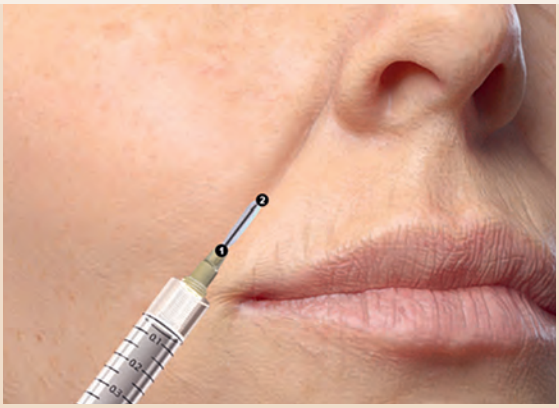


- Insert the needle at a 30-degree angle to the skin, directing it toward the ala, and advance it to the hub.



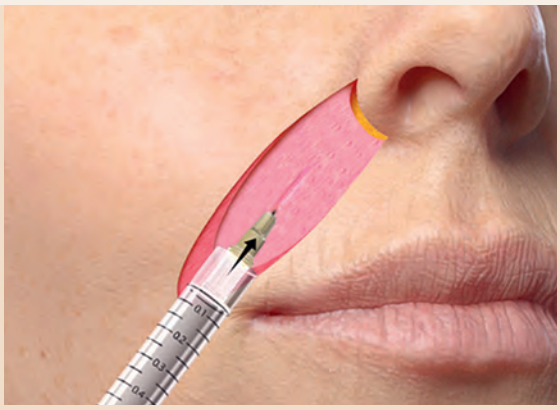
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid to deep dermis.

STEP 4 Locate the second injection site



- The location of the second injection point is approximately 1 cm superior to the first injection point.
- To measure the distance, place the hub of the needle on the first injection point.
- The tip of the needle is the approximate site of the second injection.

STEP 5 Make a linear thread injection



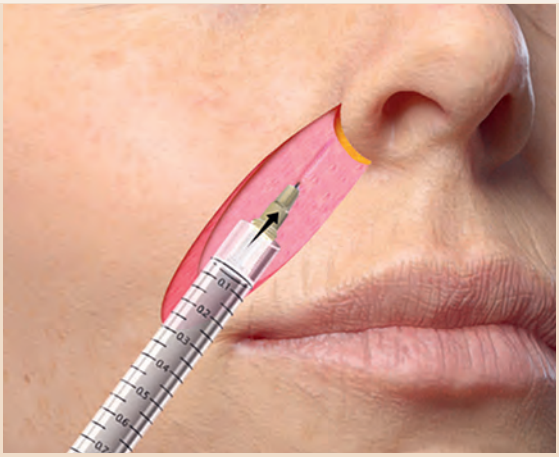
- Insert the needle at a 30-degree angle to the skin and advance it to the hub.

- Inject a second linear thread of filler in the mid to deep dermis.

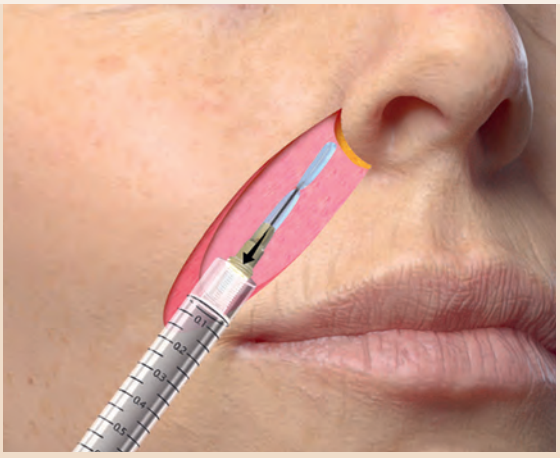
STEP 6 Locate the third injection site

- The location of the third injection point is 1 cm superior to the second injection point.

STEP 7 Make a linear thread injection



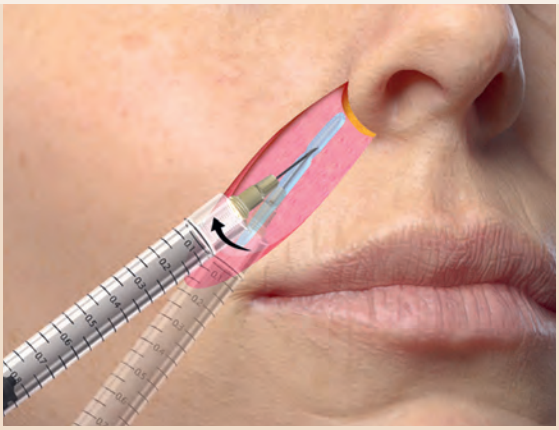
- Inject a third linear thread of filler in the mid to deep dermis.



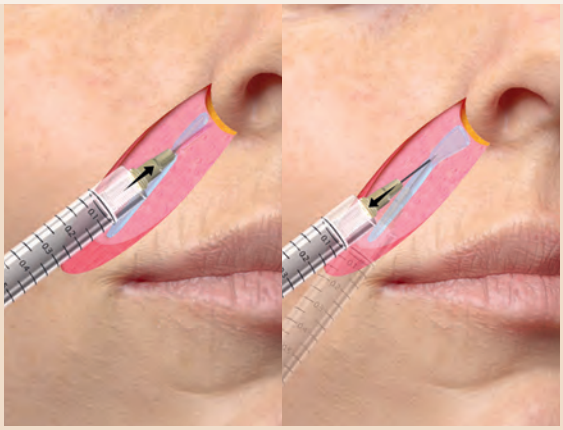
- Do not fully withdraw the needle.

STEP 8

Make the fanning injections



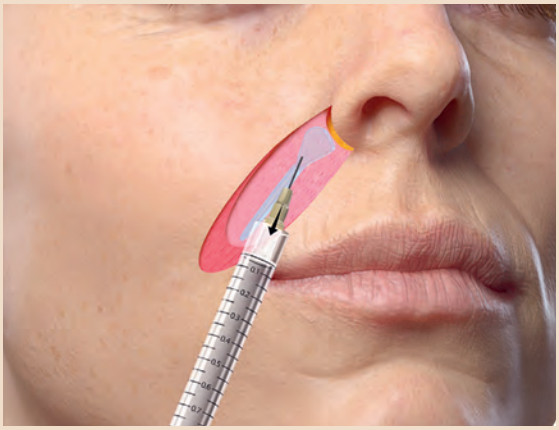
- After the third linear thread injection, redirect the needle inferiorly and medially at a small angle.



- Inject dermal filler adjacent to the third linear thread.

- Without fully removing the needle, redirect it again superiorly and distally at a small angle.

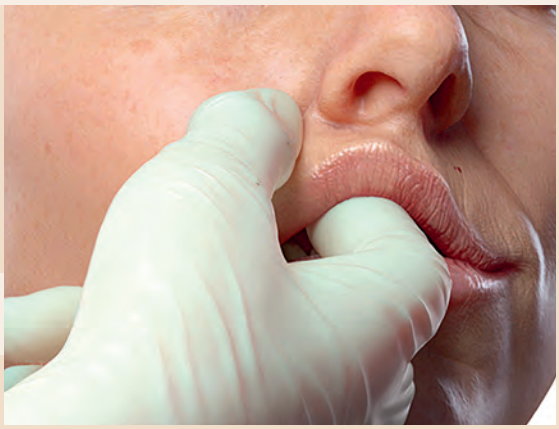
- Inject dermal filler adjacent to the linear thread.



- Repeat until filler is distributed evenly and the desired correction is achieved.

STEP 9 **Compress the treatment area**

- Place the thumb on the skin and the first finger in the mouth and compress the treatment area to smooth any visible bumps or palpable lumps of dermal filler.
- If necessary, moisten the area with water and use your fingers to stretch and manipulate the filler.



STEP 10 **Repeat on the contralateral side**

- Repeat steps 2 to 9 on the contralateral side of the face.

Case 1

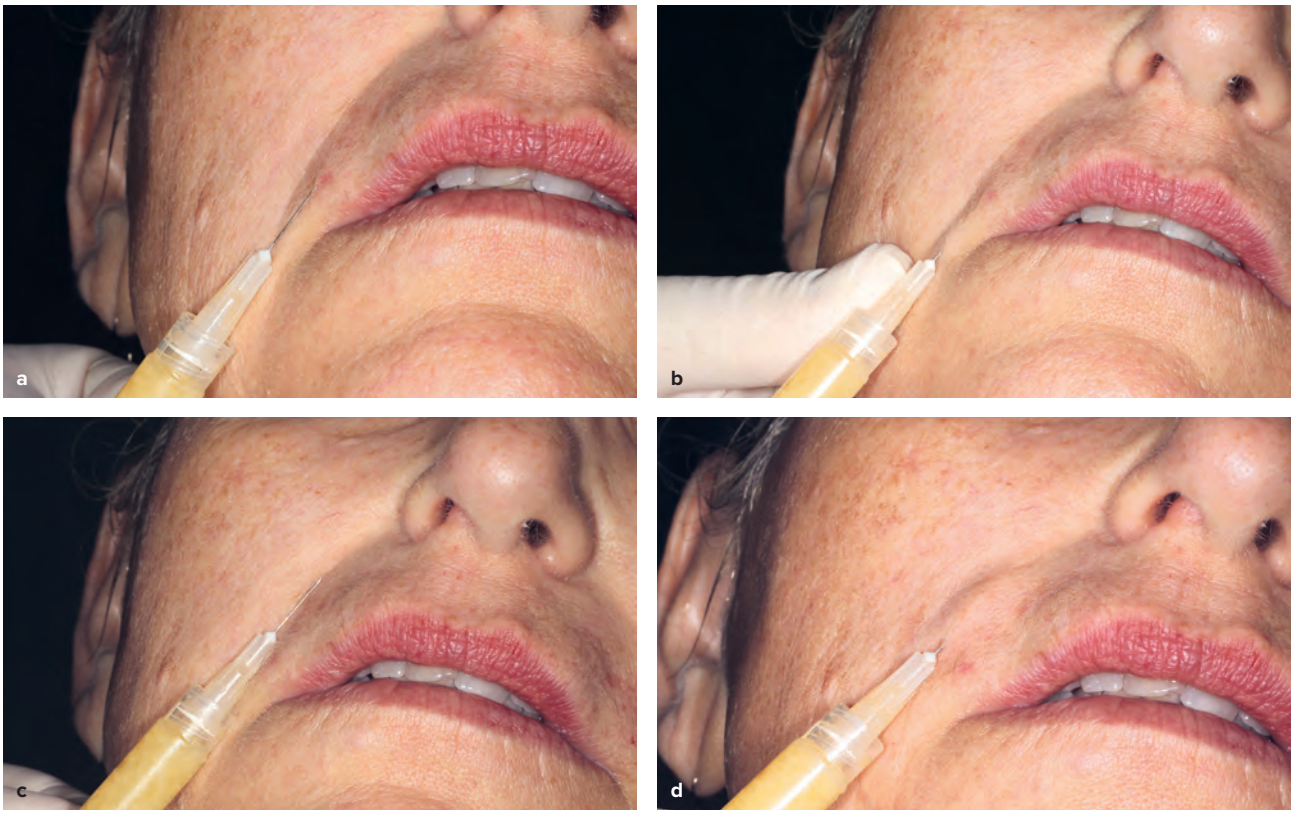


FIG 8-2 Case 1. *(a)* To locate the first injection point, the needle is placed over the fold. The first injection is made at the hub. *(b)* A linear thread injection is made. The path of the needle must follow the fold. *(c)* The second injection point is again located according to the hub of the needle. *(d)* Another linear thread injection is made, again with the path of the needle following the fold.

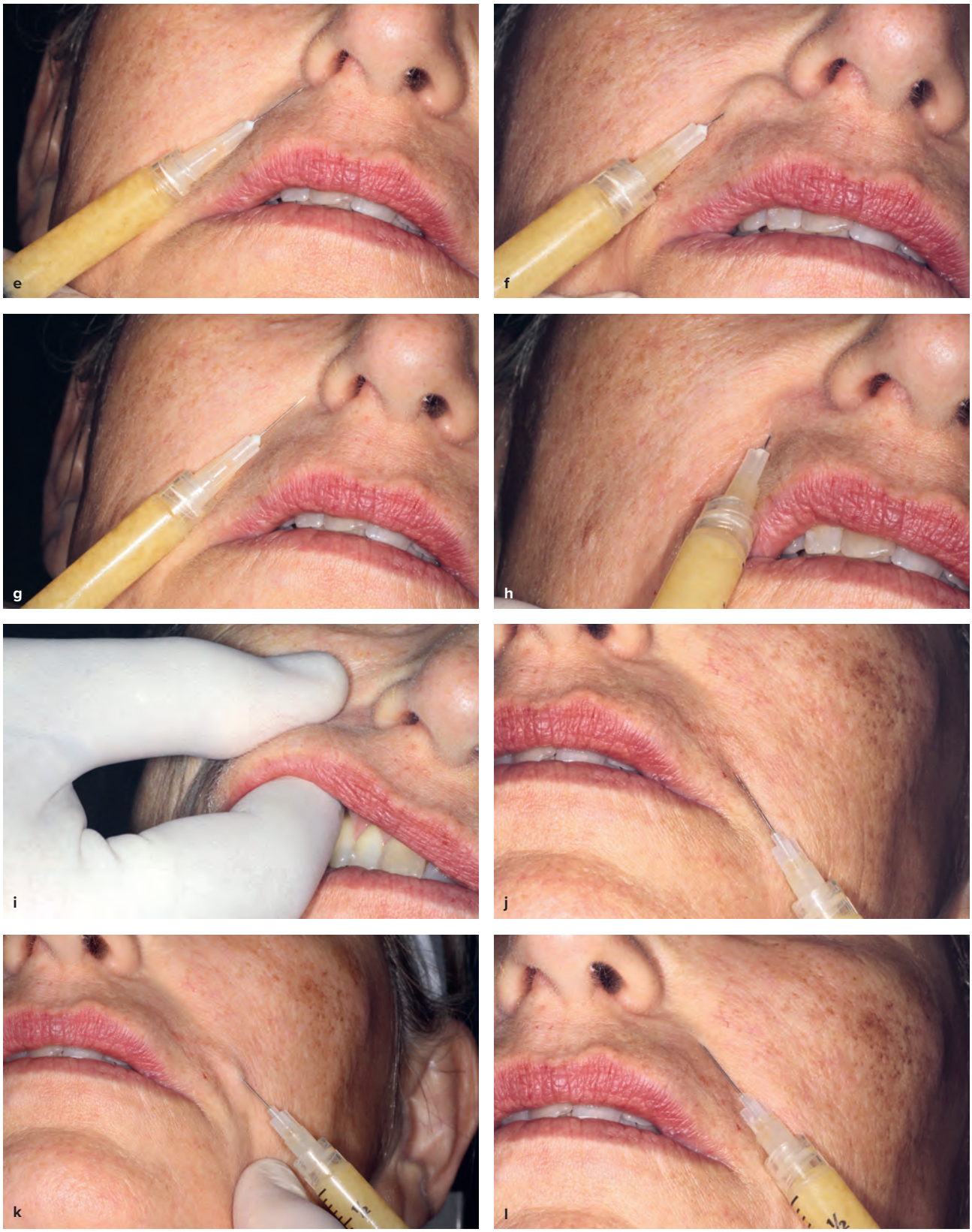


FIG 8-2 *(CONT)* *(e to h)* For the most superior section of the fold nearest to the nose, a fanning injection is used. *(i)* At the end of the injection procedure, a compressive massage is performed to spread the filler uniformly throughout the area of the fold. *(j)* The same protocol is used to treat the contralateral fold. To locate the first injection point, the needle is placed over the fold. The first injection is made at the hub. *(k)* A linear thread injection is made. The path of the needle must follow the fold. *(l)* The second injection point is again located according to the hub of the needle.

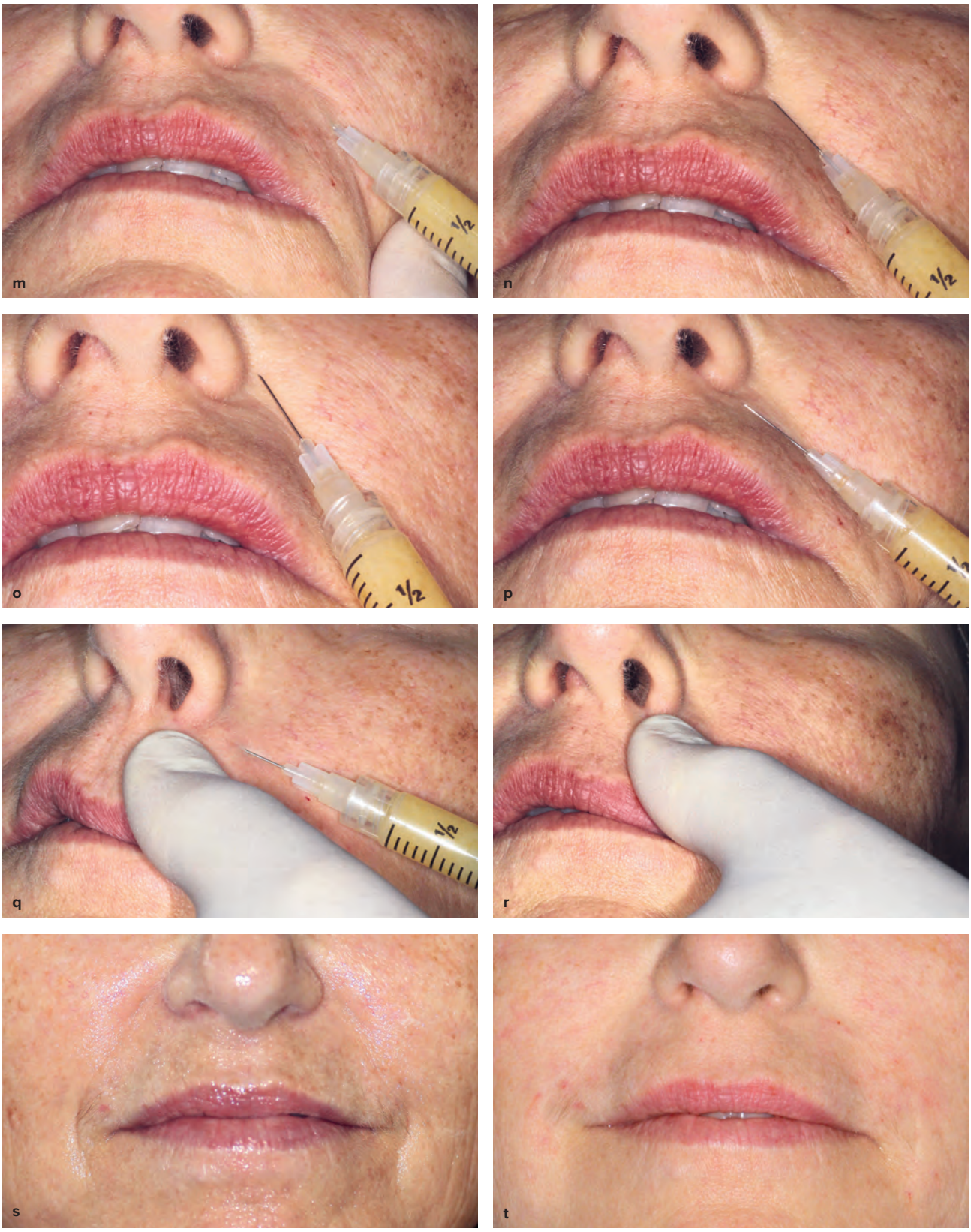


FIG 8-2 *(CONT)* *(m)* Another linear thread injection is made, again with the path of the needle following the fold. *(n to p)* For the most superior section of the fold nearest to the nose, a fanning injection is used. *(q)* An additional small amount of filler is injected to complete the procedure. *(r)* At the end of the injection procedure, a compressive massage is performed to spread the filler uniformly throughout the area of the fold. *(s)* Pretreatment view. *(t)* Immediately after injection.

MARIONETTE LINES

Marionette lines descend toward the jaw from the oral commissures or corners of the mouth, where the upper and lower lips meet. They are caused by dermal atrophy and reduction in skin elasticity, soft tissue volume, and mandibular bone volume (through resorption). Other causes include descent of fat from the midcheek area and hyperdynamic action of the muscles in the lower facial region.

Indications and contraindications

- Excessive contraction of the depressor anguli oris muscles facilitates development of marionette lines in some patients. In such cases, botulinum toxin treatment of the depressor anguli oris muscles may be indicated to complement dermal filler treatment for wrinkle reduction.
- Restoring the volume deficit of an extended mental crease can help to reduce marionette lines in patients requiring both procedures.
- Moderate to severe volume deficits can be treated using two types of filler via layering: Deep volume loss is addressed by a filler designed for structural support, while surface wrinkles are diminished via a more fluid and supple filler.
- Associated esthetic challenges of the lower face include not only marionette lines but also oral commissures, both of which can be treated effectively with dermal fillers.
- The look of sorrow associated with marionette lines makes the lateral lower lip a common target for dermal filler rejuvenation. As a result, the clinician must understand filler volume requirements and needle injection techniques for both areas.

Anesthesia and filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 0.6 mL)
- 30-gauge, 0.5-inch needle
- A topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base (optional)
- Suggested dermal fillers:
  - Juvéderm Ultra
  - Juvéderm Volbella
  - PRP
  - Autologous fat transfer (AFT)
- Suggested quantity of fillers:
  - Mild lines: 0.8 mL
  - Moderate lines: 1.6 mL
  - Severe lines: 2.4 mL

Precautions

- Sensitivity to pain increases as the lip is approached.
- Dermal overtreating or overfilling can cause unwanted contour changes for the lateral upper lip, vascular damage, or necrosis.

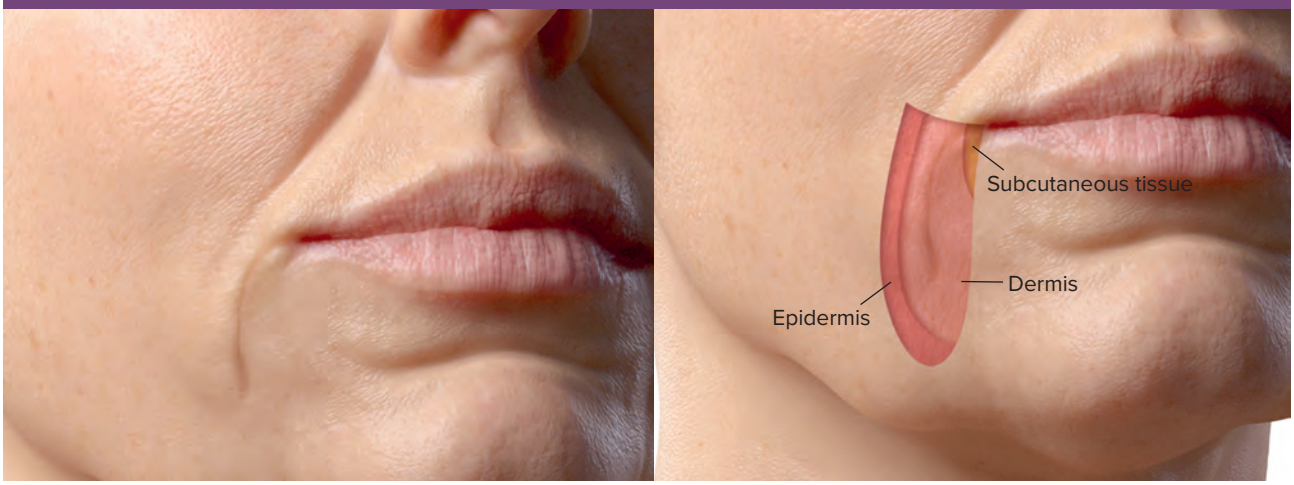
Anesthesia technique

Alcohol pads are used to clean the skin over and around the marionette lines in preparation for anesthesia, which is administered bilaterally. Beginning inferiorly, six 0.1-mL injections of buffered 2% lidocaine-epinephrine solution are given subcutaneously. Alternatively, a topical anesthetic can be applied in patients who have low sensitivity to pain. Allow 5–10 minutes for the anesthesia to take effect.

Dermal filler injection technique

The patient is reclined at a 60-degree angle, and the marionette line area is cleaned with alcohol. A 30-gauge, 0.5-inch needle is firmly attached to a prefilled dermal filler syringe. Standing on one side of the patient, the clinician primes the needle by extruding a small amount of filler from its tip. The point of needle insertion is located by laying it atop the skin parallel and medial to the marionette line, with the tip of the needle 1 mm inferior to the lower lip. The needle hub marks the needle insertion point. The clinician inserts the needle superiorly toward the lower lip at a 30-degree angle to the skin and slowly advances it all the way to the needle hub. The needle is then slowly withdrawn as the clinician injects a linear thread of filler, mid to deep dermis, with steady plunger pressure. Before the needle is fully withdrawn, additional filler is delivered using the medial fanning technique. For this technique, the clinician redirects the needle medially several times with slight changes in angle, advancing to the hub each time to place dermal filler evenly. This process is repeated as needed to address line volume deficits, with two to three medial fanning injections made inferiorly at 1-cm distances.

FIG 8-3 Step-by-step procedure for marionette lines



Next, the clinician prepares to make a lateral fanning injection slightly inferior to the lower lip border. Again, to locate the point of insertion, the clinician rests the needle atop the skin slightly parallel and inferior to the lower lip, with the tip of the needle reaching 1 mm medial to the marionette line. Here again, the needle hub indicates the point of injection. After inserting the needle at a 30-degree angle to the skin, the clinician moves it toward the lip corner, fanning inferiorly once the needle is advanced to its hub. The clinician places as many as three fanning injections on each side along the length of the line. A final lateral fanning injection is then made, overlaying the most superior fanning injection.

After moistening the skin with water, the clinician uses intraoral skin compression and/or stretches the skin between finger and thumb to even out the injected filler product. This often results in additional swelling/bruising.

The clinician then uses the same procedure to treat the marionette lines and commissures on the contralateral side of the face.

Expected duration of results

- An additional dermal filler treatment may be required for static marionette lines.
- For dynamic lines, the additional treatment may be combined with botulinum toxin injections, particularly in cases of deep marionette lines.
- The duration of treatment results for marionette lines depends on the filler agent used, but averages approximately 6 to 9 months.

Figure 8-3 demonstrates the step-by-step technique for marionette lines.

STEP 1 Administer anesthesia

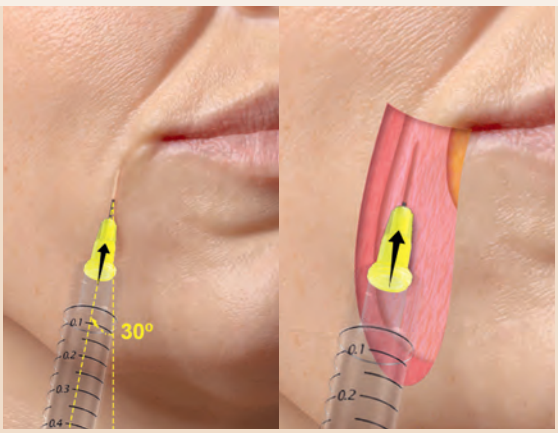
Each dot indicates 0.1 mL anesthesia.

- Before starting, an 18-gauge, 1.5-inch needle is used to draw 1.0 mL buffered 2% lidocaine-epinephrine into a 1.0-mL syringe; the needle is then removed and replaced with a 30-gauge, 0.5-inch needle.
- Use alcohol to clean the skin over and around the marionette line on one side of the face.
- Inject 0.1 mL buffered 2% lidocaine-epinephrine solution subcutaneously around the marionette line using a 30-gauge, 0.5-inch needle.
- Move to the other side and repeat.
- Allow 10 minutes for the anesthesia to take effect.

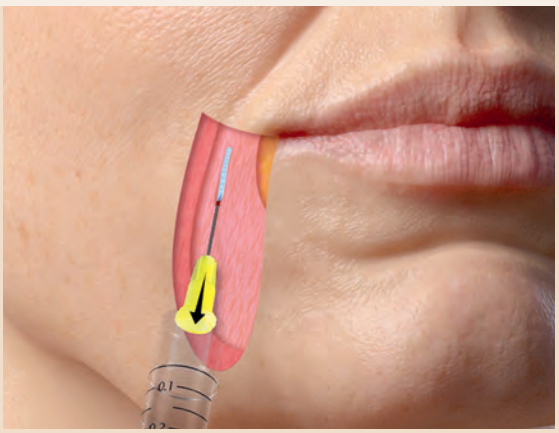
STEP 2 Locate the first injection site

- Find the superior aspect of the marionette line.
- Lay the needle on the skin parallel and just medial to the marionette line with the needle tip 1 mm below the lip line.
- The first injection point is at the needle hub.

STEP 3 Make a linear thread injection



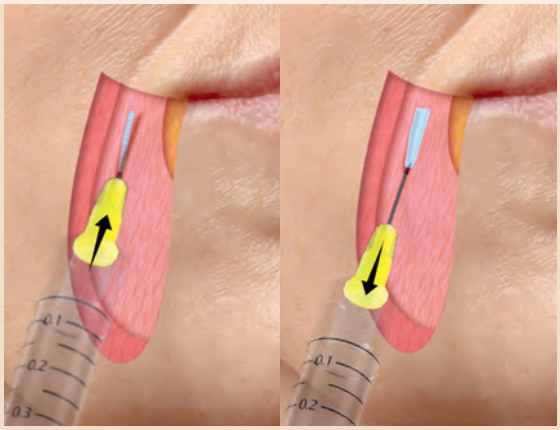
- Insert the needle at a 30-degree angle to the skin, directing it superiorly toward the lip, and advance it to the hub.



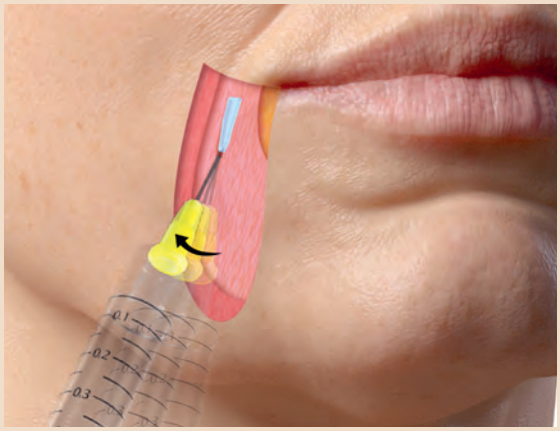
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid to deep dermis. Do not fully withdraw the needle.

STEP 4 Apply the fanning technique

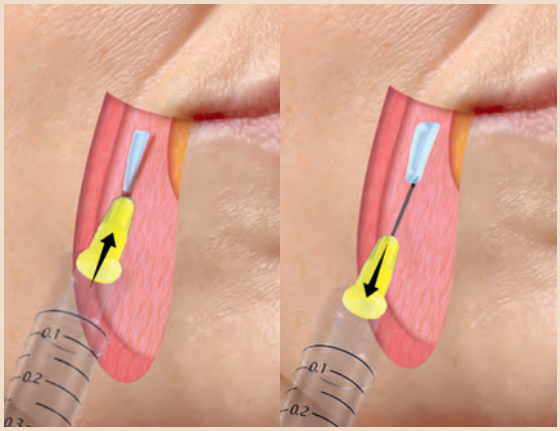
- Re-angle and redirect the needle medially and advance to the hub.



- Inject a linear thread in the mid to deep dermis. Continue the fanning injection until the desired correction is achieved.
- Ensure that the dermal filler placements are contiguous.



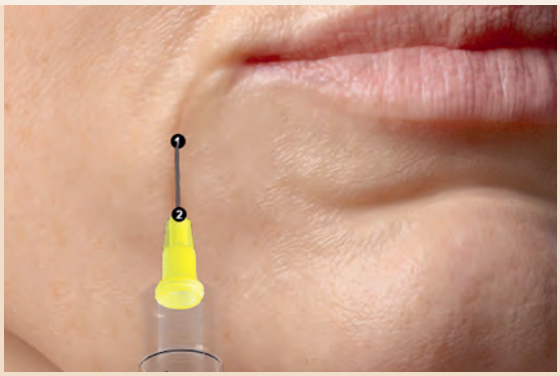
- Re-angle and redirect the needle medially and advance to the hub.



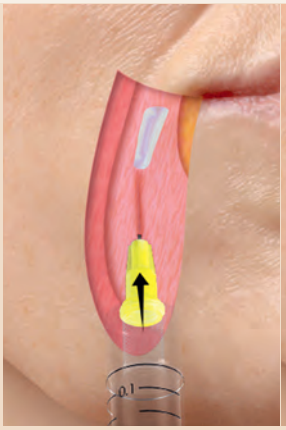
- Inject a linear thread in the mid to deep dermis. Continue the fanning injection until the desired correction is achieved.
- Ensure dermal filler placements are contiguous.

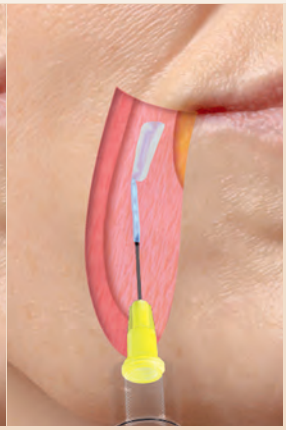
STEP 5 Locate the second injection site

- The second injection point is approximately 1 cm inferior to the first injection point.
- To measure the distance, lay the needle on the skin with the tip on the first injection point.
- The hub of the needle is the approximate site of the second injection.

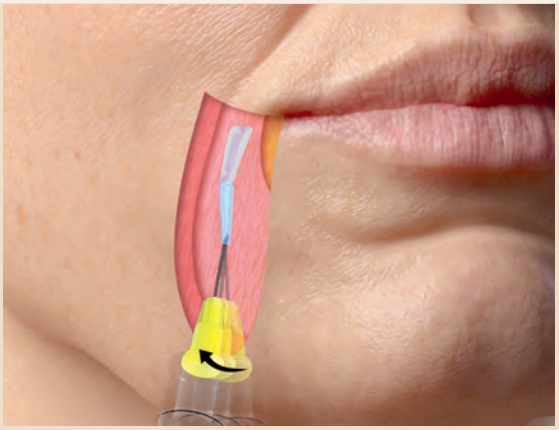


STEP 6 Repeat the linear thread injection and follow with the fanning technique



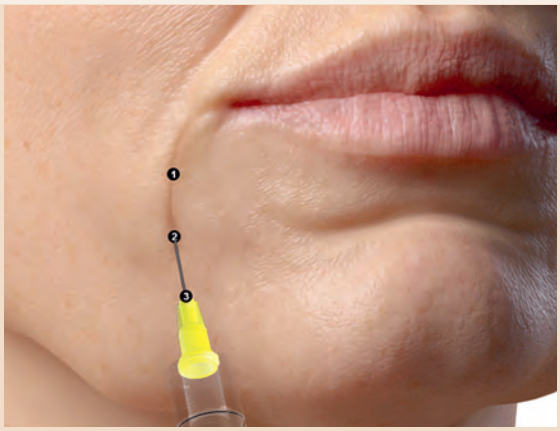


- Insert the needle at a 30-degree angle to the skin, directing it superiorly toward the lip, and advance it to the hub.
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid to deep dermis. Do not fully withdraw the needle.



- Re-angle and redirect the needle medially and advance to the hub.
- Inject a linear thread in the mid to deep dermis. Continue the fanning technique until the desired correction is achieved.
- Ensure that the dermal filler placements are contiguous.

STEP 7 Locate the third injection site

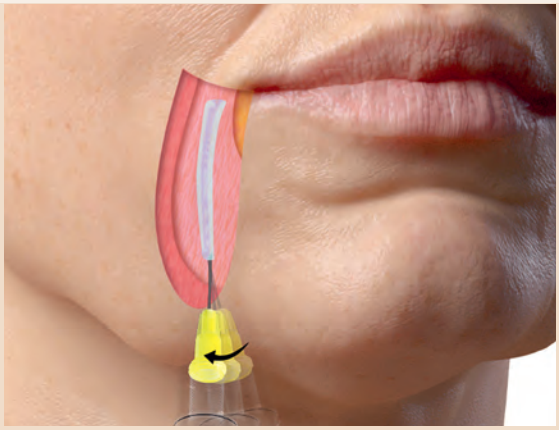


- The location of the third injection point is 1 cm inferior to the second injection point.

STEP 8

Repeat step 6

- Insert the needle at a 30-degree angle to the skin, directing it superiorly toward the lip, and advance it to the hub.
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid to deep dermis. Do not fully withdraw the needle.
- Re-angle and redirect the needle medially and advance to the hub.
- Inject a linear thread in the mid to deep dermis.
- Continue the fanning technique until desired correction is achieved.
- Ensure that the dermal filler placements are contiguous.



STEP 9

Compress the treatment area

- Place the thumb on the skin and the first finger in the mouth and compress the treatment area to smooth any visible bumps or palpable lumps of dermal filler.
- If necessary, moisten the area with water and use the fingers to stretch and manipulate the filler.

STEP 10

Move to the contralateral side and repeat

- Repeat steps 2 to 9 on the contralateral side of the face.

MENTAL CREASE

The mental or labiomental crease appears as a line just above the chin. It is caused by hyperdynamic action of muscles in the lower facial region, dermal atrophy, and diminished skin elasticity. Other contributors are loss of soft tissue volume as well as mandibular bone and alveolar process resorption.

Indications and contraindications

- Excessive contraction of the mentalis muscle facilitates development of a deep mental crease in some patients. In these cases, botulinum toxin treatment of the mentalis muscle is indicated to complement dermal filler treatment for crease reduction.
- Restoring the volume deficit of a chin area can help to reduce mental crease deficits in patients requiring simultaneous procedures.
- Moderate to severe volume deficits can be treated using two types of filler via layering: Deep volume loss

is addressed by a filler designed for structural support, while surface wrinkles are diminished via a more fluid and supple filler.
- Reduction of the mental crease is the aim of dermal filler treatment because the prominence of the crease intensifies with age.

Anesthesia and filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 0.3 mL)
- 30-gauge, 0.5-inch needle
- A topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base (optional)
- Suggested dermal fillers:
  - Belotero
  - Radiesse
  - Juvéderm
  - Restylane
  - PRP
- Suggested quantities of dermal filler:
  - Mild crease: 0.4 mL
  - Moderate crease: 0.8 mL
  - Severe crease: 1.6 mL

Precautions

- Sensitivity to pain in the chin area increases as injections move from the most lateral to the medial region.

Anesthesia technique

Alcohol pads are used to clean the skin over and around the mental crease in preparation for anesthesia. Three injections of 0.1 mL buffered 2% lidocaine-epinephrine, or a total volume of 0.3 mL, are given subcutaneously. Alternatively, a topical cream can be applied in patients who have low sensitivity to pain. Allow 5–10 minutes for the anesthesia to take effect.

Dermal filler injection technique

The patient is reclined at a 60-degree angle, and the crease area is cleaned with alcohol. A 30-gauge, 0.5-inch needle is firmly attached to a prefilled dermal filler syringe. Standing on one side of the patient, the clinician primes the needle by extruding a small amount of filler from its tip.

The initial injection point is the inferior/lateral section of the crease. It can be located by setting the needle atop the skin with the needle tip at the end of the crease; the needle hub marks the injection point. The clinician inserts the needle at a 30-degree angle to the skin and follows the outline of the crease superiorly and medially, all the way up to the needle hub. The needle is then slowly withdrawn as the clinician injects a linear thread of filler, mid to deep dermis, with steady plunger pressure. Next, the center of the crease is treated in the same fashion, beginning with a second injection immediately adjacent to the first.

The clinician moves to the other side of the patient to place the next injection on the opposite side of the patient's mental crease, beginning at the inferior lateral section and proceeding in the same fashion as the initial injection described above.

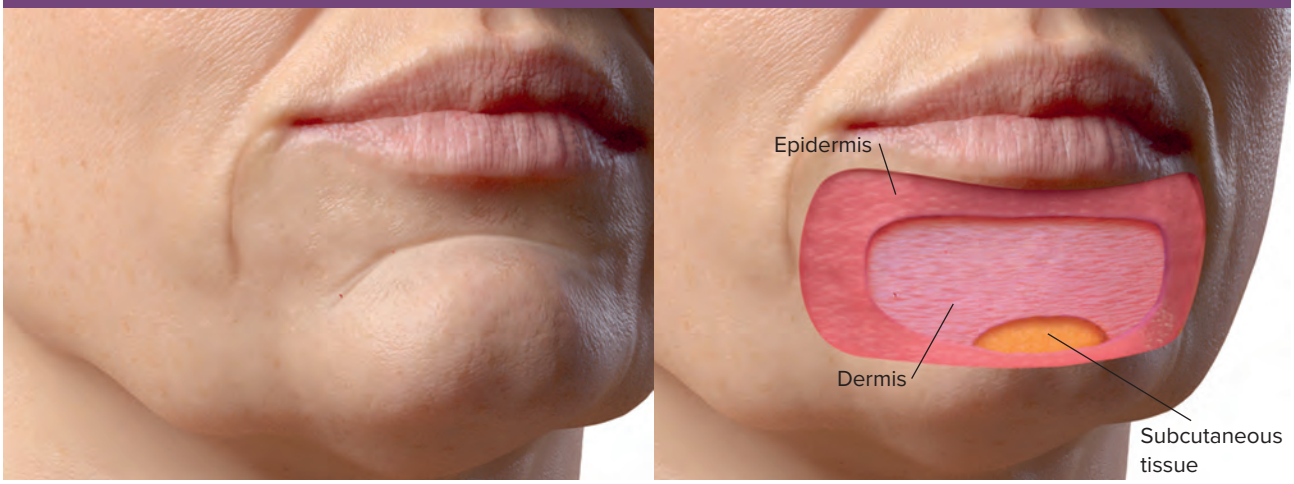
After moistening the skin with water, the clinician uses intraoral skin compression and/or stretches the skin between finger and thumb to even out the injected filler product. This often results in additional swelling/bruising.

Expected duration of results

- For static creases, an additional dermal filler treatment may be required.
- For dynamic creases, the additional treatment may be combined with botulinum toxin injections, particularly in cases of a deep mental crease resulting from hyperdynamic mentalis muscles.
- Ice or topical anesthesia should be used to help prevent distortion of tissue caused by lidocaine infiltration.
- The duration of treatment results for a mental crease depends on the filler agent used, but averages approximately 6 to 9 months.

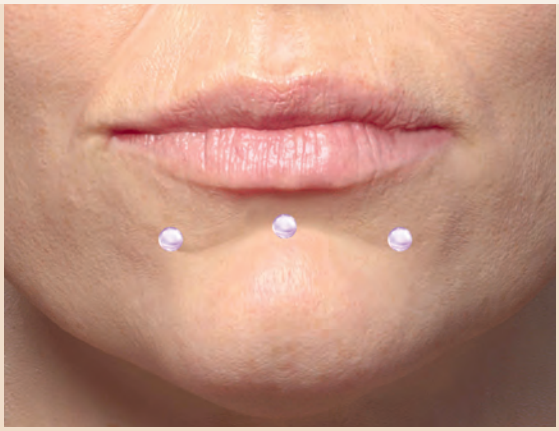
Figure 8-4 demonstrates the step-by-step technique for mental crease, and Fig 8-5 demonstrates a case example.

FIG 8-4 Step-by-step procedure for mental crease



STEP 1 Administer anesthesia

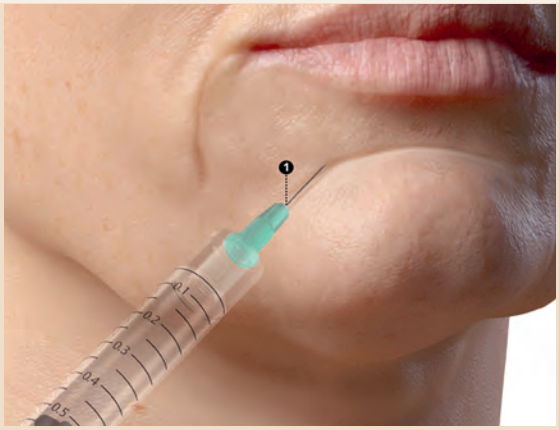
- Use alcohol to clean the skin over and around the mental crease.
- Inject 0.1 mL buffered 2% lidocaine-epinephrine solution subcutaneously using a 30-gauge, 0.5-inch needle.
- Allow 10 minutes for the anesthesia to take effect.



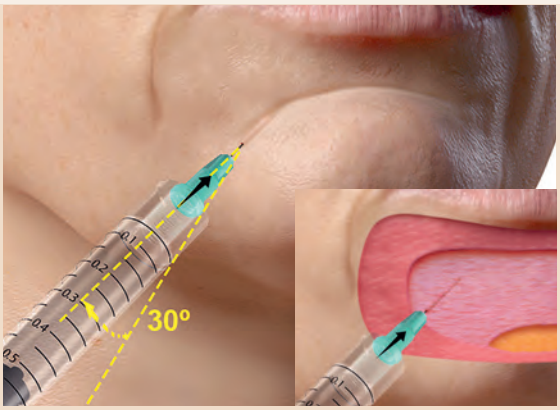
Each dot indicates 0.1 mL anesthesia.

STEP 2 Locate the first injection site

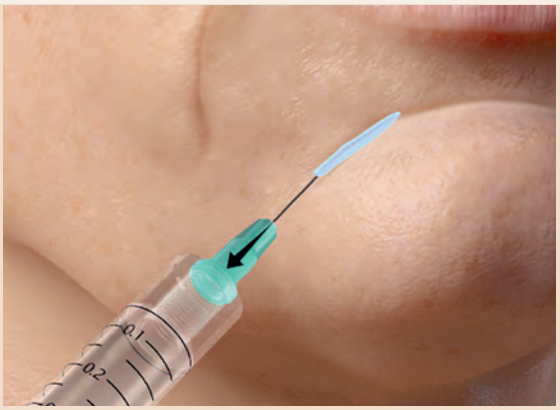
- Lay the needle on the skin with the tip at one end of the mental crease.
- The first injection point is at the needle hub.



STEP 3 Make a linear thread injection

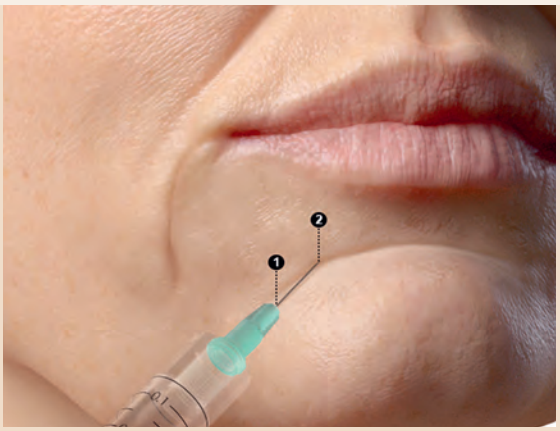


- Insert the needle at a 30-degree angle to the skin, following the contour of the mental crease, and advance to the hub.



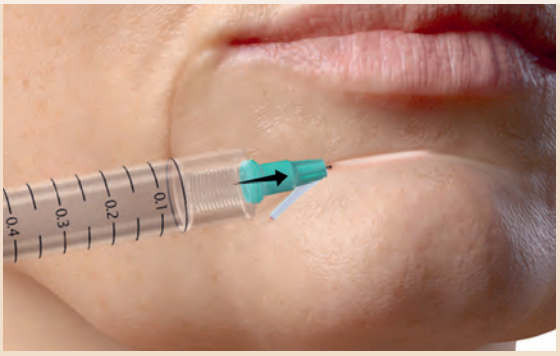
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid to deep dermis.

STEP 4 Locate the second injection site

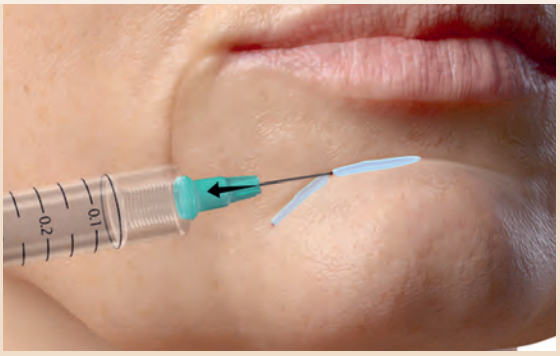


- The second injection point is approximately 1 cm superior and medial to the first injection point.

STEP 5 Make a linear thread injection



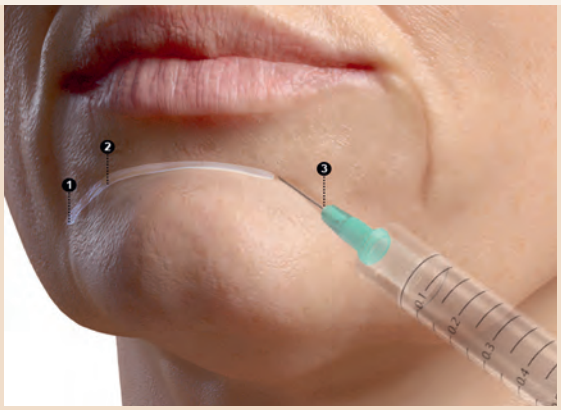
- Insert the needle at a 30-degree angle to the skin over the center section of the mental crease, and advance to the hub.



- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid to deep dermis. Repeat as needed.

STEP 6 Move to the contralateral side and locate the third injection site

- The third injection point is on the opposite side of the mental crease at the inferior lateral aspect.



STEP 7 Repeat step 3

- Insert the needle at a 30-degree angle to the skin, following the contour of the mental crease, and advance to the hub.
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid to deep dermis.

STEP 8 Compress the treatment area

- Place both thumbs on the chin and compress the treatment area to smooth any visible bumps or palpable lumps of dermal filler.
- If necessary, moisten the area with water and use the fingers to stretch and manipulate the filler.

Case 2

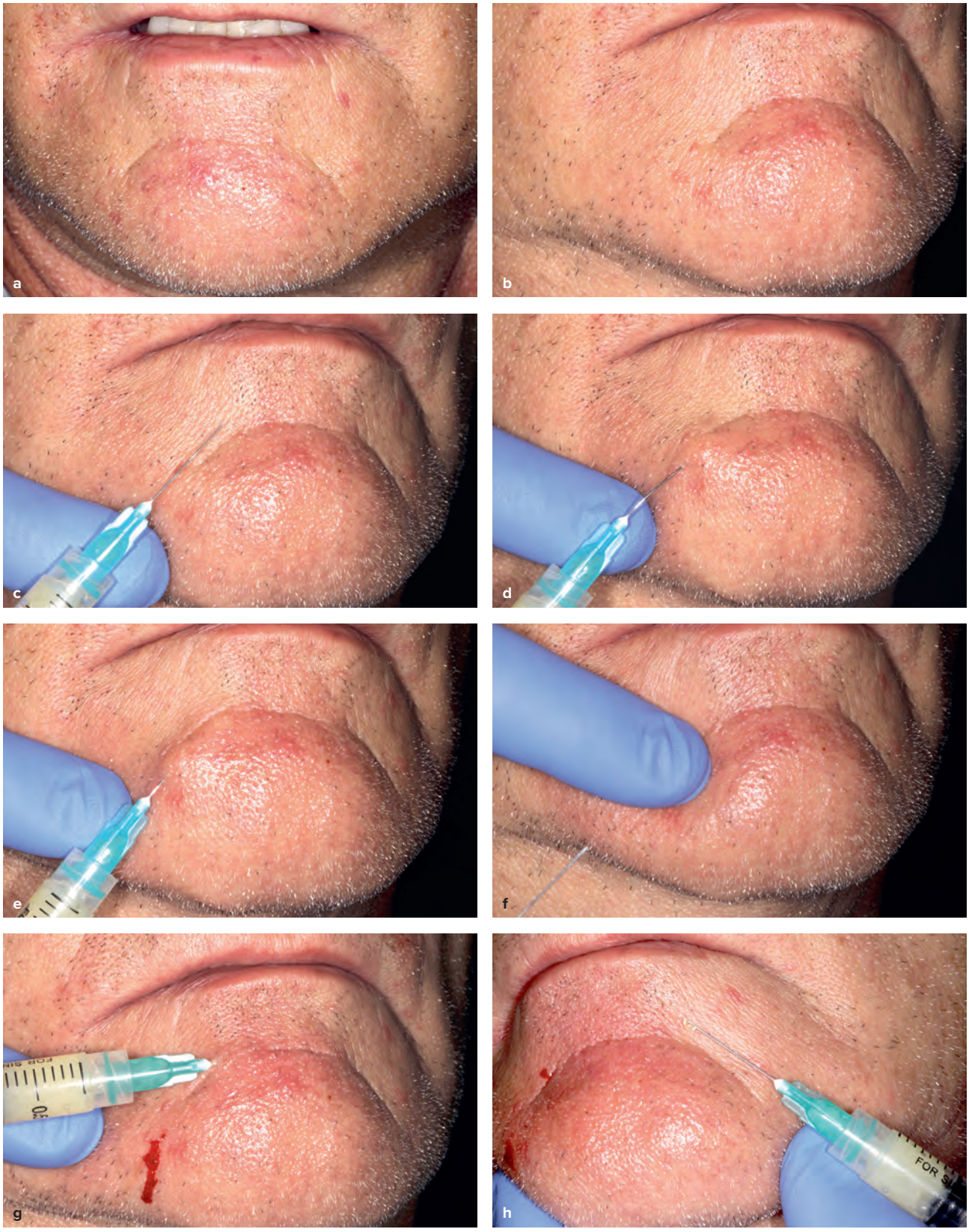


FIG 8-5 Case 2. *(a and b)* Pretreatment views. *(c)* To choose the injection point, measure the crease with the needle. *(d)* The needle path must follow the crease. *(e)* Using the linear thread technique, the filler is injected while the needle is being withdrawn (retrograde). *(f)* A compressive massage is performed to evenly spread the filler. *(g)* Complete another linear thread injection. *(h)* Measure the distance to the injection point with the needle.

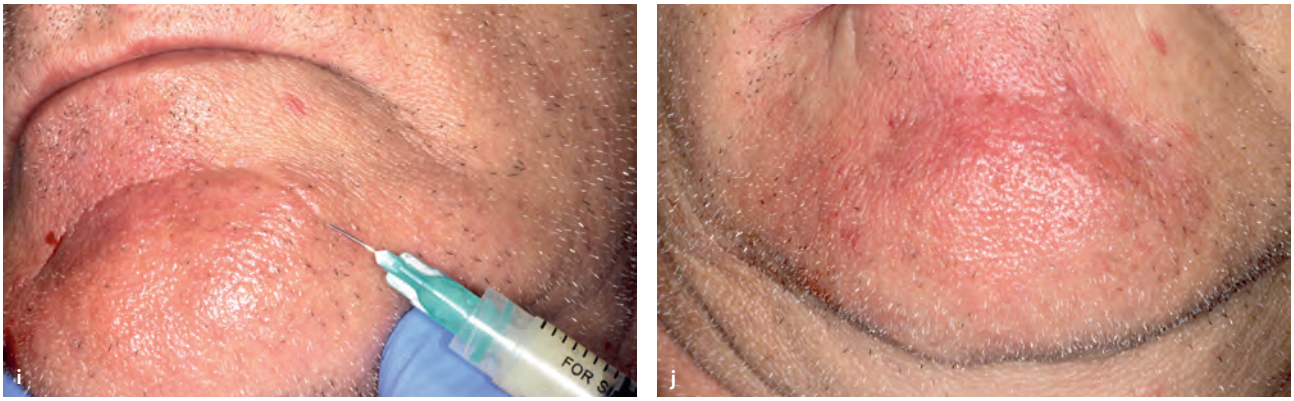


FIG 8-5 *(CONT)* *(i)* The filler is injected while withdrawing the needle (retrograde). *(j)* Posttreatment view.

CHIN AUGMENTATION

Chin augmentation is necessitated by contours of the chin that have become recessed or flattened, whether the chin is triangular (usually in women) or square (usually in men).

Indications and contraindications

- Anterior and lateral views of the patient's chin profile should be used to assess how dermal fillers might be used for chin augmentation. For example, the lower lip projection should be slightly beyond the most anterior projection of the rounded (not flat) chin.
- Dermal fillers can help to restore soft tissue reduction that has led to recession or flattening not only of the chin but also of the malar regions.
- Note that anesthesia consists of topical cream in addition to buffered 2% lidocaine-epinephrine solution.

Anesthesia and filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 0.1–0.2 mL)
- 30-gauge, 0.5-inch needle
- 27-gauge, 1.25-inch needle
- A topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base
- Triangular chins should receive one 0.1-mL injection of anesthesia; square chins require two 0.1-mL injections.
- Suggested dermal fillers:
  - Juvéderm Voluma
  - Restylane Lyft
  - PRP
- Mild recession and flattening of the chin typically requires a 0.6 to 0.8 mL volume of dermal filler.
- Moderate to severe chin recession and flattening requires a 1.3 to 1.5 mL volume of dermal filler.

Precautions

- Chin augmentation with dermal fillers should be avoided in patients whose chins are particularly small or recessed, as is often the case with micrognathia (mandibular hypoplasia), severe malocclusion, and craniofacial anomalies.
- Triangular chins should receive two fanning injections of filler in the deep dermis.
- Because excessive contraction of the mentalis muscle facilitates development of not only a deep mental crease but also chin flattening, botulinum toxin treatment of the mentalis muscle can complement dermal filler treatment for crease reduction and chin flattening.
- Restoring the volume deficit of a mental crease or an extended mental crease can help improve chin flattening conditions in patients requiring simultaneous procedures.
- Ice or topical anesthesia should be used to help prevent distortion of tissue caused by lidocaine infiltration.

Anesthesia technique

Alcohol wipes are used to clean the skin of the chin. For patients with a triangular chin, one subcutaneous injection of 0.1 mL buffered 2% lidocaine-epinephrine solution is given. For patients with a square chin, two subcutaneous injections of 0.1 mL buffered 2% lidocaine-epinephrine solution are given. A thin layer of topical cream anesthetic is then applied to the chin.

Dermal filler injection technique

The patient is reclined at a 45-degree angle, and the chin is cleaned with alcohol wipes. A 27-gauge, 1.25-inch needle is firmly attached to the dermal filler syringe. The clinician extrudes a small amount of filler via plunger pressure to prime the needle.

The injection point is at the midline, which can be located by positioning the needle hub slightly below the midpoint of the jaw with the needle lying over the skin and pointing toward the lower lip. The needle tip should reach the upper boundary of the chin. The injection point is at the hub of the needle. The needle is inserted at a 90-degree angle all the way through the dermis and muscle until it touches the bone. When that tap is felt, the needle is withdrawn approximately 1 mm, and a bolus of filler is injected. Once the first bolus of filler has been injected, the needle is partially withdrawn and re-angled distally. A second bolus of filler is deposited at the same depth as the first injection using the depot technique. The needle is again partially withdrawn and re-angled medially, and a third bolus of filler is injected subperiosteally using the depot technique.

If necessary to achieve esthetic balance, the needle can be re-angled again superolaterally and/or inferolaterally and additional boluses of filler injected subperiosteally using the depot technique.

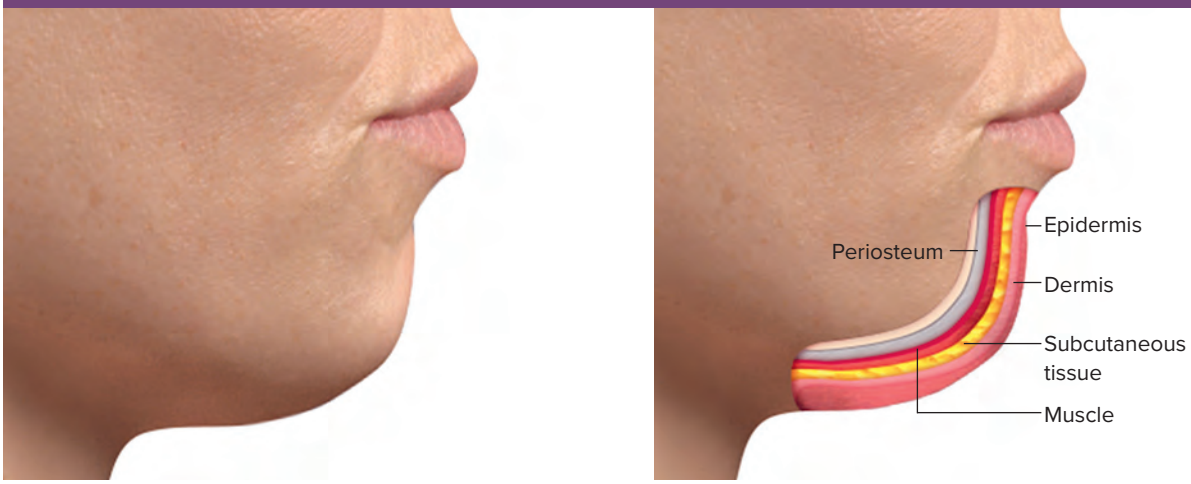
The clinician then applies pressure with the thumbs—medially, laterally, and around the outer boundaries of the chin—to even out any filler product beneath the skin that shows signs of poor, bumpy distribution. Areas that have not received any (or enough) filler product can be re-treated to achieve esthetic balance, but this time with simple linear threads via the same (or, if needed, an alternate) injection point, followed by additional thumb compression to ensure balanced product distribution.

Expected duration of results

- For chin augmentation asymmetries, follow-up treatment can include 0.2 to 0.3 mL of dermal filler injections.
- Mild recession and flattening of the chin typically requires a 0.6 to 0.8 mL volume of filler, whereas a moderate to severe chin recession and flattening requires a 1.3 to 1.5 mL volume of filler.
- Chin implants have been the typical treatment option for a recessed chin; however, a less invasive approach that uses dermal fillers with more structural support than those described in this chapter can achieve excellent results.

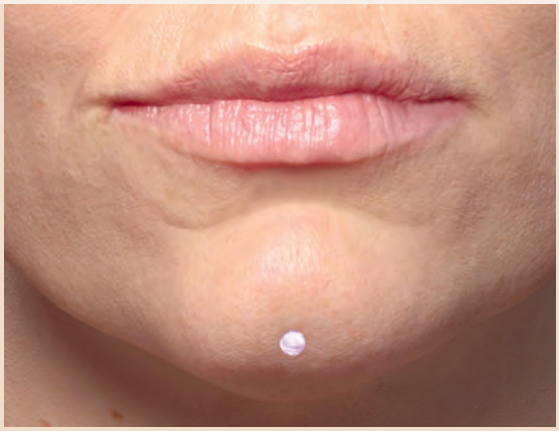
Figure 8-6 demonstrates the step-by-step technique for chin augmentation, and Figs 8-7 and 8-8 present clinical case examples.

FIG 8-6 Step-by-step procedure for chin augmentation



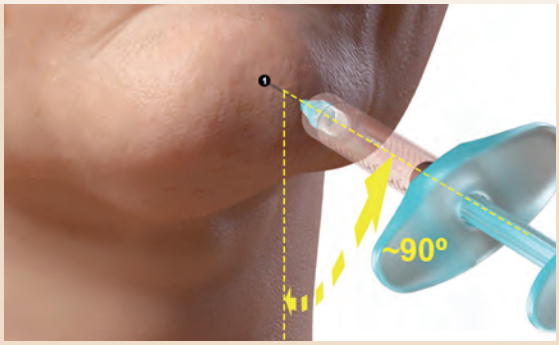
STEP 1 Administer anesthesia

- Use alcohol to clean the skin over and around the chin.
- Inject 0.1 mL (for triangular chins) or 0.2 mL (for square chins) buffered 2% lidocaine-epinephrine solution subcutaneously using a 30-gauge, 0.5-inch needle.
- Apply topical anesthetic cream to the skin over and around the chin area.
- Allow 15–30 minutes for the anesthetic to take effect.
- Use alcohol to remove the topical cream.



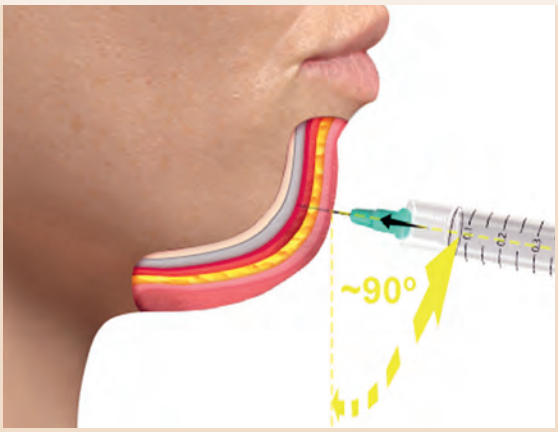
The dot indicates 0.1 mL anesthesia.

STEP 2 Locate the first injection site

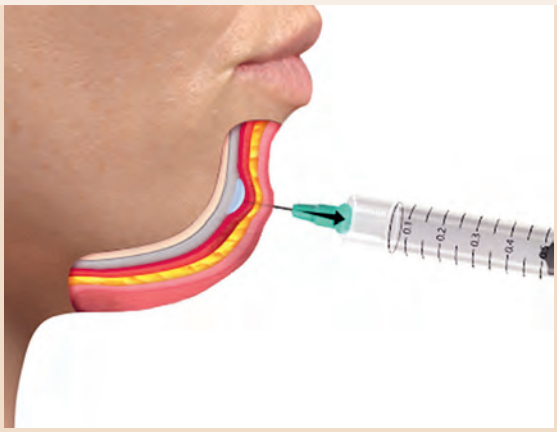


- Find the midline by holding the hub of the needle just below the midpoint of the jaw with the needle pointing toward the lower lip.
- The first injection point is at the needle hub.

STEP 3 Make a depot injection

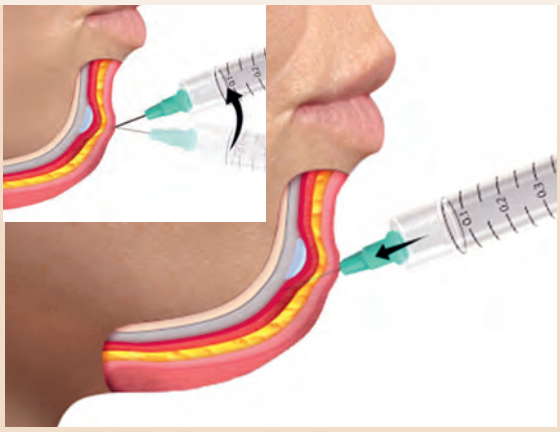


- Insert the needle and advance it through epidermis, dermis, and subcutaneous tissue. When you feel the bone, pull back about 1 mm.

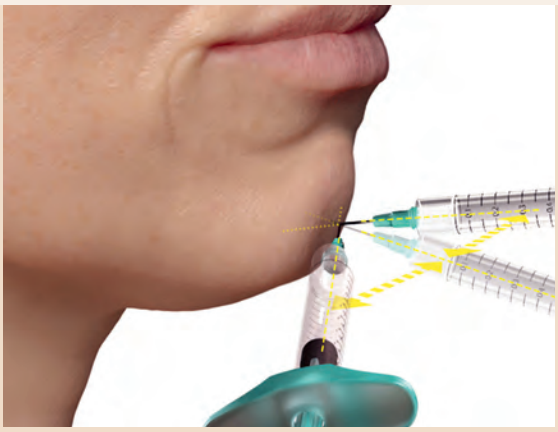


- Apply firm pressure and inject filler using the depot technique just above the periosteum. Do not fully withdraw the needle.

STEP 4 Make second and third depot injections



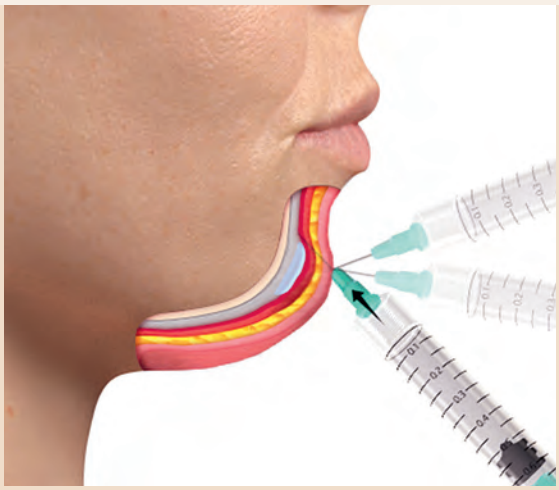
- Re-angle and direct the needle slightly distally and advance again all the way to the periosteum. Withdraw the needle approximately 1 mm, and inject a second bolus of filler at the same level as the first.



- Withdraw the needle slightly and re-angle it medially, then advance it to the periosteum. Withdraw the needle approximately 1 mm and inject a third bolus of filler at the same level as the first and second injections.

STEP 5

If necessary, make additional depot injections



- Re-angle the needle superiorly, inferiorly, supero-lateraly, and inferolaterally, and inject additional boluses of filler subperiosteally as needed using the depot technique.

STEP 6

Compress the treatment area

- Place the thumbs on the chin and apply pressure medially, laterally, and around the outer boundaries to even out any visible or palpable lumps of dermal filler.
- Areas that received insufficient filler can be re-injected with simple linear threads, using the same midline injection point or an alternate point, if needed.

Case 3

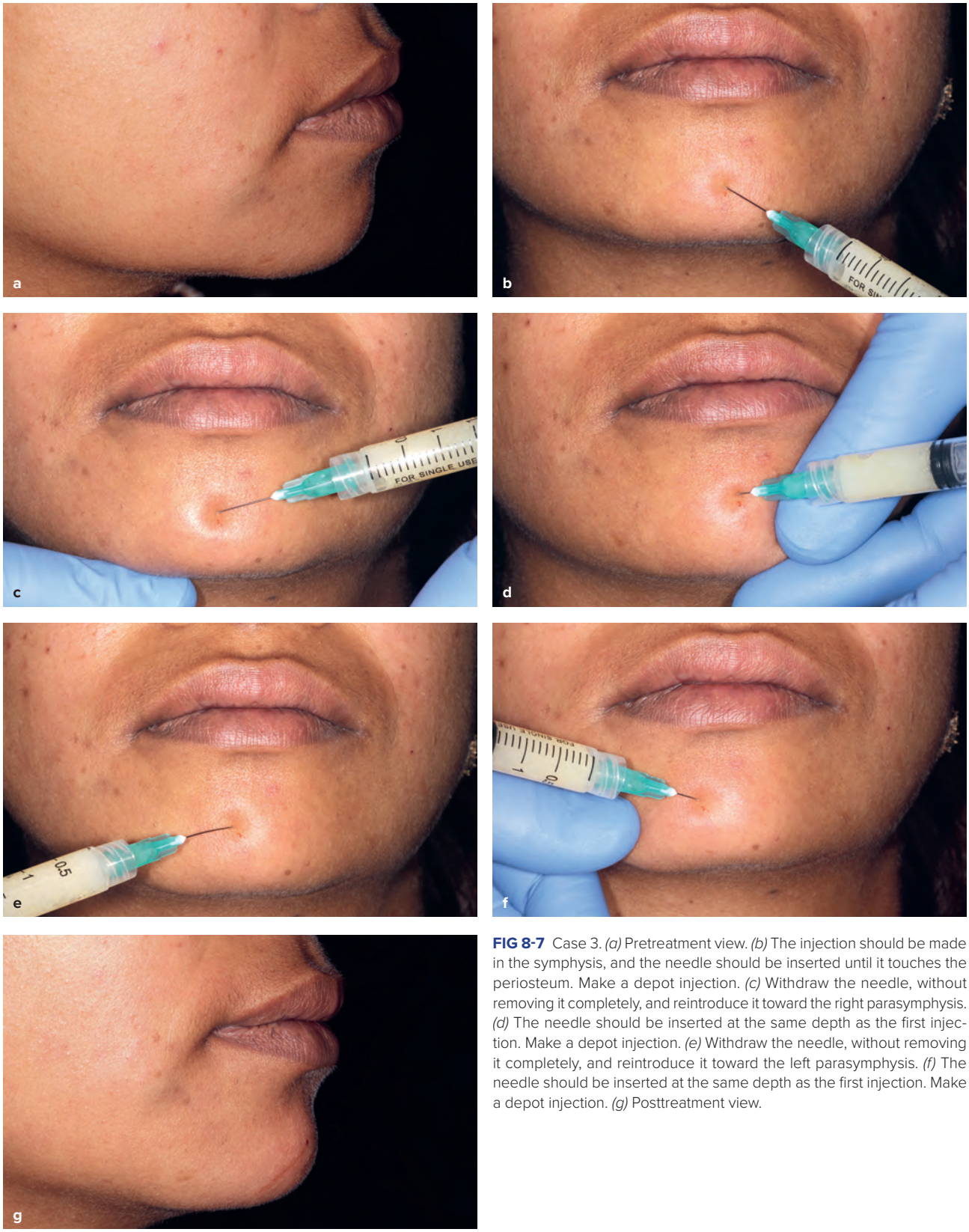


FIG 8-7 Case 3. *(a)* Pretreatment view. *(b)* The injection should be made in the symphysis, and the needle should be inserted until it touches the periosteum. Make a depot injection. *(c)* Withdraw the needle, without removing it completely, and reintroduce it toward the right parasymphysis. *(d)* The needle should be inserted at the same depth as the first injection. Make a depot injection. *(e)* Withdraw the needle, without removing it completely, and reintroduce it toward the left parasymphysis. *(f)* The needle should be inserted at the same depth as the first injection. Make a depot injection. *(g)* Posttreatment view.

Case 4

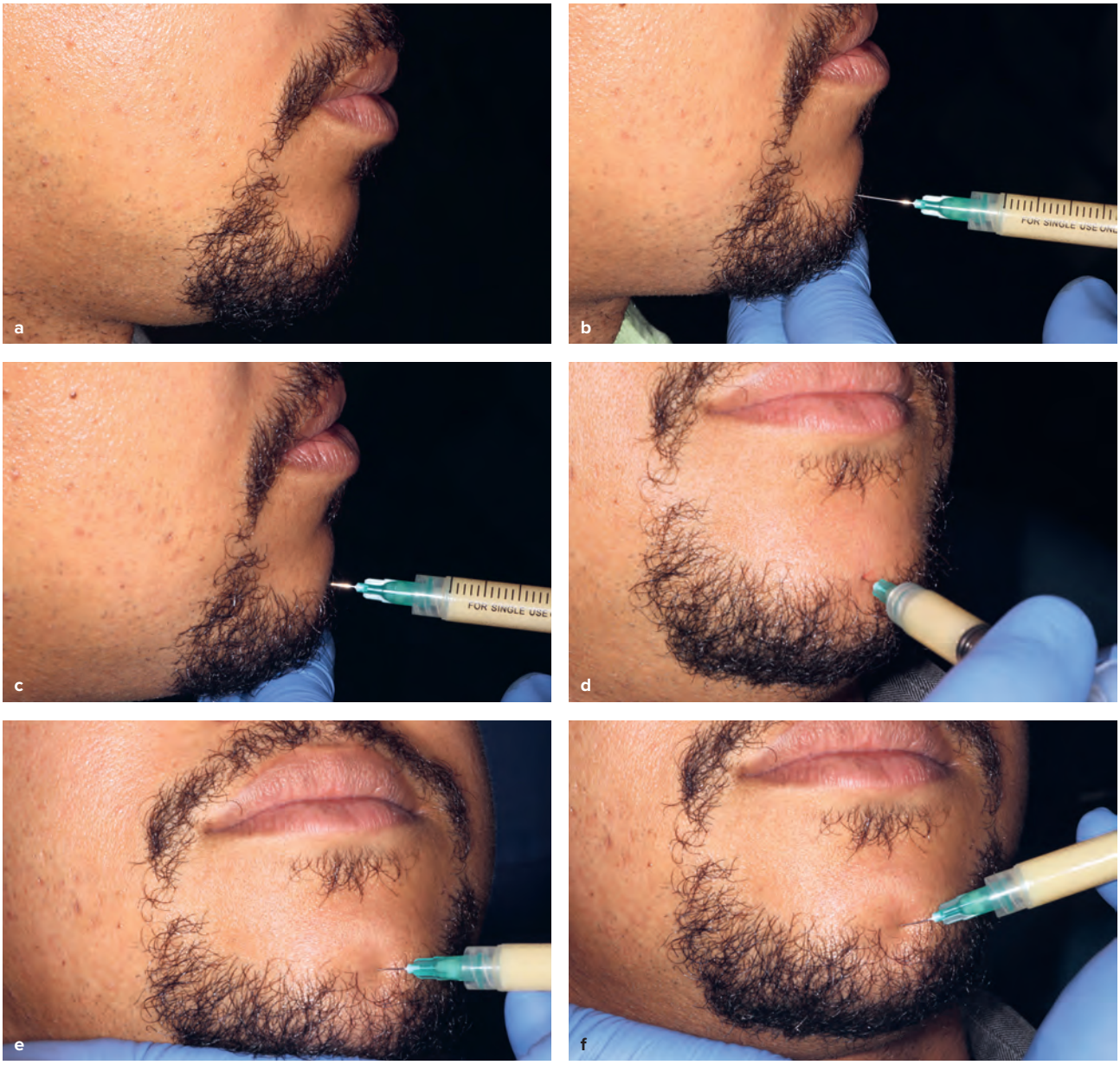


FIG 8-8 Case 4. *(a)* Pretreatment view. *(b)* The injection should be made in the symphysis. *(c)* The needle should be inserted until it touches the periosteum. *(d)* Using the depot technique, inject the appropriate amount to obtain the desired result. *(e)* Withdraw the needle, without removing it completely, and reintroduce it toward the right parasymphysis. *(f)* The needle was directed to the base for better distribution of the filler. The needle should be inserted at the same depth as for the first injection.

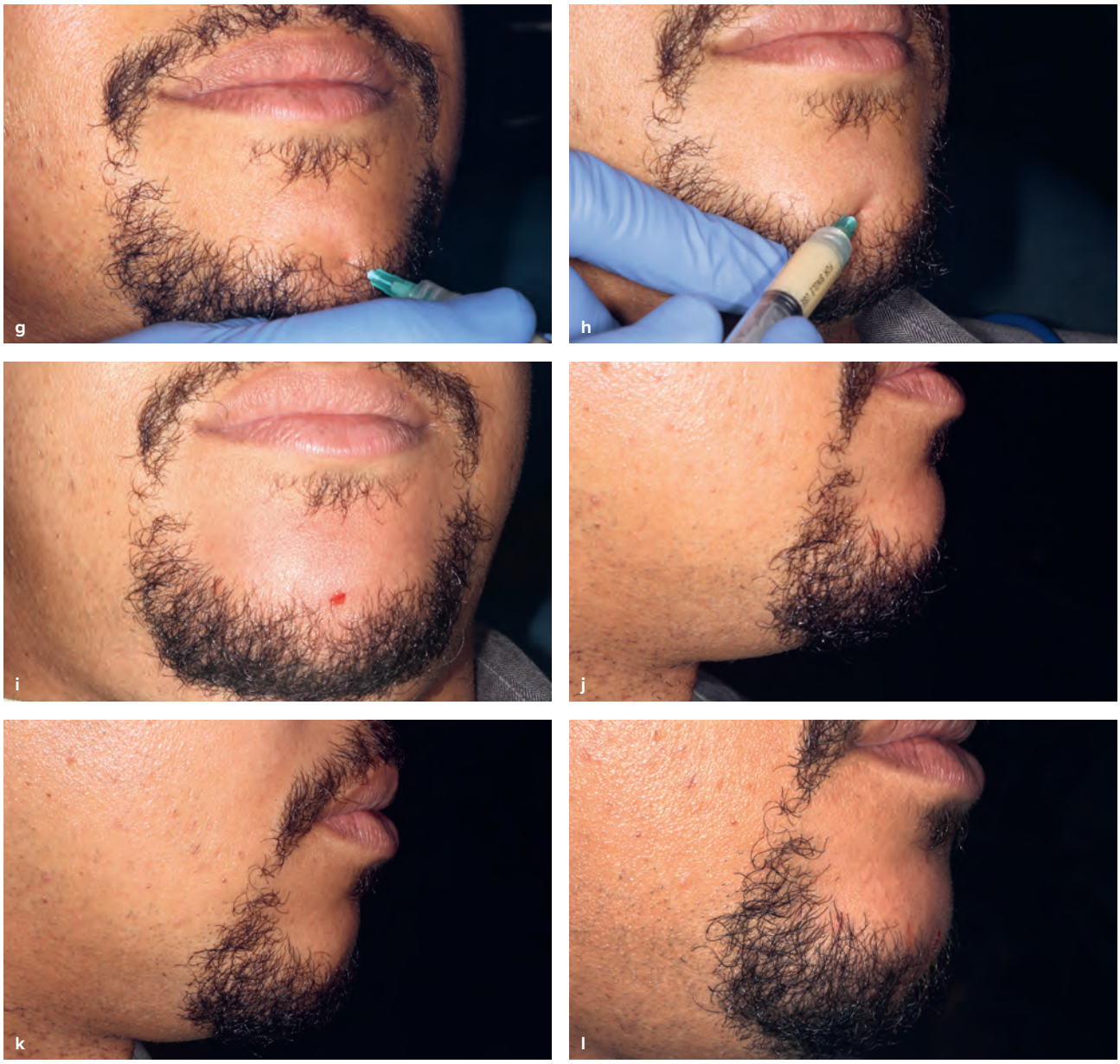
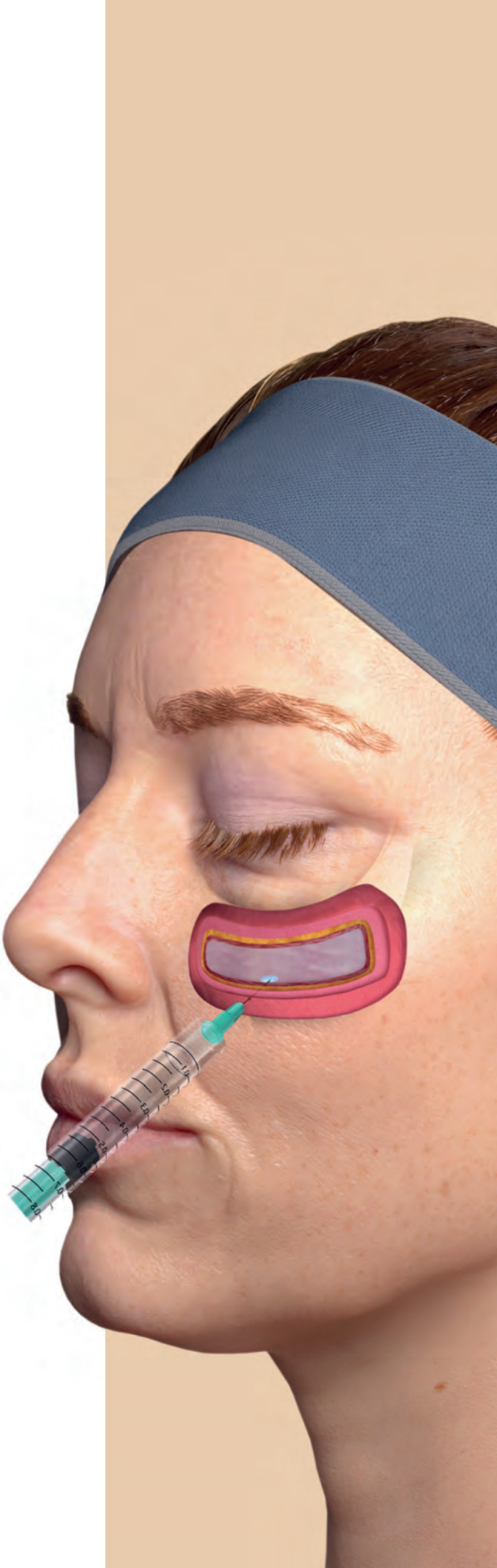


FIG 8-8 *(CONT)* *(g)* Withdraw the needle, without removing it completely, and reintroduce it toward the right parasymphysis again. The needle was directed superiorly for better distribution of the filler. *(h)* Withdraw the needle, without removing it completely, and reintroduce it toward the left parasymphysis. The needle was directed superolaterally for better distribution of the filler. *(i and j)* Frontal and lateral views immediately after treatment. *(k and l)* Pre- and posttreatment views showing nice improvement in the projection of the chin, which should be harmonious with the projection of the lower lip.

9

YELLOW-LIGHT PROCEDURES

Intermediate filler treatment areas include the extended mental crease, malar or cheekbone region, frown lines, and scars. Experience with the basic treatment procedures presented in chapter 8 is strongly advised for anyone undertaking these yellow-light procedures, which are somewhat more advanced than the beginner procedures. Like chapter 8, this chapter begins with a review of the specific indications, armamentarium, and techniques for performing each of these intermediate treatments. Next, the illustrated, step-by-step instructions on how to carry out each injection allow the reader to visualize each treatment. And finally, clinical cases demonstrate all of the steps as they are carried out on actual patients. Box 9-1 lists the general contraindications for dermal filler treatment, and Box 9-2 lists the supplies needed for the procedures discussed in this chapter.



BOX 9-1 General contraindications

- History of anaphylactic reaction
- Severe allergies
- Sensitivity or allergic reaction to dermal filler products
- Use of isotretinoin (Accutane, Roche) within the preceding 6 months
- Skin atrophy
- Poor healing
- Treatment area dermatosis
- An uncontrolled systemic condition
- Treatment area infection
- Hypertrophic or keloid scarring
- Abnormal bleeding
- Pregnancy or nursing
- Body dysmorphic disorder
- Highly unrealistic expectations

BOX 9-2 Basic supplies

- Alcohol pads
- Cotton-tipped applicators
- Handheld mirror
- Nonsterile gloves
- Nonwoven 3 × 3–inch gauze
- Surgical marker or white eyeliner pencil

EXTENDED MENTAL CREASE

The triangular-shaped extended mental crease exhibits a loss of volume below the corners of the mouth and above the chin and is circumscribed by marionette lines. As the lower face ages, the extended mental crease can become more noticeable, often creating a facial affect of obstinacy or sorrow.

Indications and contraindications

- Restoring the volume deficit in the chin and/or marionette line areas can help improve extended mental crease conditions in patients requiring simultaneous procedures.
- Dermal fillers that provide greater relative structural support can help address the substantive loss of volume in this area of the lower face.

Anesthesia and dermal filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 0.6 mL)
- 30-gauge, 0.5-inch needle
- A topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% dimethyl sulfoxide (DMSO) in a Lipoderm (Professional Compounding Centers of America) base
- Suggested dermal fillers:
  - Juvéderm Voluma (Allergan)
  - Restylane Lyft (Galderma)
  - Platelet-rich plasma (PRP)
- Suggested dermal filler quantities:
  - Mild extended mental crease: 0.8 mL
  - Moderate to severe extended mental crease: 1.6 mL

Precautions

- Ice or topical anesthesia should be used to help avoid distortion of tissue caused by lidocaine infiltration.

Anesthesia technique

Alcohol pads are used to clean the skin over and around the extended mental crease in preparation for anesthesia. Three 0.1-mL injections of buffered 2% lidocaine-epinephrine solution are given subcutaneously on each side of the chin. Allow 5–10 minutes for the anesthesia to take effect.

Dermal filler injection technique

The patient is reclined at a 60-degree angle, and the extended mental crease is cleaned with alcohol. A 30-gauge, 0.5-inch needle is firmly attached to a prefilled dermal filler syringe. The clinician primes the needle by extruding a small amount of filler from its tip. Standing on one side of the patient, the clinician lays the needle on the skin so that the hub rests at the medial-to-lateral portion of the crease; the needle hub marks the first insertion point. The clinician inserts the needle at a 30-degree angle to the skin and, moving toward the marionette line, advances the needle to its hub. As the needle is slowly (but not fully) extracted, an inferior-advancing fanning technique is used to evenly deposit a linear thread of filler in the deep dermis in small increments. Shallow placement of dermal filler will result in noticeable unevenness on the surface of the skin. The injection is repeated as needed for adequate volumizing.

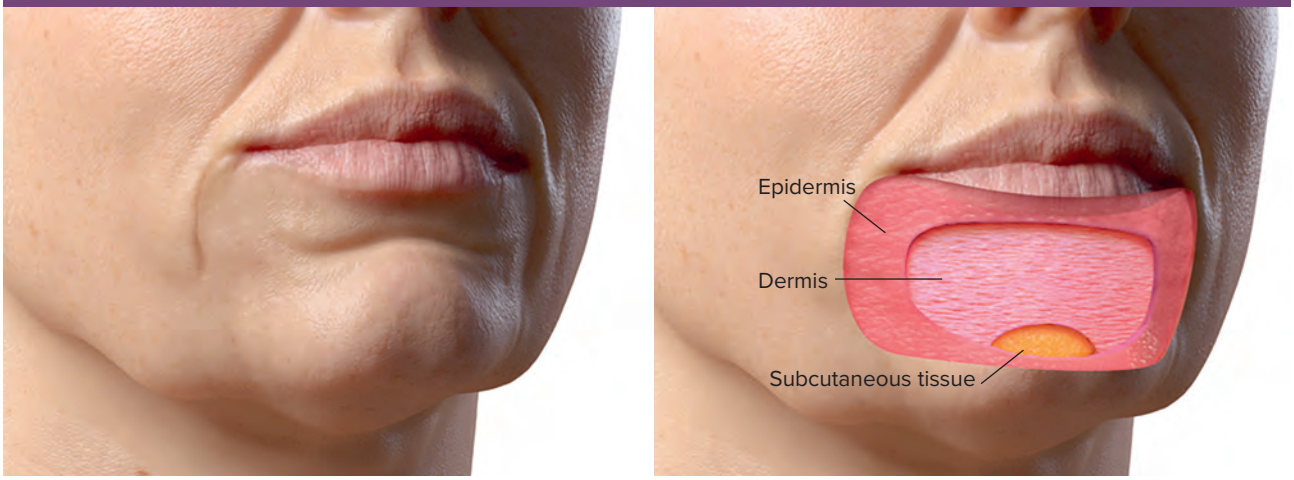
The clinician then moves to the opposite side of the patient and repeats the procedure on the contralateral side of the extended mental crease. The clinician then uses both thumbs to massage the treatment areas from the center outward to even out any poorly distributed filler.

Expected duration of results

- The longevity of the treatment results for extended mental crease depends on the filler agent used, but averages approximately 6 to 9 months.
- For persistent extended mental crease, follow-up treatment is required.

Figure 9-1 demonstrates the step-by-step technique for extended mental crease, and Fig 9-2 demonstrates a case example.

FIG 9-1 Step-by-step procedure for extended mental crease



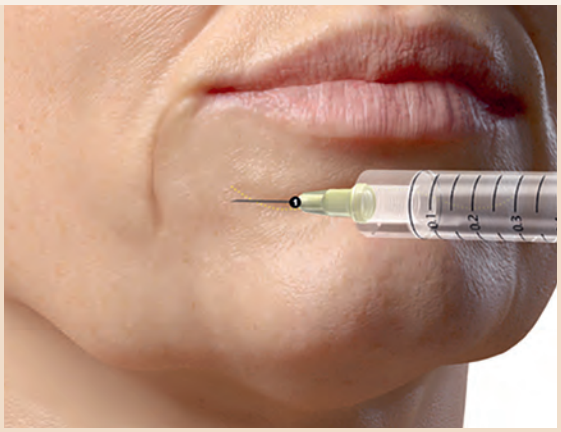
STEP 1 Administer anesthesia

- Use alcohol to clean the skin over and around the extended mental crease.
- Inject 0.1 mL buffered 2% lidocaine-epinephrine solution subcutaneously using a 30-gauge, 0.5-inch needle.
- Allow 10 minutes for the anesthesia to take effect.

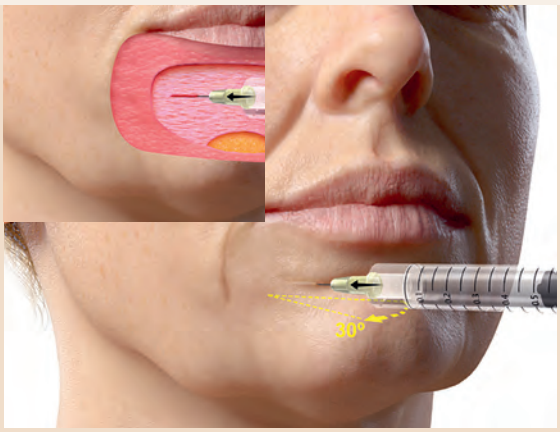
Each dot indicates 0.1 mL anesthesia.

STEP 2 Locate the first injection site

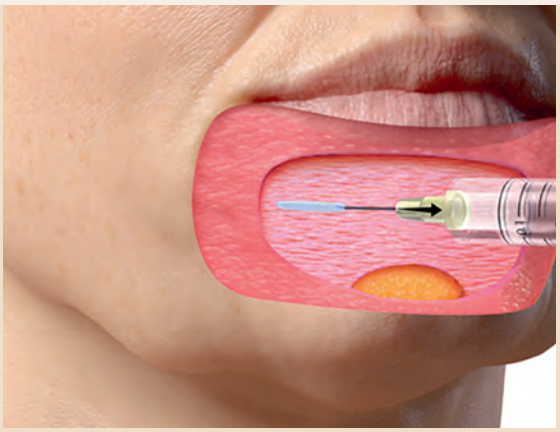
- Prime the needle by extruding a small amount of filler from its tip.
- Lay the needle on the skin with the tip at the medial-to-lateral aspect of the extended mental crease.
- The first injection point is at the needle hub.



STEP 3 Make a linear thread injection

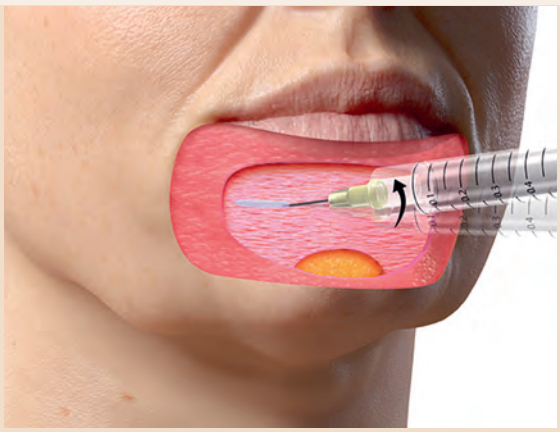


- Insert the needle at a 30-degree angle to the skin, following the contour of the extended mental crease, and advance to the hub.



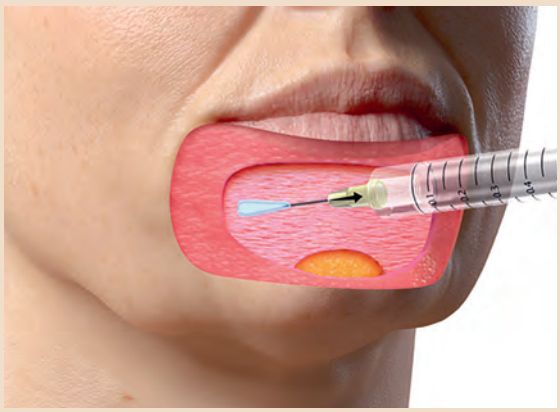
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the deep dermis. Do not fully withdraw the needle.

STEP 4 Apply the fanning technique



- Re-angle and redirect the needle and advance to the hub.
- Inject a linear thread in the deep dermis.

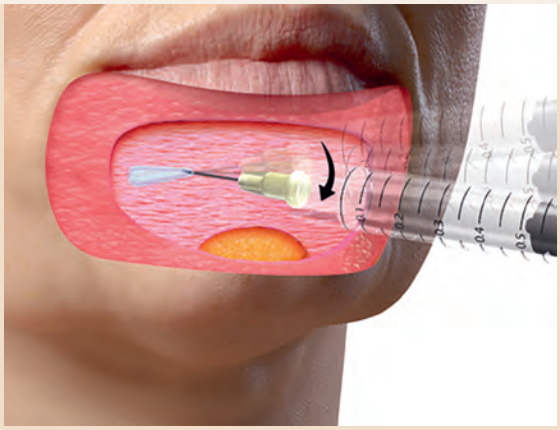
- Repeat the fanning technique to inject filler in an arc, moving toward the jawline.

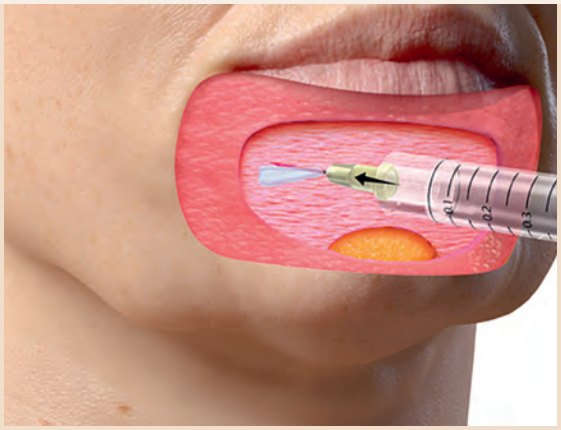


- Withdraw the needle when you reach the lowest point of the arc.

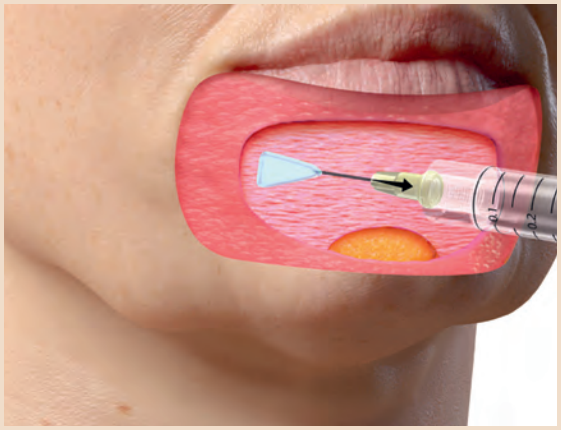
STEP 5

Continue to apply the fanning technique





- Repeat steps 3 and 4 until the desired correction is achieved.



STEP 6

Compress the treatment area

- Place both thumbs on the skin and apply firm pressure from medial to lateral to smooth any visible bumps or palpable lumps of dermal filler.

STEP 7

Move to the contralateral side and repeat steps 2 to 4

Case 1

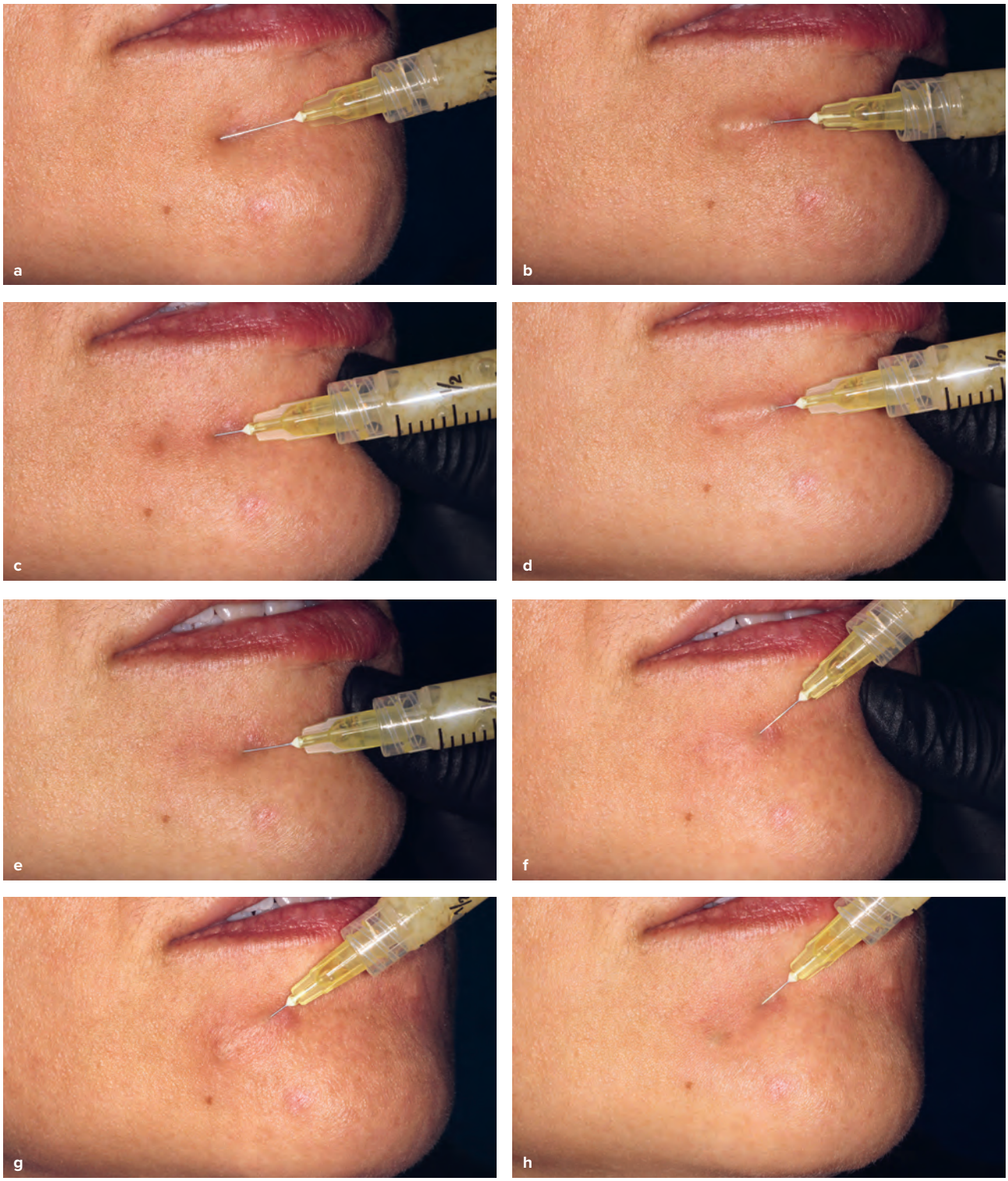


FIG 9-2 Case 1. *(a)* To locate the first injection point, the needle is laid along the extended mental crease so that the tip aligns with its distal end. The needle hub marks the spot where the first injection is made. *(b)* The needle is inserted all the way to the hub, and a linear thread of filler is injected in a slow retrograde fashion. *(c)* A second injection will be made one needle length from the insertion point of the first injection. *(d)* A linear thread of filler is injected along the extended mental crease. *(e)* The needle is partially withdrawn at the end of the second injection. *(f)* The needle is repositioned downward at a 45-degree angle. The fanning technique will be applied to lift the tissue around the crease. *(g)* The needle is inserted all the way to the hub. *(h)* A linear thread of filler is injected in a retrograde fashion.

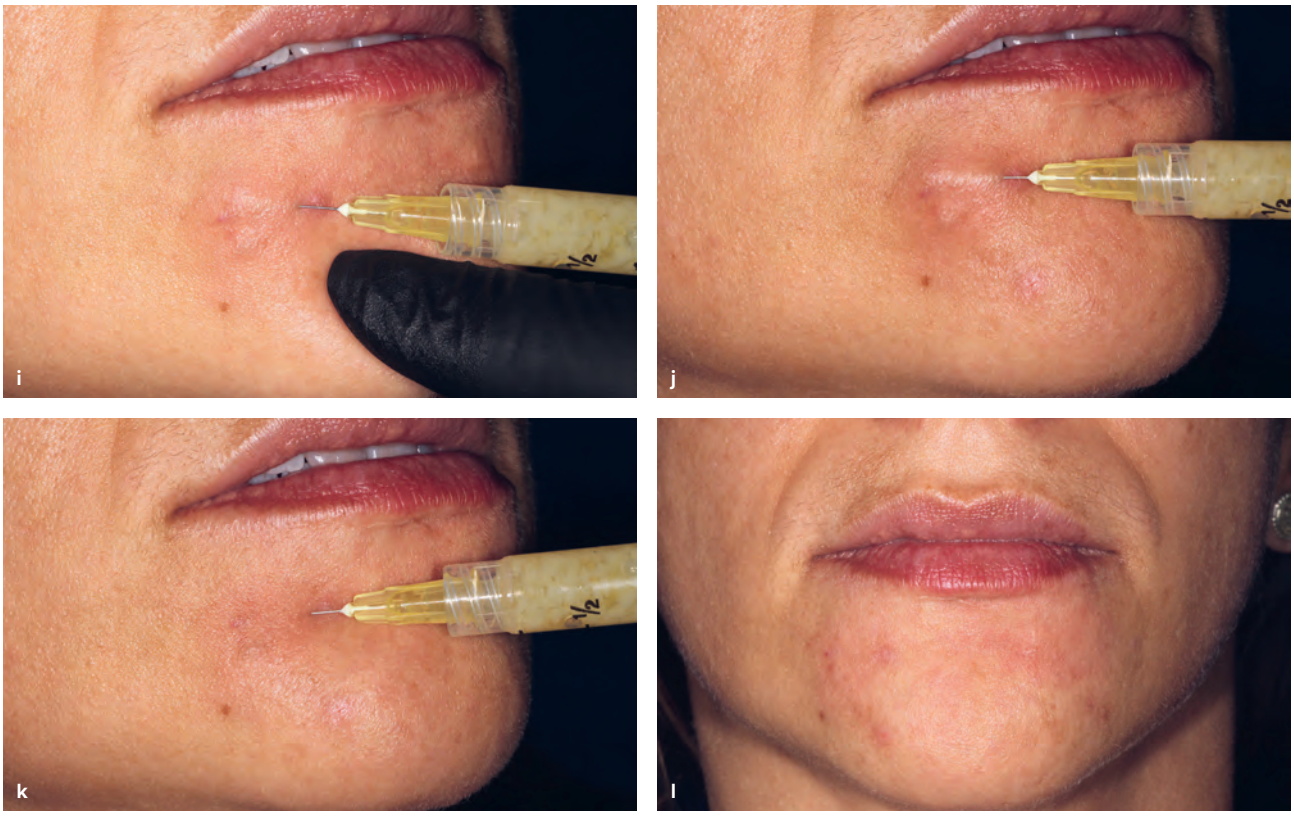


FIG 9-2 *(CONT)* *(i)* The needle is repositioned upward at a 45-degree angle. *(j)* A linear thread is injected in a retrograde fashion. *(k)* The needle is withdrawn, and the contralateral side of the extended mental crease is treated in the same manner. *(l)* Immediate posttreatment appearance.

MALAR AUGMENTATION

A shallow, recessed appearance in the malar region can give the impression of premature aging perhaps more than any other facial area.

Indications and contraindications

- If patients require treatment of the nasolabial folds as well as malar augmentation, the latter should be performed first, because volume restoration in the midface can reduce the need for reduction of nasolabial folds.

Anesthesia and dermal filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 0.6 mL)
- 30-gauge, 0.5-inch needle
- 28-gauge, 0.75-inch needle
- A topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base
- Suggested dermal fillers:
  - Juvéderm Voluma
  - Belotero Balance (Merz North America)
  - Radiesse (Merz North America)
  - Restylane Lyft
  - Sculptra (Galderma)
  - PRP
- Suggested quantity of dermal filler:
  - 2.0 to 2.6 mL for malar augmentation

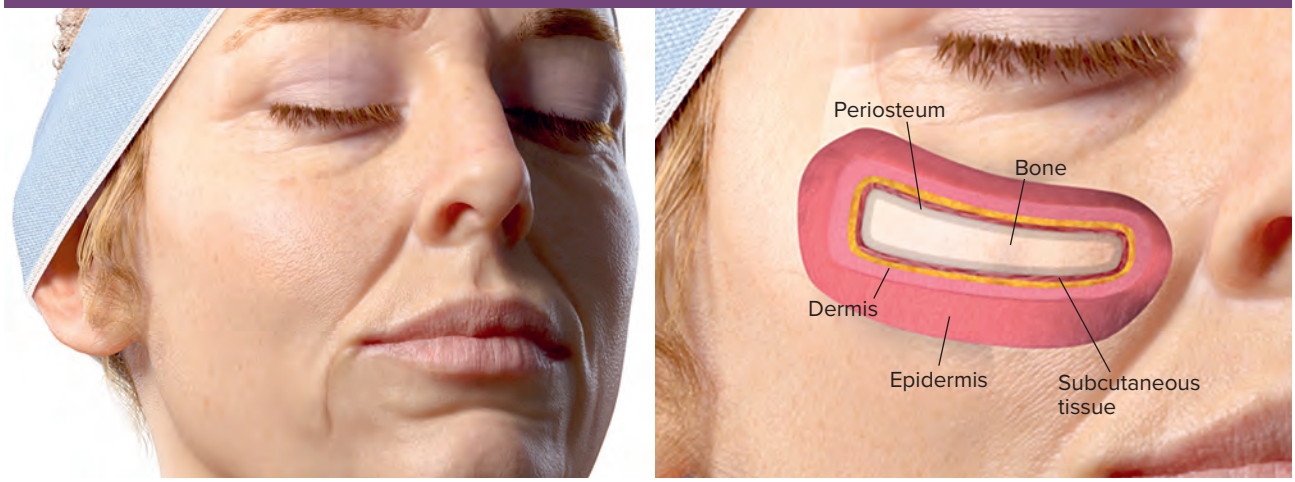
Precautions

- Ice or topical anesthesia should be used to help prevent distortion of tissue caused by lidocaine infiltration.

Anesthesia technique

Alcohol pads are used to clean the skin over and around the malar regions in preparation for anesthesia, which is administered bilaterally. Six 0.1-mL injections of buffered 2% lidocaine-epinephrine solution are given subcutaneously. Allow 5–10 minutes for the anesthesia to take effect.

FIG 9-3 Step-by-step procedure for malar augmentation



Dermal filler injection technique

The patient is reclined at a 60-degree angle, and the malar region is again cleaned with alcohol.

A 28-gauge, 0.75-inch needle is firmly attached to the prefilled dermal filler syringe. Standing on one side of the patient, the clinician extrudes a small amount of filler from the needle to prime it.

Where the malar groove line intersects with the inferior margin of the zygoma bone, the clinician first inserts the needle at a 45-degree angle to the skin until it softly taps the zygoma bone and then withdraws it 1 to 2 mm. Dermal filler is then injected via the depot technique: 0.2–0.3 mL at full depth or 0.1 mL at half depth or less. The needle is removed when deposited filler volume is sufficient. Any filler that tracks in the dermis as a result of being injected during needle withdrawal must be expressed from the skin.

A second injection and deposit is made about 1 cm superolateral to the first injection, along the inferior zygoma. A third and final injection or deposit in this round of injections is made about 1 cm superolateral to the second. A second round of injections is then performed like the first round: The fourth injection is made about 1 cm superomedial to the original injection point, and the fifth about 1 cm superolateral to the fourth. Nonpalpable filler areas in the malar region can be treated with boluses of sufficient size to even out the filler placement using the same injection protocols. Firmly smoothing the treated malar areas with the thumbs, mediolaterally, can provide additional filler balance.

The clinician then moves to the other side of the patient to treat the opposite malar region.

Expected duration of results

- The longevity of the treatment results for malar augmentation depends on the filler agent used, but averages approximately 6 to 9 months.
- For asymmetries in malar augmentation results, follow-up treatment is required.

Figure 9-3 demonstrates the step-by-step technique for malar augmentation, and Fig 9-4 demonstrates a case example.

STEP 1 Administer anesthesia

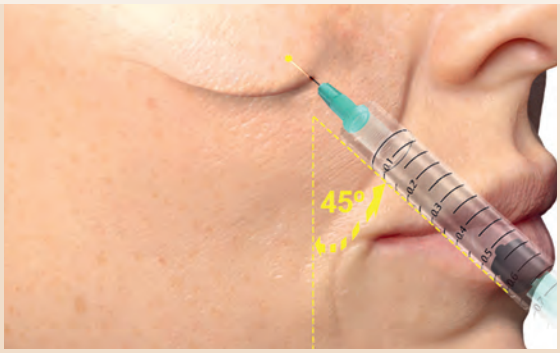
- Use alcohol to clean the skin over and around the malar region.
- Inject 0.1 mL buffered 2% lidocaine-epinephrine solution subcutaneously using a 30-gauge, 0.5-inch needle.
- Allow 10 minutes for the anesthesia to take effect.

Each dot indicates 0.1 mL anesthesia.

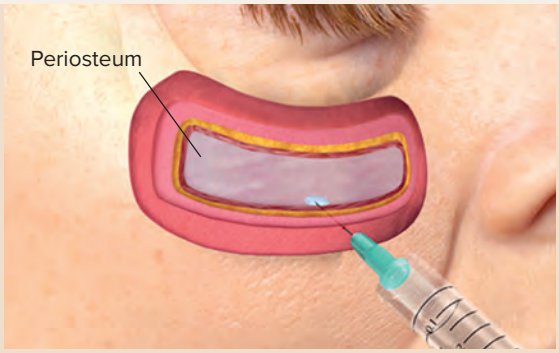
STEP 2 Locate the first injection site

- Use a surgical marker to outline the inferior border of the zygoma bone.
- Find the point where the inferior border of the zygoma bone intersects with the malar groove.

STEP 3 Make a depot injection



- Insert the needle at a 45-degree angle to the skin and advance it until you feel the soft tap of the bone.



- Withdraw the needle 1–2 mm and apply firm pressure on the syringe plunger to inject a bolus of filler.
- Release the plunger pressure before pulling the needle out of the skin to avoid tracking dermal filler in the epidermis.

STEP 4 Locate the second injection site

- The second injection point is approximately 1 cm superolateral to the first injection point, along the inferior zygoma.

STEP 5 Make a second depot injection

- Insert the needle at a 45-degree angle to the skin and advance it until you feel the soft tap of the bone.
- Withdraw the needle 1–2 mm and apply firm pressure on the syringe plunger to inject a bolus of filler.
- Release the plunger pressure before pulling the needle out of the skin to avoid tracking dermal filler in the epidermis.

STEP 6 Locate the third injection site

- The third injection point is approximately 1 cm superolateral to the second injection point, along the inferior zygoma.

STEP 7 Make a third depot injection

- Insert the needle at a 45-degree angle to the skin and advance it until you feel the soft tap of the bone.
- Withdraw the needle 1–2 mm and apply firm pressure on the syringe plunger to inject a bolus of filler.
- Release the plunger pressure before pulling the needle out of the skin to avoid tracking dermal filler in the epidermis.

STEP 8 Palpate the treatment area

- Place both thumbs on the skin and firmly smooth the treated malar areas, moving mediolaterally.
- Identify any areas that were skipped, and inject them with small boluses of filler using the technique described in step 3 until all filler placements are contiguous.

STEP 9 Repeat on the contralateral side

- Repeat steps 2–8 on the contralateral side of the face.

Case 2

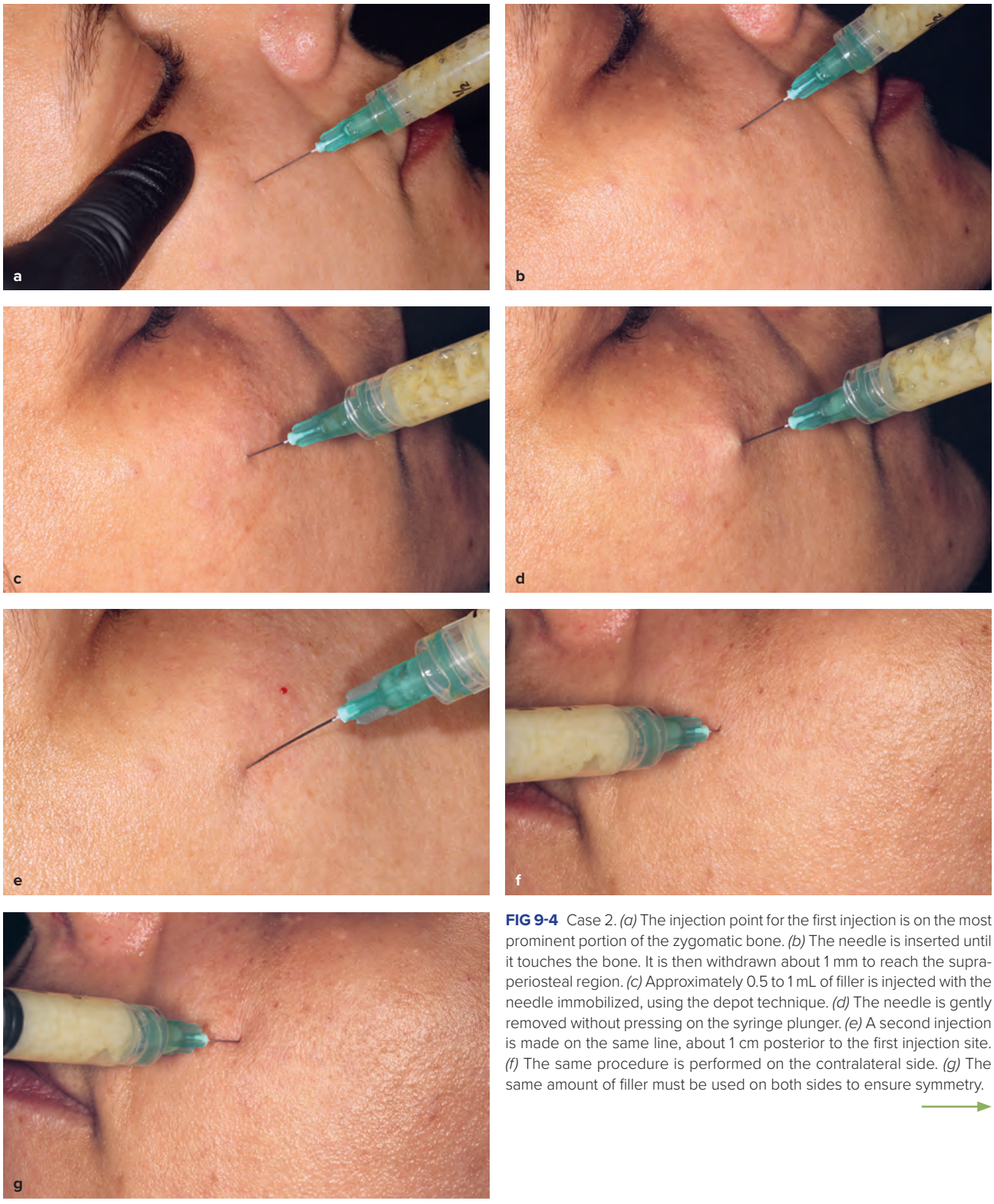
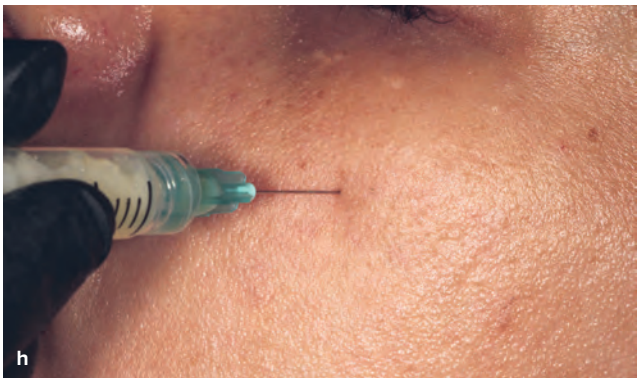


FIG 9-4 Case 2. *(a)* The injection point for the first injection is on the most prominent portion of the zygomatic bone. *(b)* The needle is inserted until it touches the bone. It is then withdrawn about 1 mm to reach the supra-periosteal region. *(c)* Approximately 0.5 to 1 mL of filler is injected with the needle immobilized, using the depot technique. *(d)* The needle is gently removed without pressing on the syringe plunger. *(e)* A second injection is made on the same line, about 1 cm posterior to the first injection site. *(f)* The same procedure is performed on the contralateral side. *(g)* The same amount of filler must be used on both sides to ensure symmetry.



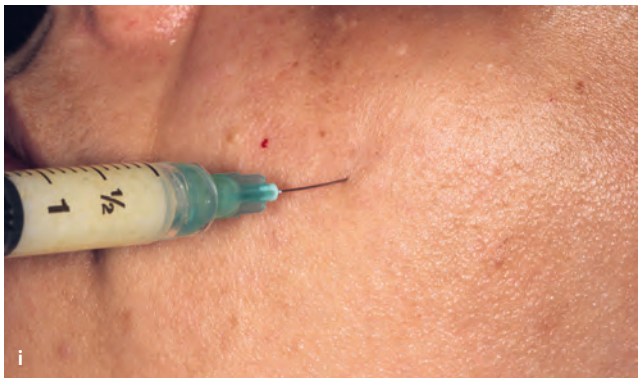


FIG 9-4 *(CONT)* *(h)* A second injection is made on the same line 1 cm more posterior to the first injection point. *(i)* The needle is gently removed without pressing on the syringe plunger. Compare the outcome with the other side.

FROWN LINES

Frown lines (also known as *glabellar rhytids*) stretch vertically between the eyebrows and are produced dynamically when patients smile, laugh, or frown. Dynamic frown lines can evolve into static lines and be present when the face is at rest. Patients with frown lines often complain of projecting an affect of obduracy and annoyance.

Indications and contraindications

- If the lines are a result of hyperdynamic muscle action, then botulinum toxin is the treatment of choice. Dermal filler treatments can often more effectively treat static frown lines.
- A topical anesthetic or ice is used to anesthetize the glabella.
- Linear thread filler injections are placed into the mid dermis for each line, beginning superiorly and proceeding inferiorly, with the need for additional injections determined by the length of the needle and of the frown lines.
- Because excessive contraction of the glabellar complex muscles facilitates development of dynamic frown lines, botulinum toxin treatment of the complex can not only reduce the lines but also provides a flatter plane for optimal filler application. Botulinum toxin treatment can be performed simultaneously with or even subsequent to the procedure, but the optimal time is 2 weeks prior to dermal filler treatment. Dermal filler reduction of surface static frown lines can be performed after patient recovery from more aggressive skin resurfacing and collagen stimulation (via ablative/nonablative lasers, dermabrasions, and chemical peels) or simultaneously with (or prior to) less aggressive versions of those procedures.

Precautions

- The thinnest dermal fillers should be administered via a 30-gauge, 0.5-inch needle to treat frown lines, where ischemia and vascular occlusion could develop in the glabella.
- To avoid the high risk of ischemia, tissue necrosis, and even blindness from arterial damage (retinal artery embolization) from tissue overfilling and vascular occlusion, the clinician should slowly inject thin filler products, intradermally, in low volumes with rearward needle movement and minimal plunger pressure.

Anesthesia and filler supplies

- Anesthetic: 0.5 g topical cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base
- 30-gauge, 0.5-inch needle
- Suggested dermal fillers:
  - Juvéderm
  - Teosyal RHA 2 (Teoxane)
- Suggested quantity of dermal filler:
  - 0.2 to 0.3 mL

FIG 9-5 Step-by-step procedure for frown lines

Anesthesia technique

The clinician cleans the glabella with alcohol. Next, a thin layer of anesthetic cream (0.5 g) is rubbed lightly over the area. After 15–30 minutes, an alcohol wipe is used to remove the cream.

Dermal filler injection technique

With the patient reclined at a 45-degree angle, the clinician stands behind the patient and applies alcohol to the frown line area. A 30-gauge, 0.5-inch needle is firmly attached to the prefilled dermal filler syringe. The clinician primes the needle by extruding a small amount of filler from the needle tip.

The injection begins at the most superior point of the frown line. The needle is inserted at a 30-degree angle to the skin, directed inferiorly, mid dermis, up to the hub of the needle and then slowly withdrawn to insert a linear thread of filler, following the natural lateral angle of the frown line. If the injection volume is insufficient, the clinician can inject filler once again in the same manner, approximately 0.5 inches below the first injection site. The clinician then uses both thumbs on the sides of the frown line to smooth the product evenly in the area. Any ischemia resulting from the procedure must be treated promptly and appropriately (see chapter 4). The clinician then treats the contralateral frown line using the same technique.

Expected duration of results

- The results of dermal filler treatment of frown lines typically last for 9 to 12 months.
- Persistent frown lines and scars could result from volume deficits, which can be addressed by additional small volumes of filler.
- In the case of dynamic frown lines, additional treatment may be accompanied by botulinum toxin injections.
- For superficial static frown lines that do not dissipate over several months, botulinum toxin and dermal filler treatments are in order, along with resurfacing procedures and collagen stimulation.

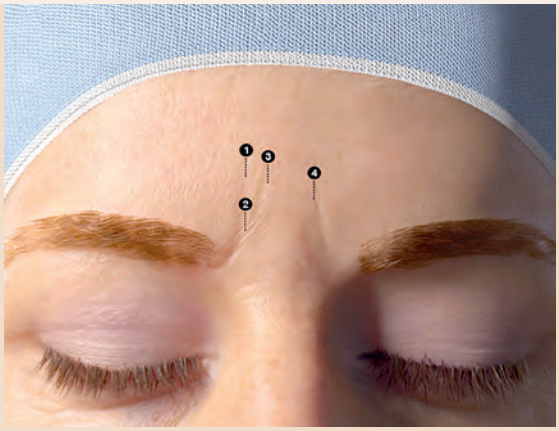
Figure 9-5 demonstrates the step-by-step technique for frown lines, and Fig 9-6 demonstrates a case example.

STEP 1 Administer anesthesia

- Use alcohol to clean the skin over and around the frown line(s).
- Apply topical anesthetic cream to the skin over the area.
- Allow 15–30 minutes for the anesthetic to take effect.
- Use alcohol to remove the topical cream.

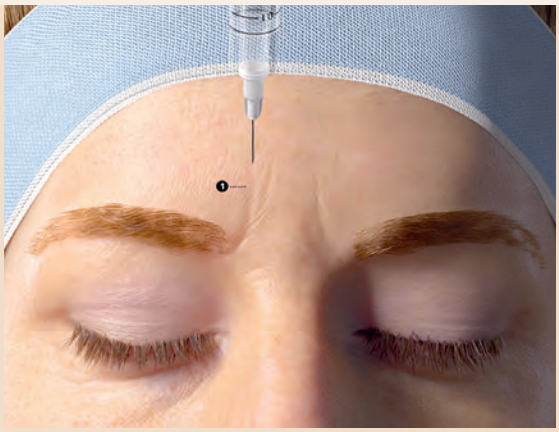
STEP 2 Determine the number of injections needed

- The number of injections varies according to the length of the frown lines.



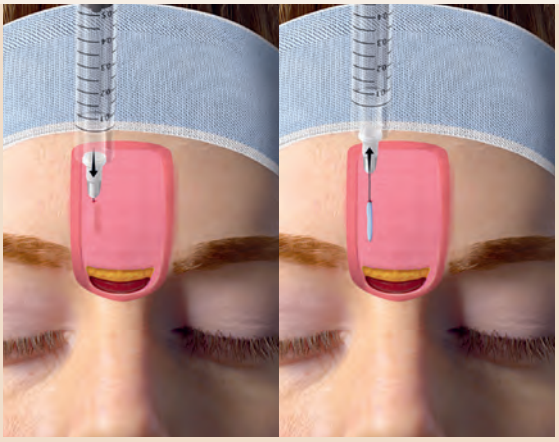
STEP 3 Locate the first injection site

- The first injection point for each frown line is at the most superior aspect of the line.



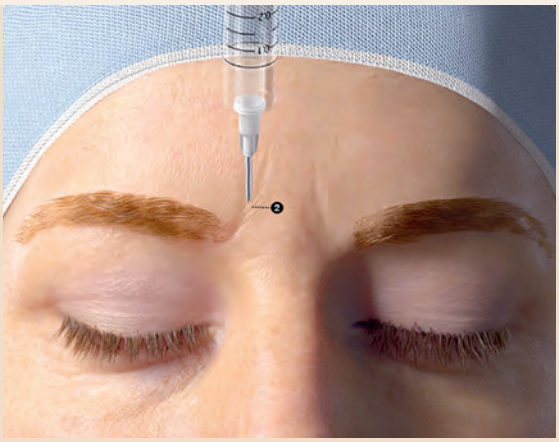
STEP 4 Make a linear thread injection

- Insert the needle at a 30-degree angle to the skin, direct it inferiorly, and advance to the needle hub.

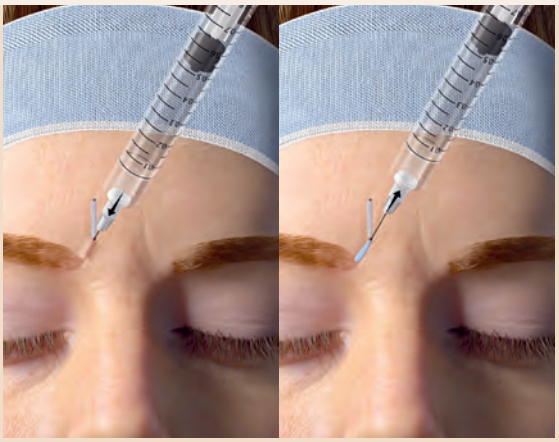


- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid dermis.

STEP 5 Make a second linear thread injection, if needed



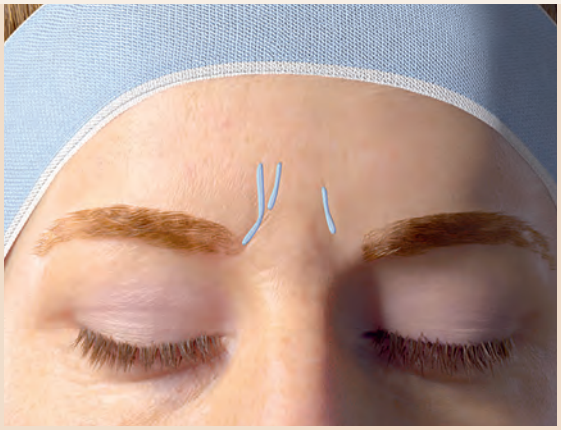
- If the frown line is too long or if it curves, a second linear thread injection may be made.
- The second injection point is approximately one needle length inferior to the first injection point.



- Inject a linear thread of filler in the mid dermis. The path of injection should follow the path of the frown line.

STEP 6 **Repeat steps 4 and 5 for each line**

- The number of injections varies according to the length of the frown lines.



STEP 7 **Compress the treatment area**

- Place the thumbs at opposite ends of the frown line and compress the edges of the filler to mold it into the frown line.

Case 3

FIG 9-6 Case 3. *(a)* Pretreatment appearance. *(b)* Application of topical anesthetic.

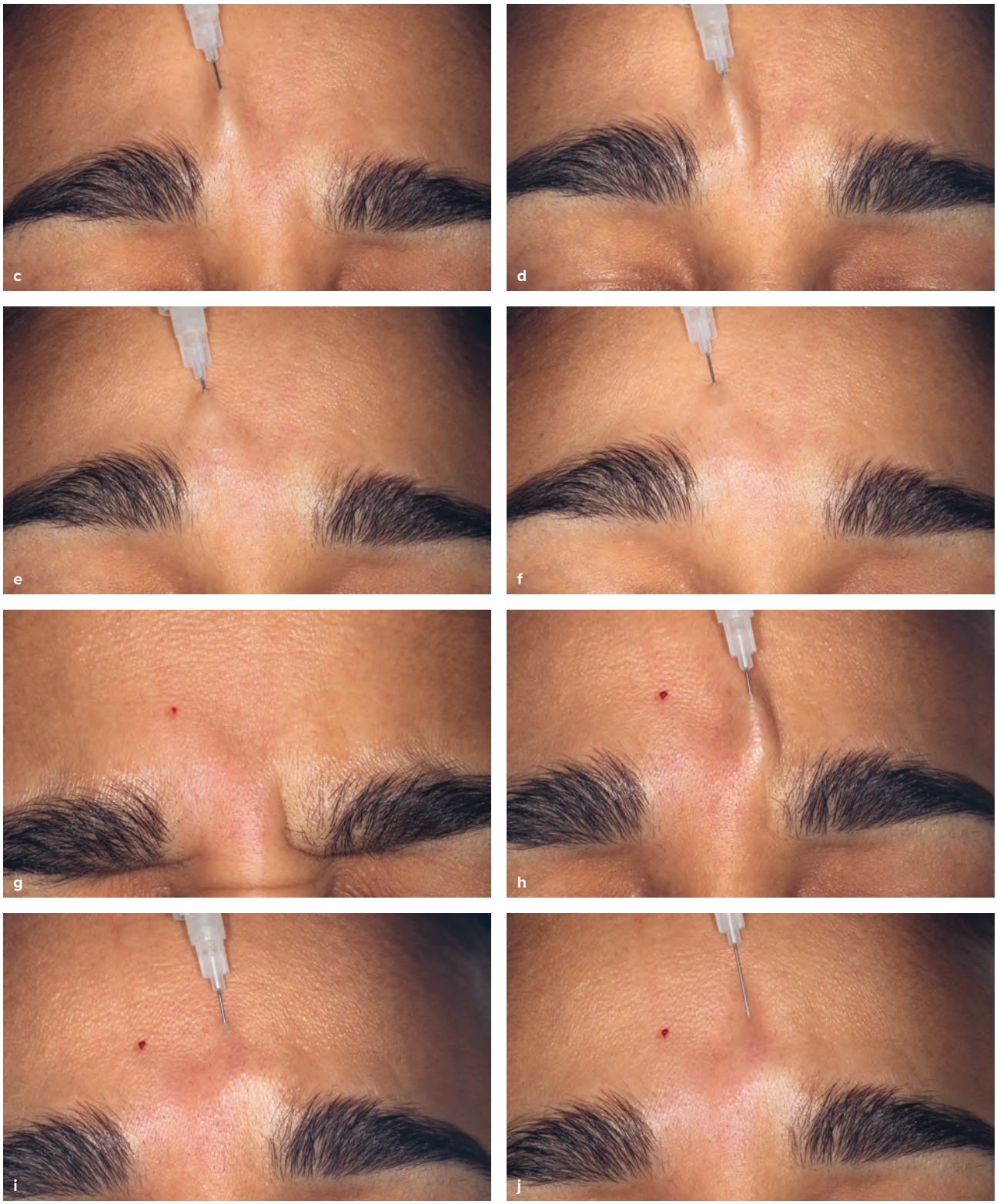


FIG 9-6 *(CONT)* *(c)* The injection of the filler must be done superficially and following the line of the crease. Care must be taken not to inject deeply to avoid injecting into the blood vessels. *(d)* For the first injection, the needle is fully inserted under the crease before the start of the injection. *(e and f)* The filler is injected continuously while the needle is slowly withdrawn. *(g)* The effect of the filler can be observed when compared with the untreated side. *(h)* The same technique is used to treat the contralateral side. *(i)* The needle should be almost parallel to the surface of the skin to avoid injection into the hypodermal plane. *(j)* At the end of the procedure, the total reduction of the wrinkle is apparent.

FIG 9-6 *(CONT)* *(k)* Minor corrections can be made to finalize the treatment.

SCARS

Composed of fibrotic tissue (often secured to subcutaneous tissue), atrophic scars can appear anywhere in the facial region as deep and narrow depressions—so-called ice pick scars—or they can have soft, round borders.

Indications and contraindications

- Dermal filler treatment can effectively treat soft, distensible atrophic depression scars with round, soft edges resulting from acne, trauma, skin excisions, or chickenpox.
- Dermal fillers are inappropriate for treating ice pick and nondistensible scars.
- Dermal filler reduction of superficial depression scars can be performed after the patient recovers from more aggressive skin resurfacing and collagen stimulation (via ablative/nonablative lasers, dermabrasions, and chemical peels) or simultaneously with (or prior to) less aggressive versions of those procedures.
- Subcutaneous incisional surgery of barely distensible scars can be followed by dermal filler treatment.

Anesthesia and filler supplies

- Anesthetic: 0.5 g topical cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base
- 30-gauge, 0.5-inch needle
- Suggested dermal fillers:
  - Bellafill (Suneva Medical)
  - Restylane
  - Juvéderm
  - PRP
- Suggested dermal filler quantity:
  - 0.3 to 0.4 mL

Precautions

- The thinnest dermal fillers should be administered via a 30-gauge, 0.5-inch needle to treat depression scars.
- To avoid tissue overfill or vascular occlusion (which can cause ischemia and necrosis), the clinician should slowly inject thin filler products, intradermally, in low volumes with rearward needle movement and minimal plunger pressure.

Anesthesia technique

After cleaning the scar area with alcohol, the clinician applies a thin layer of topical cream (0.5 g) over the area. After waiting 15 minutes, alcohol is used to remove it.

Dermal filler injection technique

With the patient reclined at a 60-degree angle, the clinician stands on the side of the patient where the scar treatment area is located and cleans the area with alcohol. A 30-gauge, 0.5-inch needle is firmly attached to the prefilled dermal filler syringe. One side of the scar is chosen for the initial injection point, which begins slightly beyond the scar perimeter. Needle entry is made at a 15-degree angle to the skin, and the needle tip is advanced to the center of the scar. As the needle is withdrawn, a linear thread of filler is smoothly and evenly injected, superficial to mid dermis. If the needle tip becomes visible, the clinician should redirect it deeper to avoid making the injection too shallow. Before it is withdrawn, the needle is fanned clockwise in

FIG 9-7 Step-by-step procedure for scar

STEP 1 **Administer anesthesia**

- Use alcohol to clean the skin over and around the scar.
- Apply topical anesthetic cream to the skin over the area.
- Allow 15–30 minutes for the anesthetic to take effect.
- Use alcohol to remove the topical cream.

small increments for even filler distribution. The injection should be discontinued if filler pools in the scar margins.

This injection procedure can be repeated to ensure proper filler volume before a second injection site is chosen opposite the first, which repeats the fanning injection treatment. Depending on the size of the treatment area, two similar opposing fanning injections can be made at quarter intervals from the first two injections. Finally, the skin of the treated area can be gently palpated via an intraoral finger and extraoral cotton-tipped instrument to smooth the filler distribution. Any ischemia resulting from the procedure must be treated promptly and appropriately.

Expected duration of results

- Treatment results for scars usually last approximately 6 to 9 months.
- Smoothing scars manually after the procedure can help prevent bumps.
- Compression of persistent bumps during follow-up visits can also help.

Figure 9-7 demonstrates the step-by-step technique for scars, and Figs 9-8 and 9-9 demonstrate case examples.

STEP 2

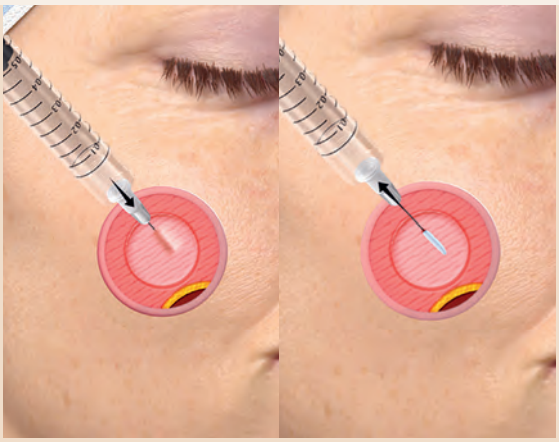
Locate the first injection site

- The first injection point is on one side of the scar slightly beyond its perimeter.

STEP 3

Make a linear thread injection

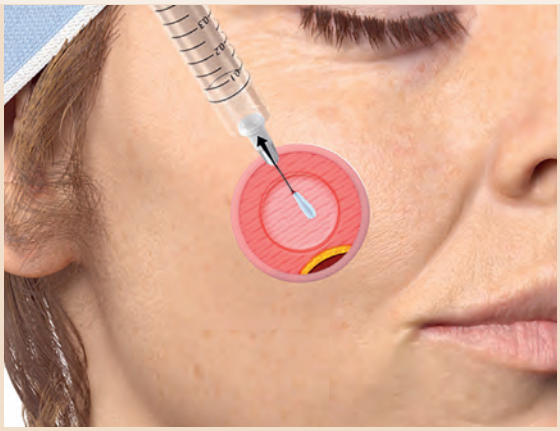
- Insert the needle at a 15-degree angle to the skin, direct it inferiorly, and advance to the needle hub.



- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler in the mid dermis.

STEP 4 Apply the fanning technique

- Re-angle and redirect the needle clockwise and advance to the hub.



- Inject a linear thread in the superficial to mid dermis.

- Continue the fanning injection, moving clockwise, until one-half of the scar has been treated.
- Ensure that the dermal filler placements are contiguous.

STEP 5 Make second and third injections, if needed

- For larger scars, two additional injections may be made opposite to each other and at 90 degrees from the location of the first and second injections.

STEP 6 **Compress the treatment area**

- Using the first finger intraorally and a cotton-tipped applicator in the other hand, compress the scar and the perimeter of the scar to smooth any visible and/or palpable lumps of filler.

Case 4

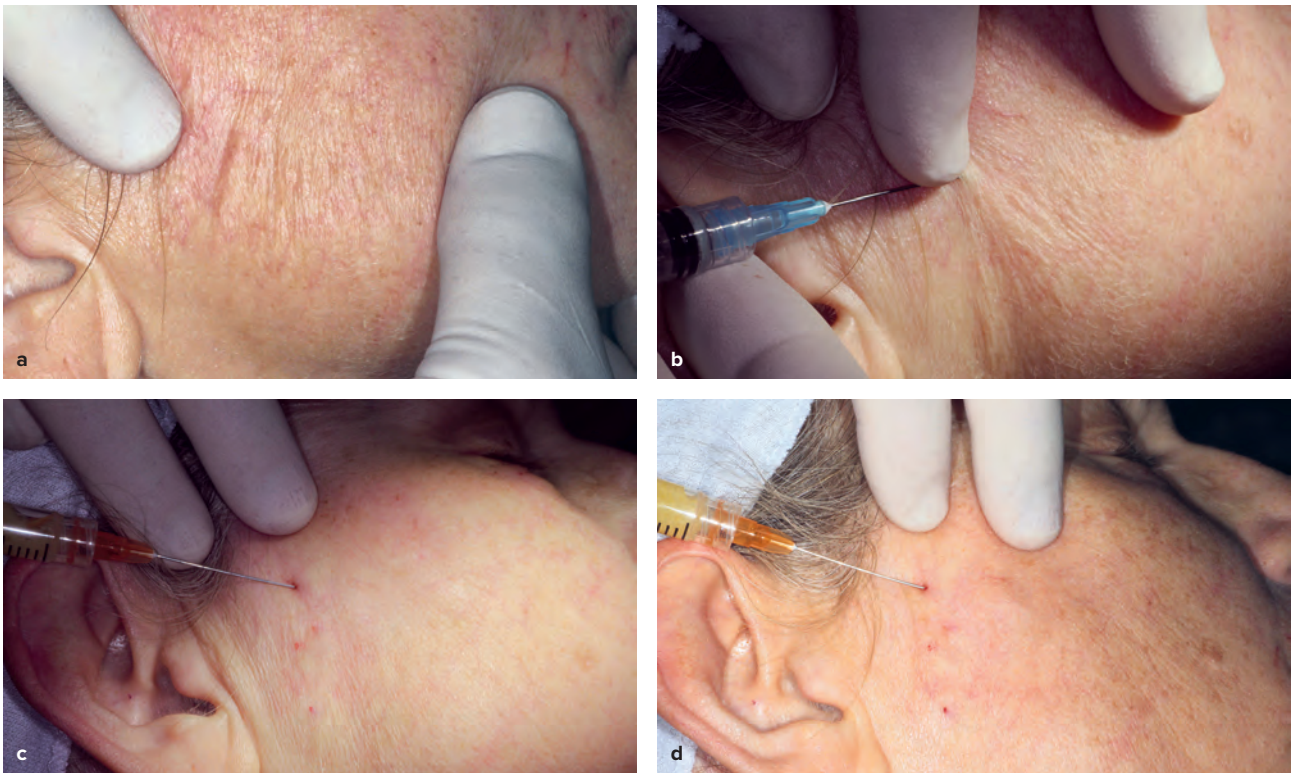


FIG 9-8 Case 4. *(a)* Pretreatment appearance. The scar causes the dermis to adhere to the muscular fascia, thereby reducing the movement of the skin. *(b)* An injection is made using a needle with a gauge slightly larger than the cannula to be used. *(c)* The cannula is inserted into the opening made by the needle. *(d)* The cannula should be inserted under the scar between the dermis and the muscular fascia.

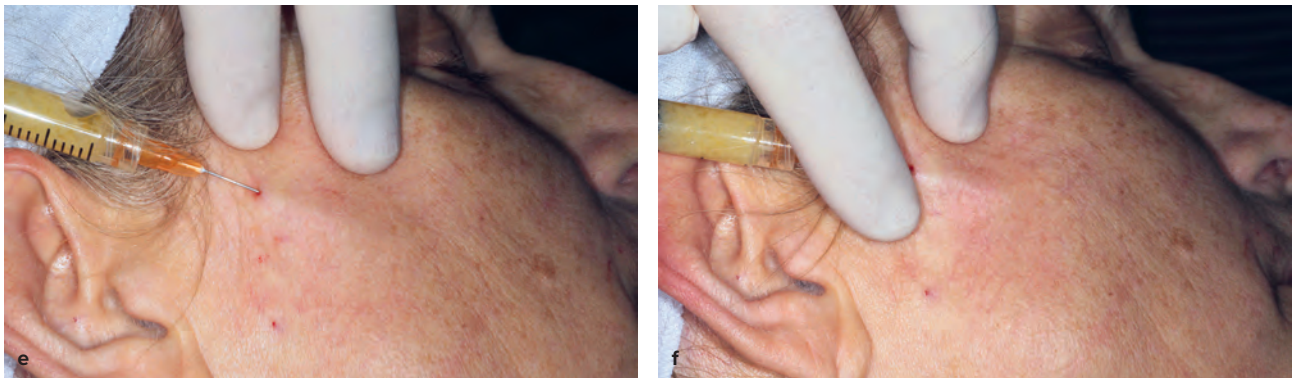


FIG 9-8 *(CONT)* *(e)* The skin is safe as the cannula is used to break adhesions with fan-shaped movements. *(f)* The filler is then injected using the fanning technique until the base of the scar has been filled, lifting the skin to the appropriate level.

Case 5

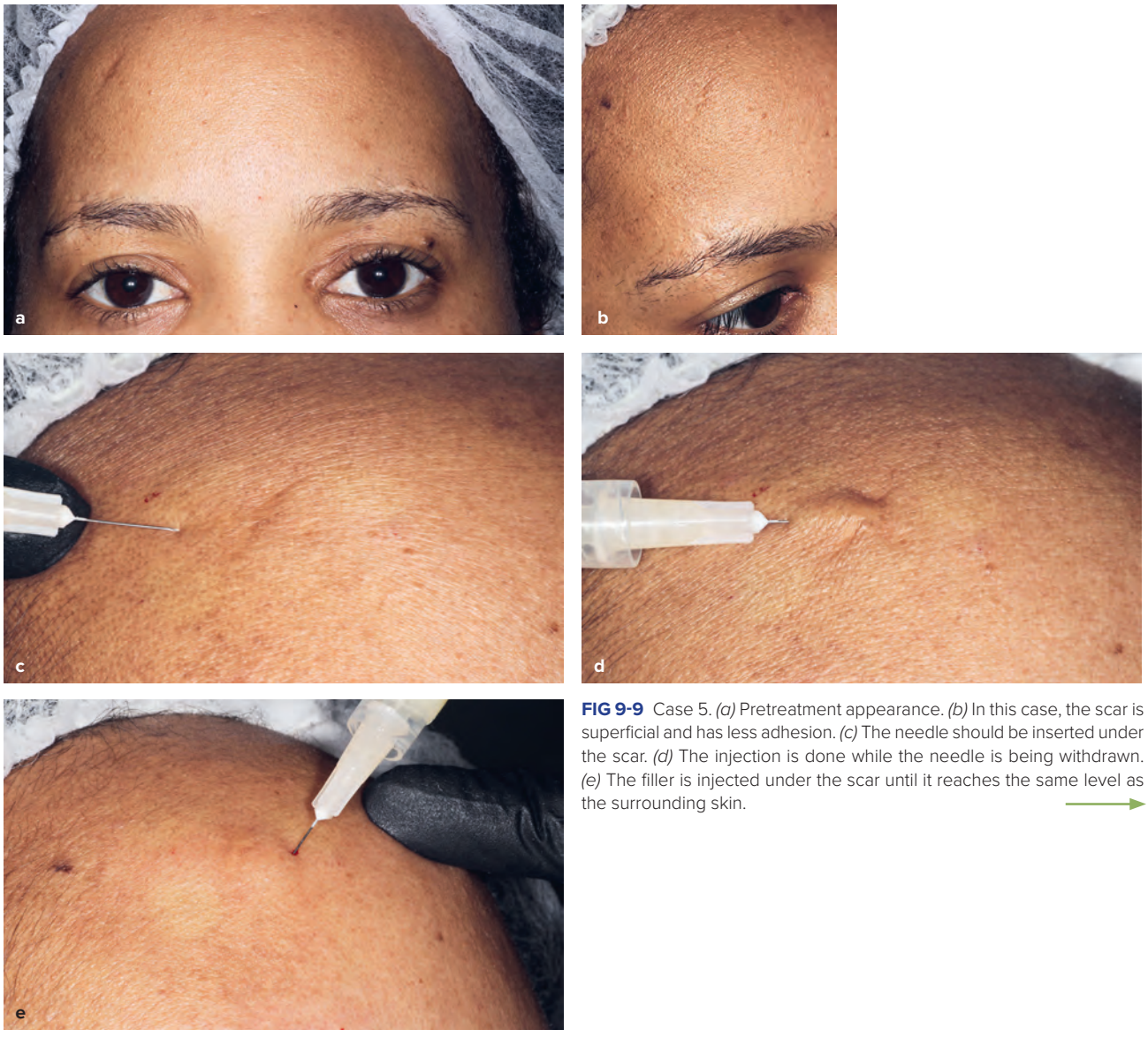
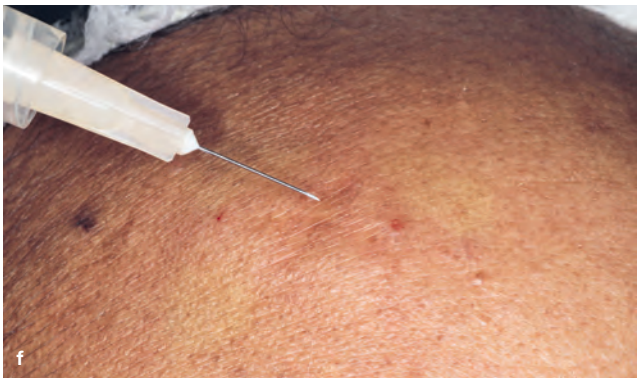


FIG 9-9 Case 5. *(a)* Pretreatment appearance. *(b)* In this case, the scar is superficial and has less adhesion. *(c)* The needle should be inserted under the scar. *(d)* The injection is done while the needle is being withdrawn. *(e)* The filler is injected under the scar until it reaches the same level as the surrounding skin.



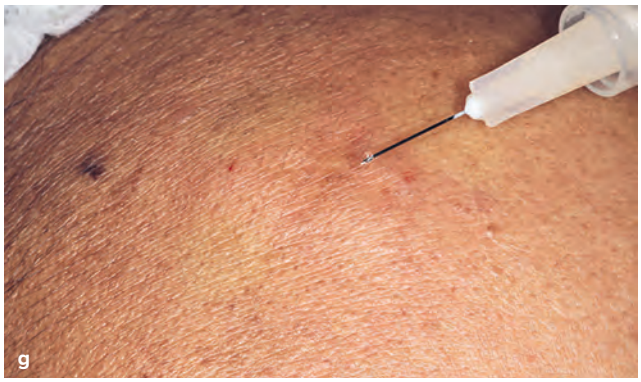
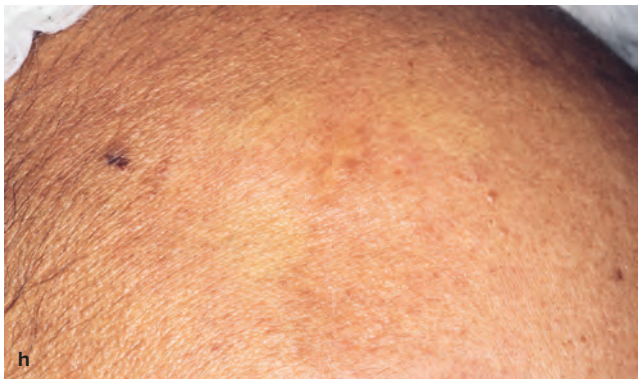


FIG 9-9 *(CONT)* *(f and g)* Small portions of filler can be placed until the skin level is homogeneous. *(h)* Posttreatment appearance.



10

RED-LIGHT PROCEDURES

Advanced filler treatment targets the lips, the lines around the lips, the philtral columns, and the tear troughs. These treatment areas are designated as red-light procedures because they are particularly challenging and should not be undertaken until the clinician has fully mastered each of the injection techniques used in this text and has full confidence in their knowledge of the facial vascular anatomy. The lips are the most sensitive part of the face for dermal filler injections and require a lip ring block for pain control, a technique most dentists know well. More than any other area, the lips require extreme attention to technique and volume used in order to avoid lopsided results, which are almost impossible to disguise. In addition, the periorbital region poses a significant risk of inadvertent vascular injury owing to the thinness of the tissue in that area. There is also the danger of an accidental injection into the globe, which invariably causes irreversible blindness. The reader is strongly encouraged to review chapter 4 on avoiding and managing complications before undertaking the procedures described in this chapter. Substantial experience performing the injection procedures described in chapters 8 and 9 is also a prerequisite.

Box 10-1 lists the general contraindications for dermal filler treatment, and Box 10-2 lists the supplies needed for the procedures discussed in this chapter.

BOX 10-1 General contraindications

- History of anaphylactic reaction
- Severe allergies
- Sensitivity or allergic reaction to dermal filler products
- Use of isotretinoin (Accutane, Roche) within the preceding 6 months
- Skin atrophy
- Poor healing
- Treatment area dermatosis
- An uncontrolled systemic condition
- Treatment area infection
- Hypertrophic or keloid scarring
- Abnormal bleeding
- Pregnancy or nursing
- Body dysmorphic disorder
- Highly unrealistic expectations

BOX 10-2 Basic supplies

- Alcohol pads
- Cotton-tipped applicators
- Handheld mirror
- Nonsterile gloves
- Nonwoven 3 × 3–inch gauze
- Surgical marker or white eyeliner pencil

LIP BORDER

The *vermilion lip border* (also known as the *lip zone* or *lip margin*) marks the transition between adjacent skin (keratinized epidermis) and the lip body proper (less keratinized pink vermilion, with dry/wet mucosal regions).

Indications and contraindications

- Lips (and the perioral region generally) require extensive patient assessment and review so that the patient and clinician may confirm exactly which esthetic enhancements can realistically be planned.
- Patients must be reminded that fillers cannot change but merely enhance a patient's anatomical lip shape; filler enhancement of the lip borders requires filler in the vermilion border to outline the shape of the lip and border.
- Restoring the volume deficits in the lip border and lip body simultaneously can help improve conditions in patients requiring both of these dermal filler procedures.
- Dermal filler treatment of the lip border is contraindicated in patients with an extremely thin and small upper lip to avoid the peculiar anterior projection known as *duck lip*.

Anesthesia and filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 2.6 mL)
  - Upper lip: 1.2 mL
  - Lower lip: 1.2 mL
  - Lip corners: 0.2 mL
- 27-gauge, 0.25-inch needle
- 30-gauge, 0.5-inch needle
- A topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% dimethyl sulfoxide (DMSO) in a Lipoderm (Professional Compounding Centers of America) base
- Suggested dermal fillers:
  - Teosyal RHA 2 (Teoxane)
  - Restylane Silk (Galderma)
  - Juvéderm Ultra XC (Allergan)
  - Juvéderm Volbella (Allergan)
  - Platelet-rich plasma (PRP)
- Suggested dermal filler quantity:
  - Upper and lower lip borders: 0.6–0.8 mL
  - Medial border of the upper lip: 0.3–0.4 mL

Precautions

- Unlike other areas of the face, the lips and lip border cannot be anesthetized adequately with lidocaine-enhanced dermal fillers alone.
- Substantial volumes of anesthesia are required for pain management in this area using a ring block technique.
- Equivalent volumes of filler are required on each side of the lips to prevent noticeable asymmetries; however, rapid lip edema may prevent accurate assessment until the next office visit.
- Overfill of the lateral area of the upper lip can cause deviations in the contour of the lip as well as unwanted dispersal of product in skin outside the lip or inside the lip mucosa.

Anesthesia technique

Any lipstick or other lip cosmetics must be removed. Then, alcohol pads are used to clean the area around the lips and the lips themselves. Because it is more sensitive, the upper lip should be pretreated at the injection sites with a 20% benzocaine topical anesthetic. A lip ring block is performed, using 1.2 mL 2% lidocaine-epinephrine solution for each of the upper and lower lips; the lip corners receive a total volume of 0.2 mL 2% lidocaine-epinephrine solution. The anesthesia should take effect in 3–5 minutes. (For more detailed instructions on administering a lip ring block, see chapter 2.)

Upper lip dermal filler injection technique

The patient is reclined at a 60-degree angle, and the lips are cleaned with alcohol. A 30-gauge, 0.5-inch needle is firmly attached to the prefilled dermal filler syringe to withstand full plunger pressure.

Standing on one side of the patient, the clinician places the needle over the vermilion border so that the tip reaches the ipsilateral top of Cupid's bow; the first injection point is at the hub of the needle. The clinician primes the needle by extruding a small amount of filler from the tip and then inserts it into the vermilion border at a 30-degree angle, moving in the direction of the ipsilateral peak, and advances it to the hub. As the clinician slowly withdraws the needle, a steady, even linear thread of filler is injected, leaving behind a rolled border of filler.

The second injection in this area of the upper lip is made one needle length lateral to the first point of injection. After priming the needle, the clinician inserts it so that the tip is adjacent to the linear thread from the first injection. As the needle is withdrawn, an even linear thread of filler is injected into the border.

The third injection is made one needle length lateral to the second injection point. After priming the needle, the clinician inserts it so that the tip is adjacent to the linear thread from the second injection. As the needle is withdrawn, an even linear thread of filler is injected into the border.

To smooth any unevenly placed filler, the clinician palpates the lip mediolaterally between the thumb and first finger. Any resistant filler is smoothed by gently pulling the water-moistened lip section between the fingers. Such palpation usually causes the area to swell and bruise more than usual.

The clinician moves to the other side of the patient and repeats the procedure on the contralateral lip border.

Lower lip dermal filler injection technique

The patient is prepared in the same fashion as for the upper lip border procedure, with the clinician standing on one side. The first injection begins at the corner of the lower lip on the side where the clinician is standing. The needle is inserted into the vermilion border at a 30-degree angle and advanced to the hub. Using firm and constant pressure, a linear thread of filler is injected as the needle is being withdrawn. The second injection is made one needle length lateral to the first injection. The needle is inserted at the point where the first injection was made and then advanced to the hub. A second linear thread of filler is injected into the vermilion border. Following the same instructions as for the second injection, a third linear thread of filler is injected into the vermilion border. The clinician should completely extrude any filler placed outside the vermilion border after the third injection has been made.

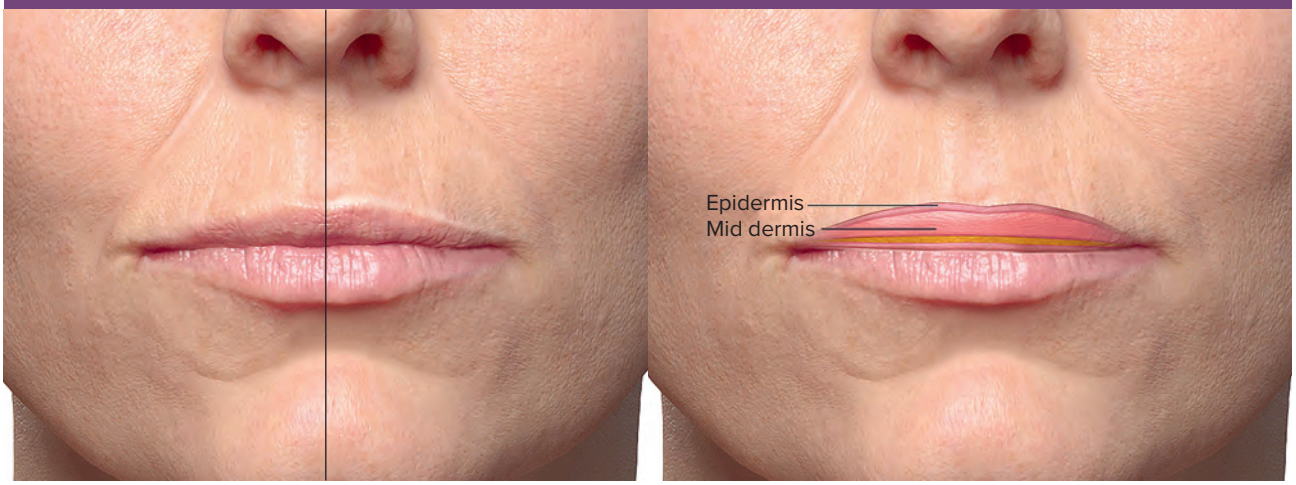
Once again, a medial-to-lateral compression of the area helps to distribute filler evenly, and the clinician then moves to the opposite side of the patient to treat the rest of the vermilion border of the lower lip with three injections. At the end, any empty areas should be injected with filler to eliminate those gaps.

Expected duration of results

- Treatment results for lips usually last approximately 6–9 months.

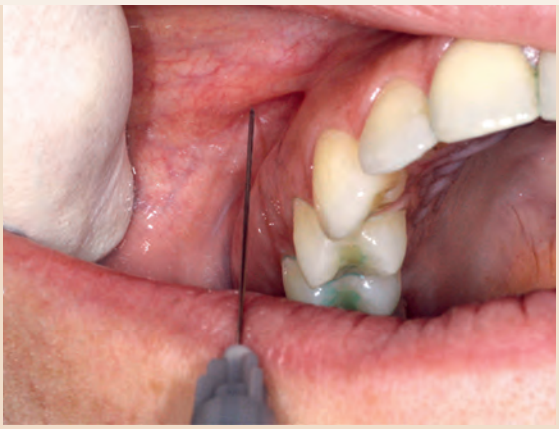
Figures 10-1 and 10-2 demonstrate the step-by-step techniques for the upper and lower lip border, respectively, and Figs 10-3 and 10-4 demonstrate case examples.

FIG 10-1 Step-by-step procedure for upper lip border

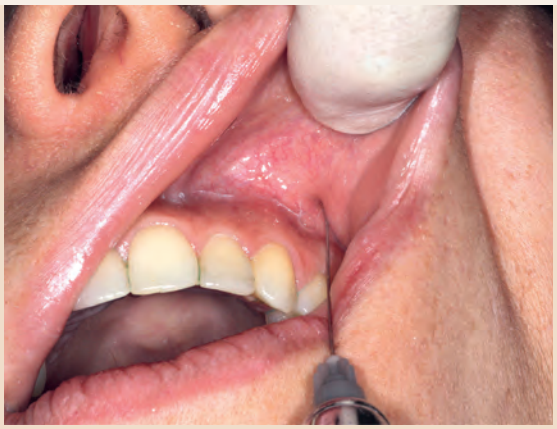


STEP 1

Administer anesthesia via a ring block procedure



- The injection is made at the bottom of the lip crease toward the distal of the canine.
- The needle is inserted until it reaches the proximity of the infraorbital foramen. Approximately one quarter of the carpule is injected.

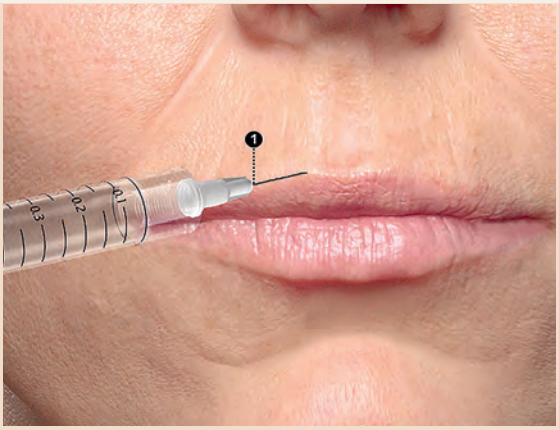


- The procedure is repeated to block the left side.
- Allow 10 minutes for anesthesia to take effect.

STEP 2

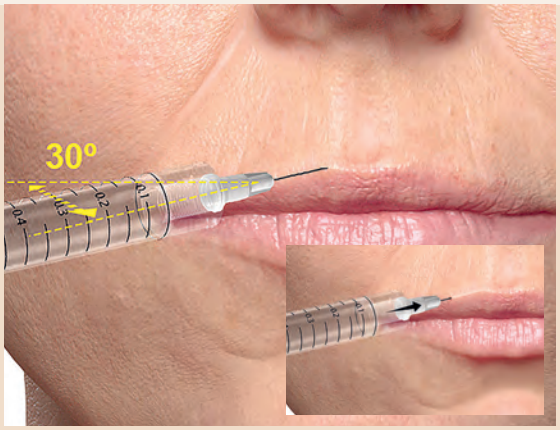
Locate the first injection site

- Lay the needle on the skin just above the vermilion border with the tip at the ipsilateral peak of Cupid's bow.
- The first injection point is at the needle hub.

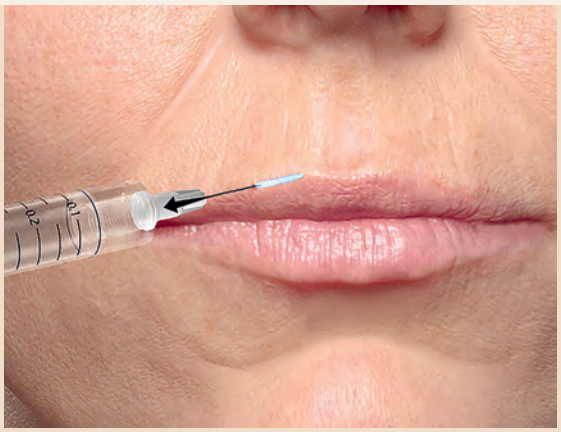


STEP 3

Make a linear thread injection



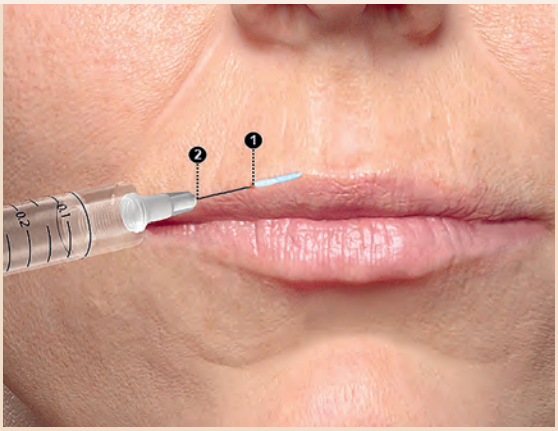
- Insert the needle at a 30-degree angle to the skin, directing it toward the ipsilateral peak of Cupid's bow, and advance to the hub.



- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

STEP 4

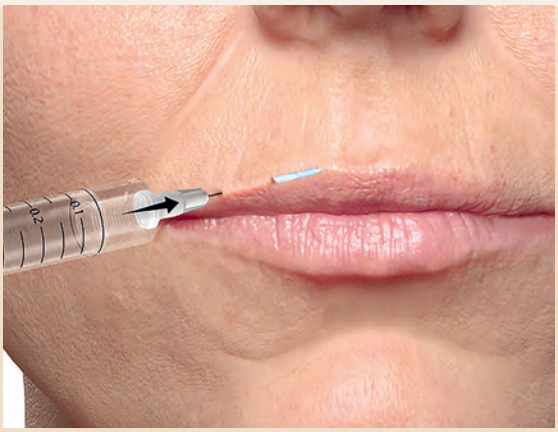
Locate the second injection site



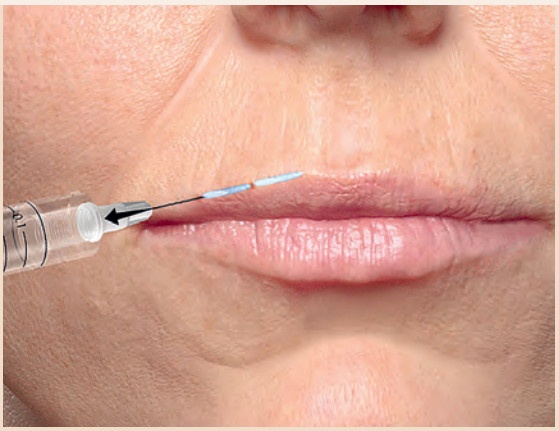
- The second injection point is one needle length lateral to the first injection.
- Lay the needle along the border of the upper lip vermilion so that the tip is immediately adjacent to the first injection. The second injection is made at the needle hub.

STEP 5

Make a second linear thread injection



- Insert the needle until the tip is adjacent to the linear thread from the first injection.

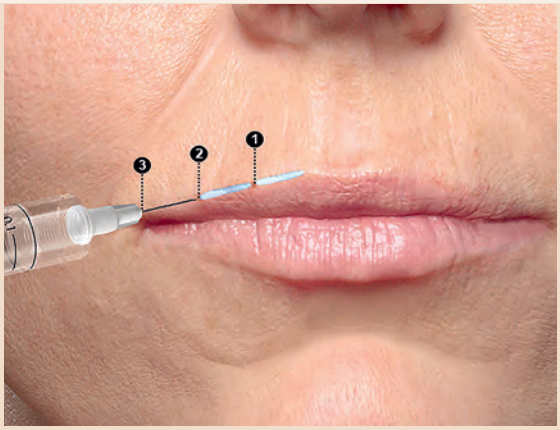


- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

STEP 6

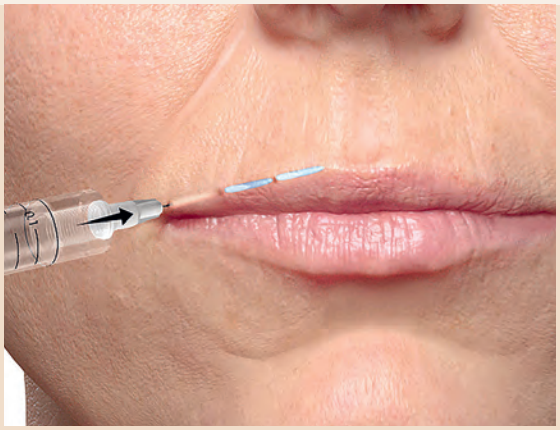
Locate the third injection site

- The third injection point is one needle length lateral to the second injection.
- Lay the needle along the border of the upper lip vermilion so that the tip is immediately adjacent to the second injection. The third injection is made at the needle hub. Generally, this is at the corner of the lip.

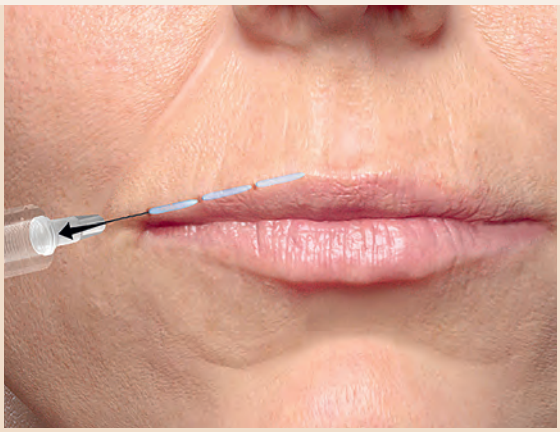


STEP 7

Make a third linear thread injection



- Insert the needle until the tip is adjacent to the linear thread from the second injection.

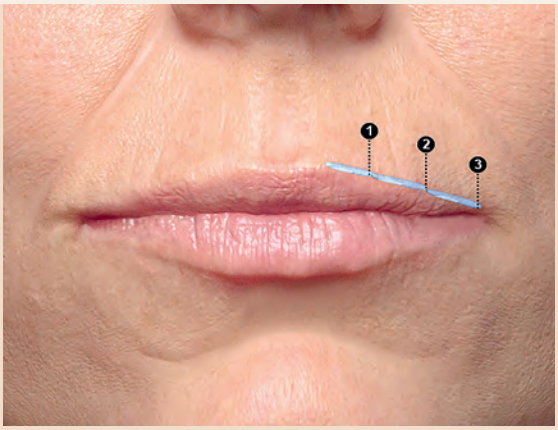


- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

STEP 8 Compress the lip

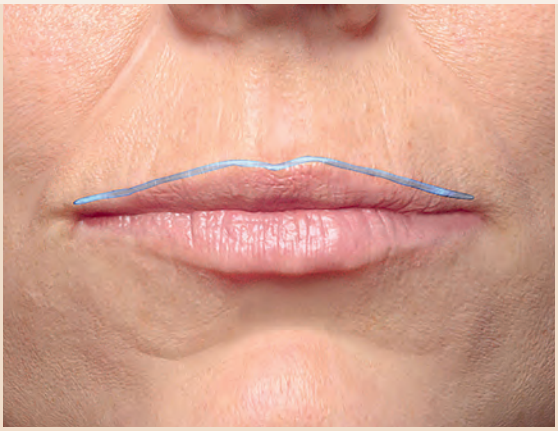
- Place the thumb on the lip and the first finger under the lip and palpate it mediolaterally to smooth out any lumps of filler.

STEP 9 Move to the other side of the patient and repeat



- Repeat steps 2 to 8 on the contralateral side of the lip.

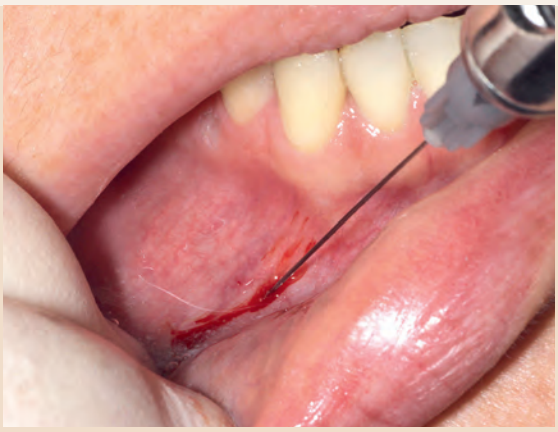
STEP 10 Eliminate gaps



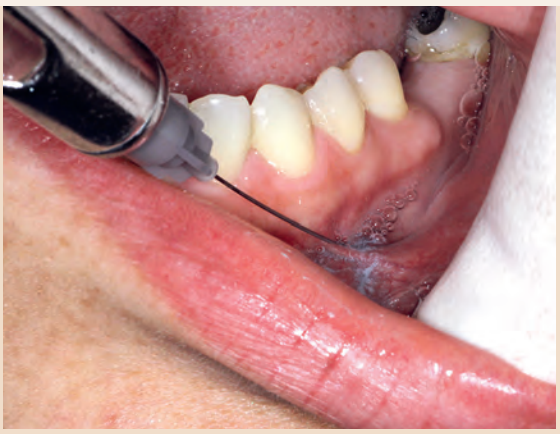
- Inject filler into any empty areas that are noted in order to eliminate all gaps, if needed.
- Compress the lip to smooth out any lumps of filler.

FIG 10-2 Step-by-step procedure for lower lip border

STEP 1 **Administer anesthesia via a ring block procedure**



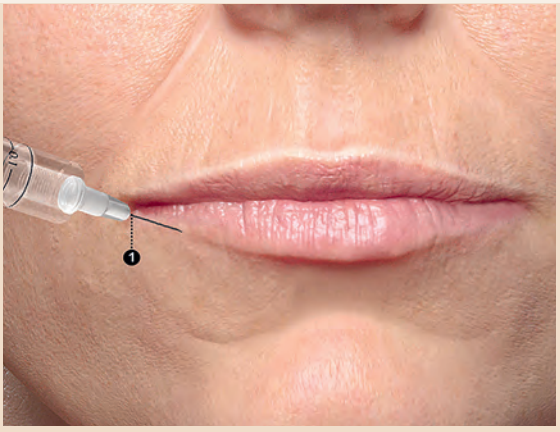
- The lower lip is blocked with anesthesia of the mental nerve.



- The procedure is repeated to block the left side.
- Allow 10 minutes for the anesthesia to take effect.

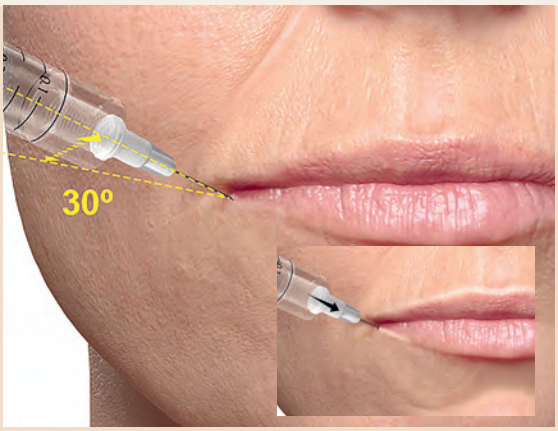
STEP 2 **Locate the first injection site**

- The insertion point for the first injection is at the corner of the lower lip.



STEP 3

Make a linear thread injection

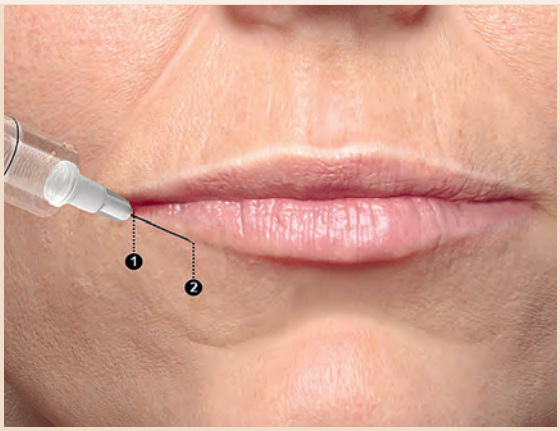


- Insert the needle into the vermilion border at a 30-degree angle to the lip epidermis, directing it toward the opposite side, and advance to the hub.

- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

STEP 4

Locate the second injection site

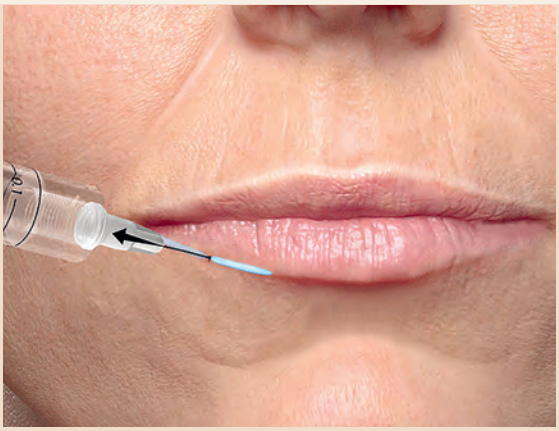


- The insertion point for the second injection is one needle length lateral to the first injection.

STEP 5

Make a second linear thread injection

- Insert the needle at the point where the first injection left off.

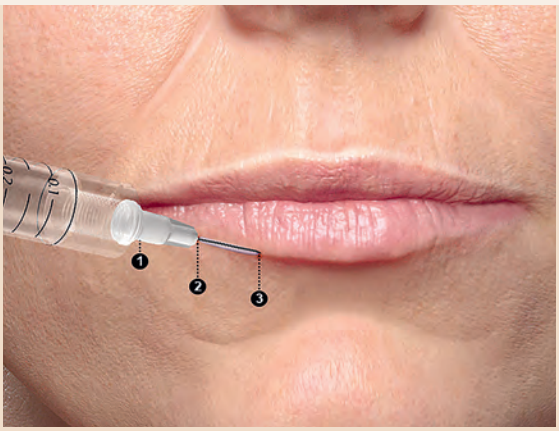


- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

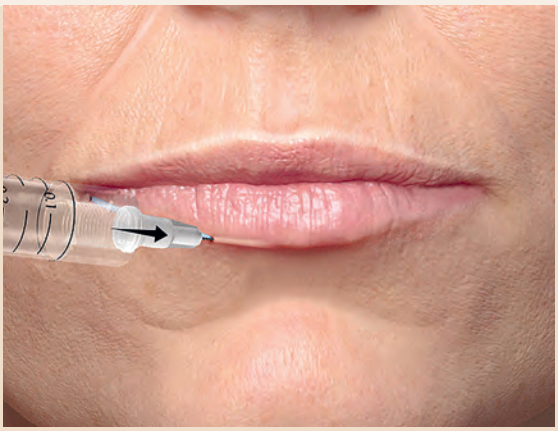
STEP 6

Locate the third injection site

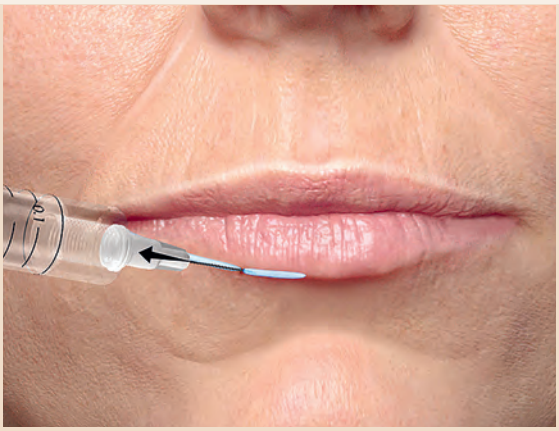
- The insertion point for the third injection is one needle length lateral to the second injection.



STEP 7 Make a third linear thread injection

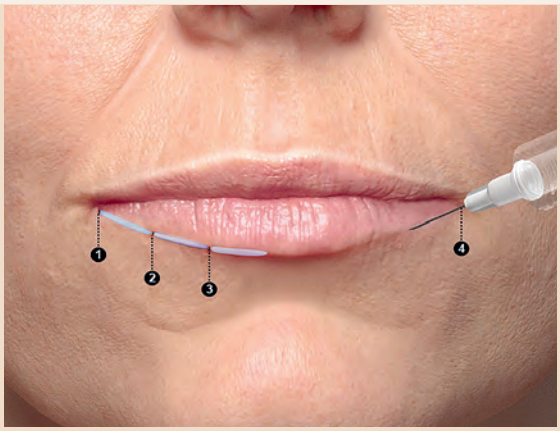


- Insert the needle at the point where the second injection left off.



- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

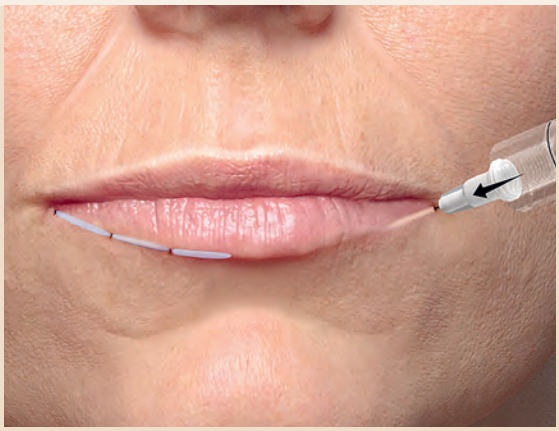
STEP 8 Locate the fourth injection site



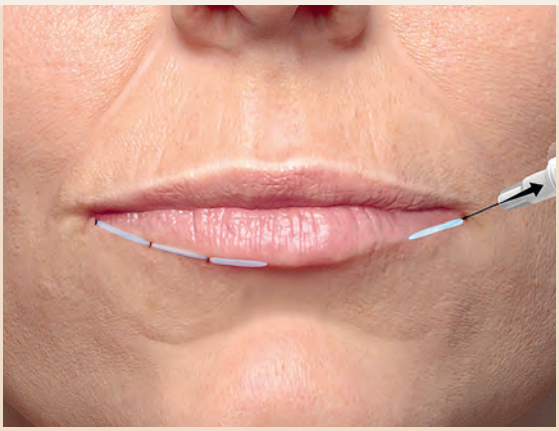
- The insertion point for the fourth injection is at the opposite corner of the lower lip.

STEP 9

Make a fourth linear thread injection



- Insert the needle into the vermilion border at a 30-degree angle to the lip epidermis, directing it toward the opposite side, and advance to the hub.

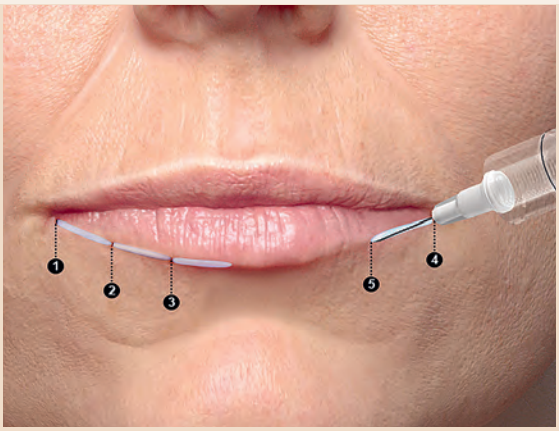


- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

STEP 10

Locate the fifth injection site

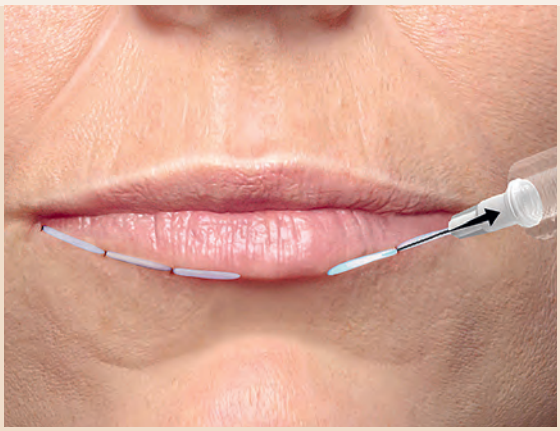
- The insertion point for the fifth injection is one needle length lateral to the fourth injection.



STEP 11

Make a fifth linear thread injection

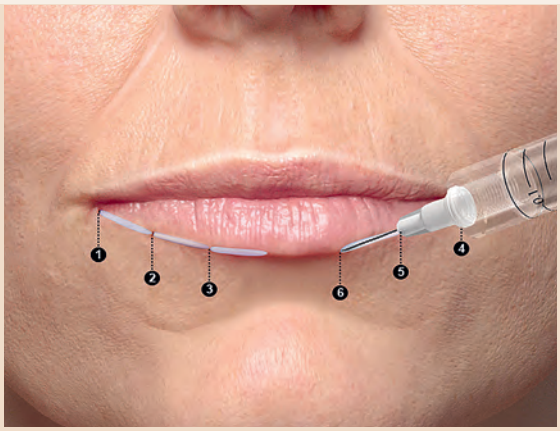
- Insert the needle at the point where the fourth injection left off.



- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

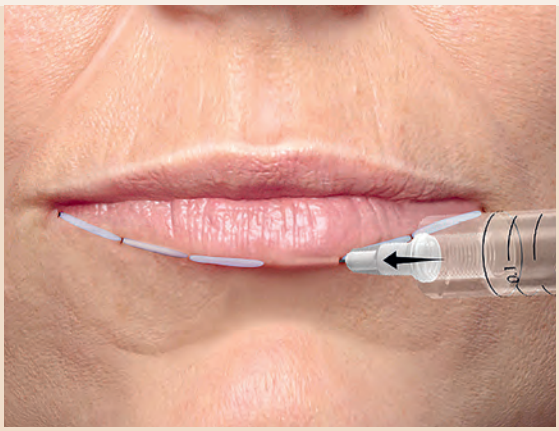
STEP 12

Locate the sixth injection site

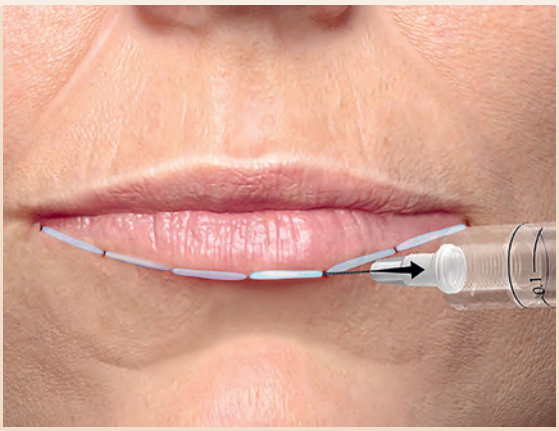


- The insertion point for the sixth injection is one needle length lateral to the fifth injection.

STEP 13 Make a sixth linear thread injection



- Insert the needle at the point where the fifth injection left off.



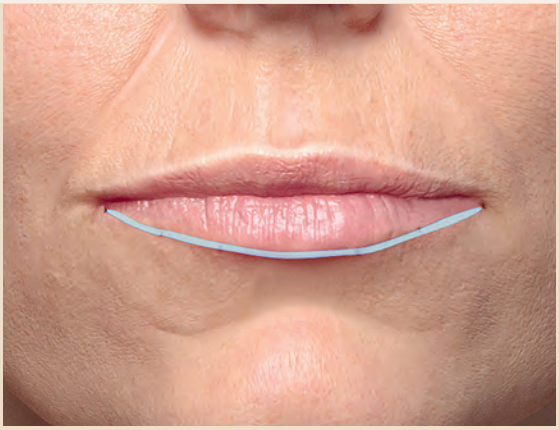
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the vermilion border.

STEP 14 Compress the lip

- Using the thumb and first finger, palpate the lip mediolaterally to smooth out any lumps of filler.
- Extrude any filler placed outside the vermilion border after the sixth injection has been made.

STEP 15 Eliminate gaps

- Inject filler into any empty areas that are noted in order to eliminate all gaps, if needed.
- Compress the lip to smooth out any lumps of filler.



Case 1

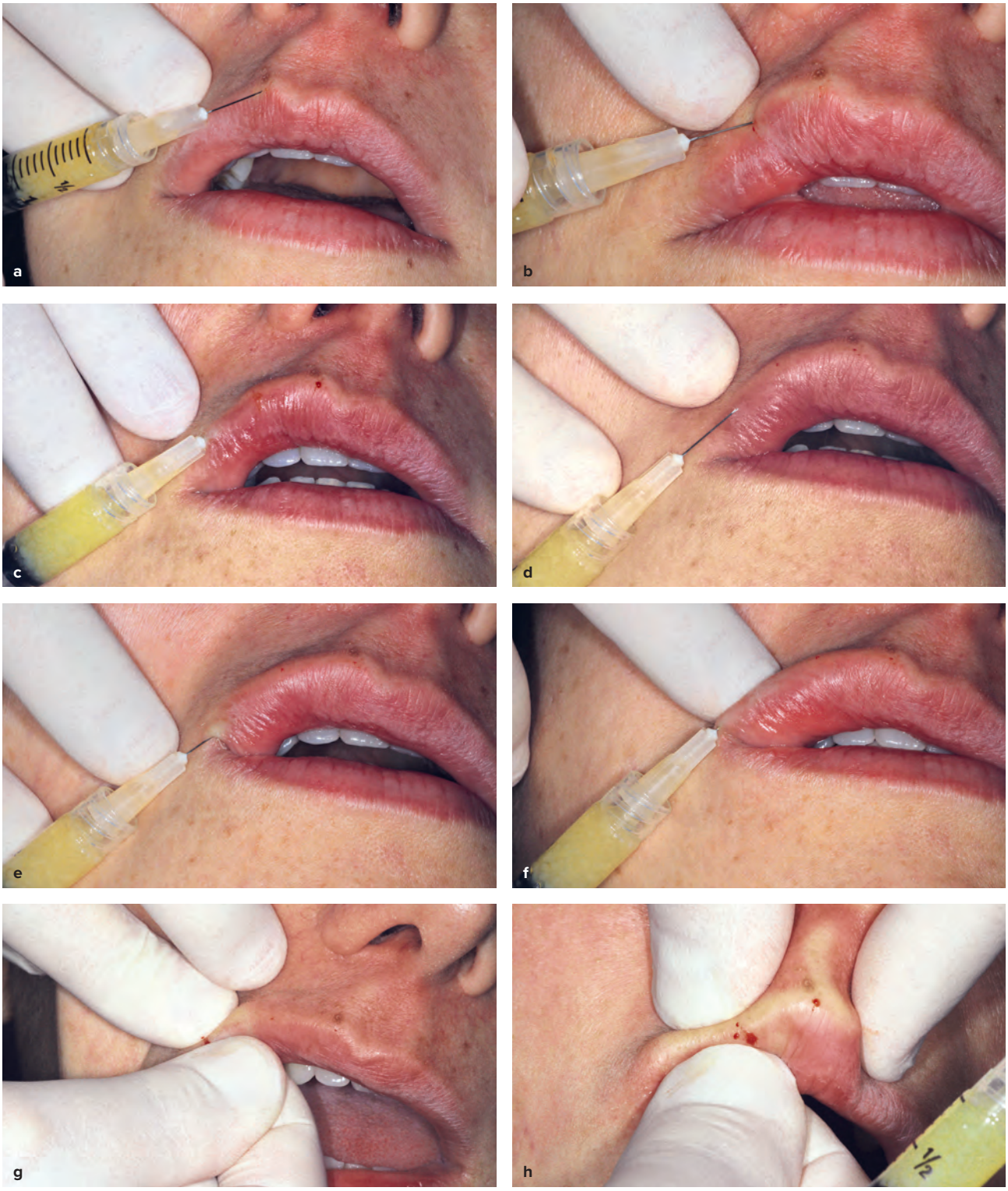


FIG 10-3 Case 1. *(a)* After defining the philtrum and Cupid's bow, we begin the contour of the lip at the transition line between the vermilion and the skin. The needle is placed on the skin to measure the injection point. *(b)* The needle should be inserted superficially with the bevel facing up. *(c)* Using the linear thread technique, the filler is injected while the clinician withdraws the needle. *(d)* The needle is again used to measure the new injection point. The filler is injected starting from the edge of the first injection. *(e)* The same procedure is used in the commissures. *(f)* Using the linear thread technique, the filler is injected starting from the end of the previous injection. *(g)* The thumbs are used to compress the filler and to give the appropriate shape to the vermilion. *(h)* This procedure is used to sculpt the vermilion.

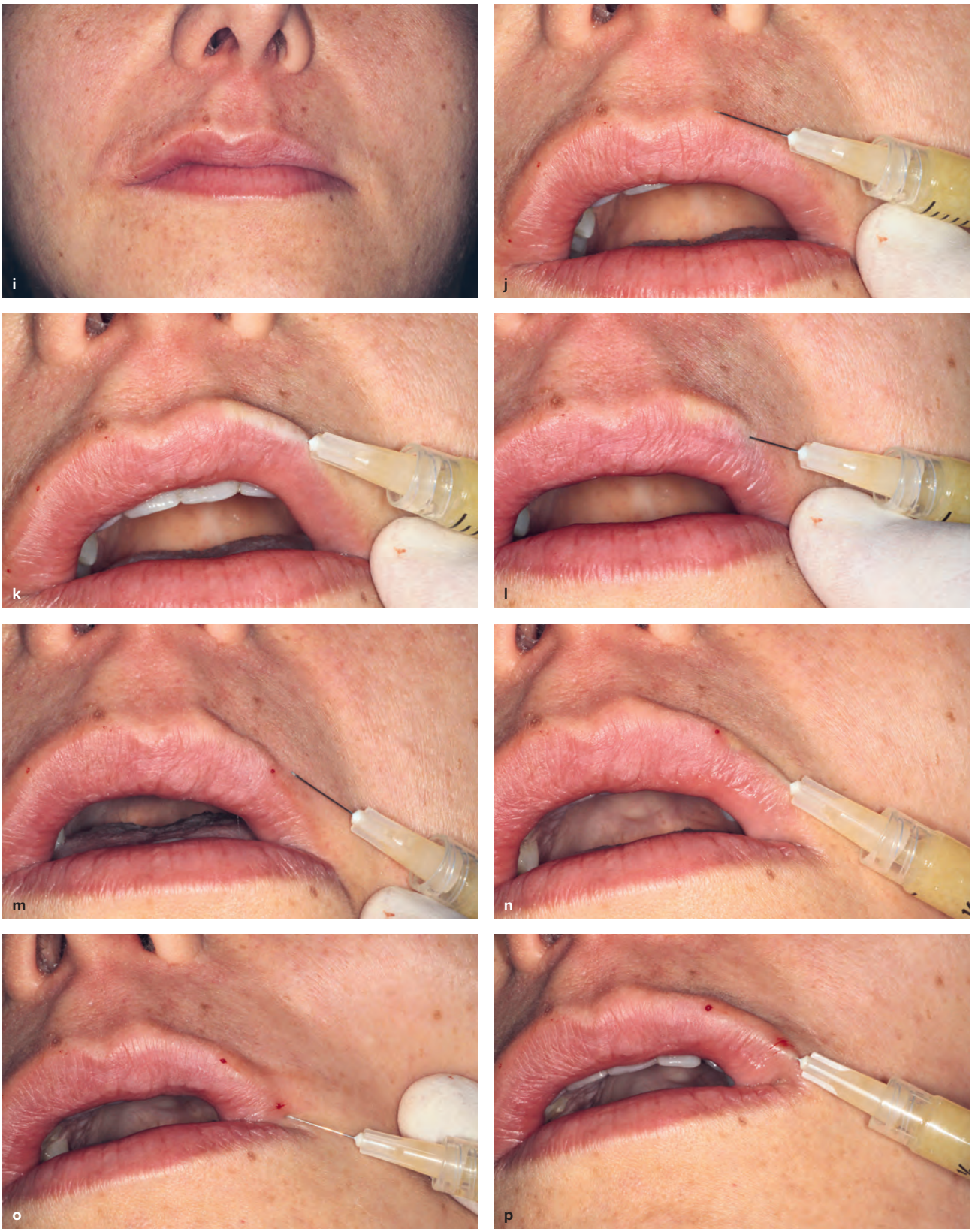


FIG 10-3 *(CONT)* *(i)* Compare the contour of the treated lip *(patient's right)* with the side that has not yet been treated. *(j)* The procedure is repeated: The needle is used to measure the first injection point. *(k)* The needle should be inserted superficially with the bevel facing up. *(l)* A linear thread injection is made using the retrograde injection method—that is, filler is injected while the needle is withdrawn. *(m)* The amount of filler injected must be consistent throughout the contour. *(n)* The needle is used to measure the location of the second injection point. *(o)* The same procedure is done in the commissures. *(p)* The amount of filler injected must be consistent throughout the contour.

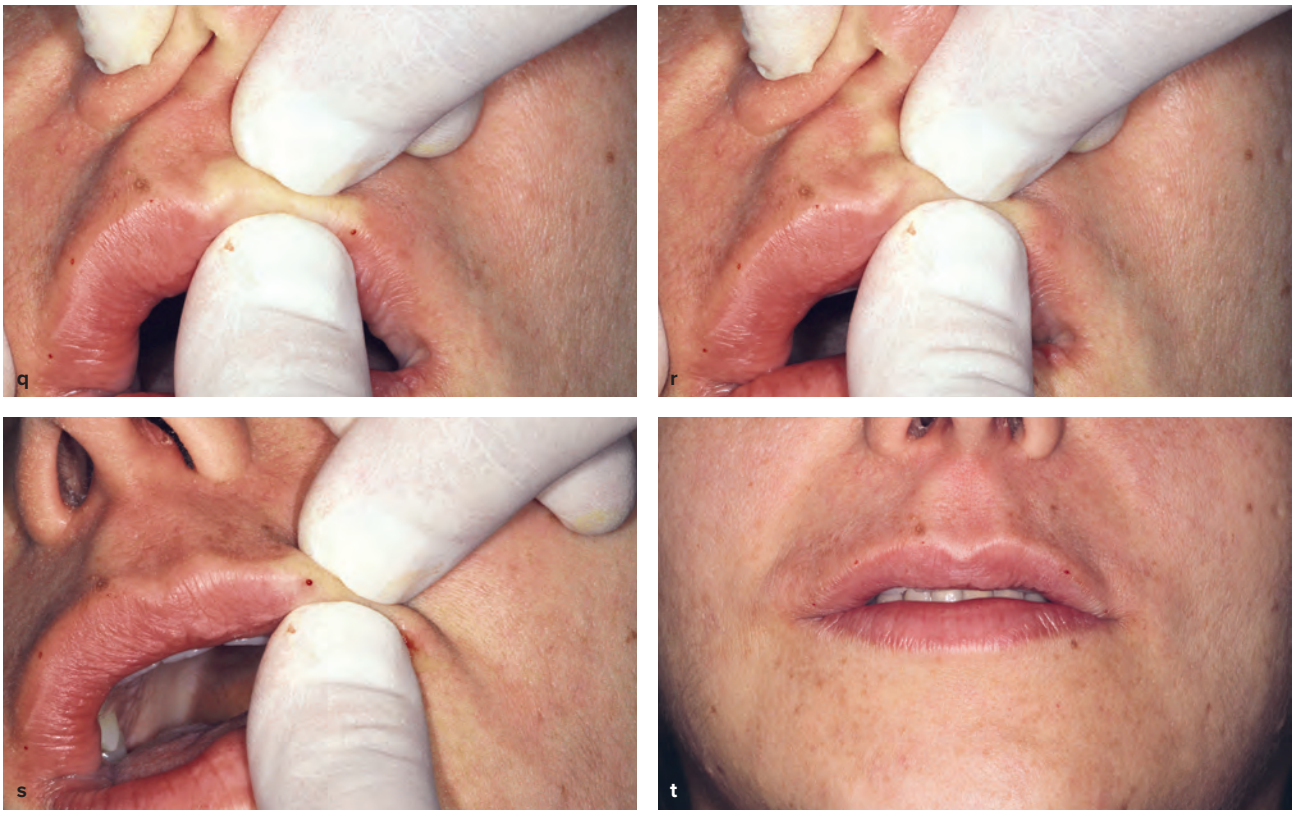


FIG 10-3 *(CONT)* *(q)* The thumbs are used to compress the filler to give the appropriate shape to the lip edge. *(r)* This procedure is used to sculpt the lip edge to the appropriate shape. *(s)* Special attention is paid to the sculpting of the angle. *(t)* Final appearance. Observe the harmony of the new contour of the upper lip.

Case 2

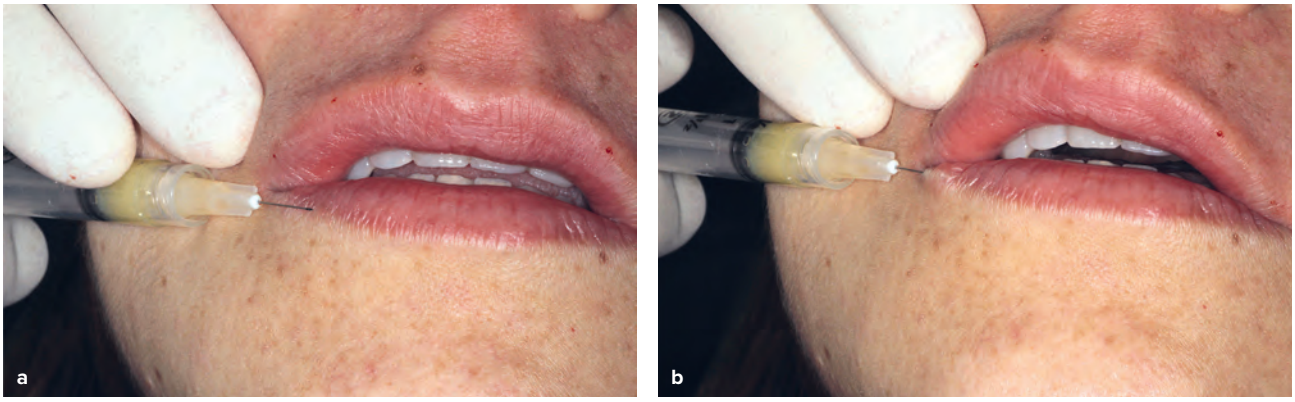


FIG 10-4 Case 2. *(a)* The injection of the lower lip border begins in the same area as the upper lip border: at the corner of the mouth. *(b)* After advancing to the hub, the filler is dispensed as the needle is removed.

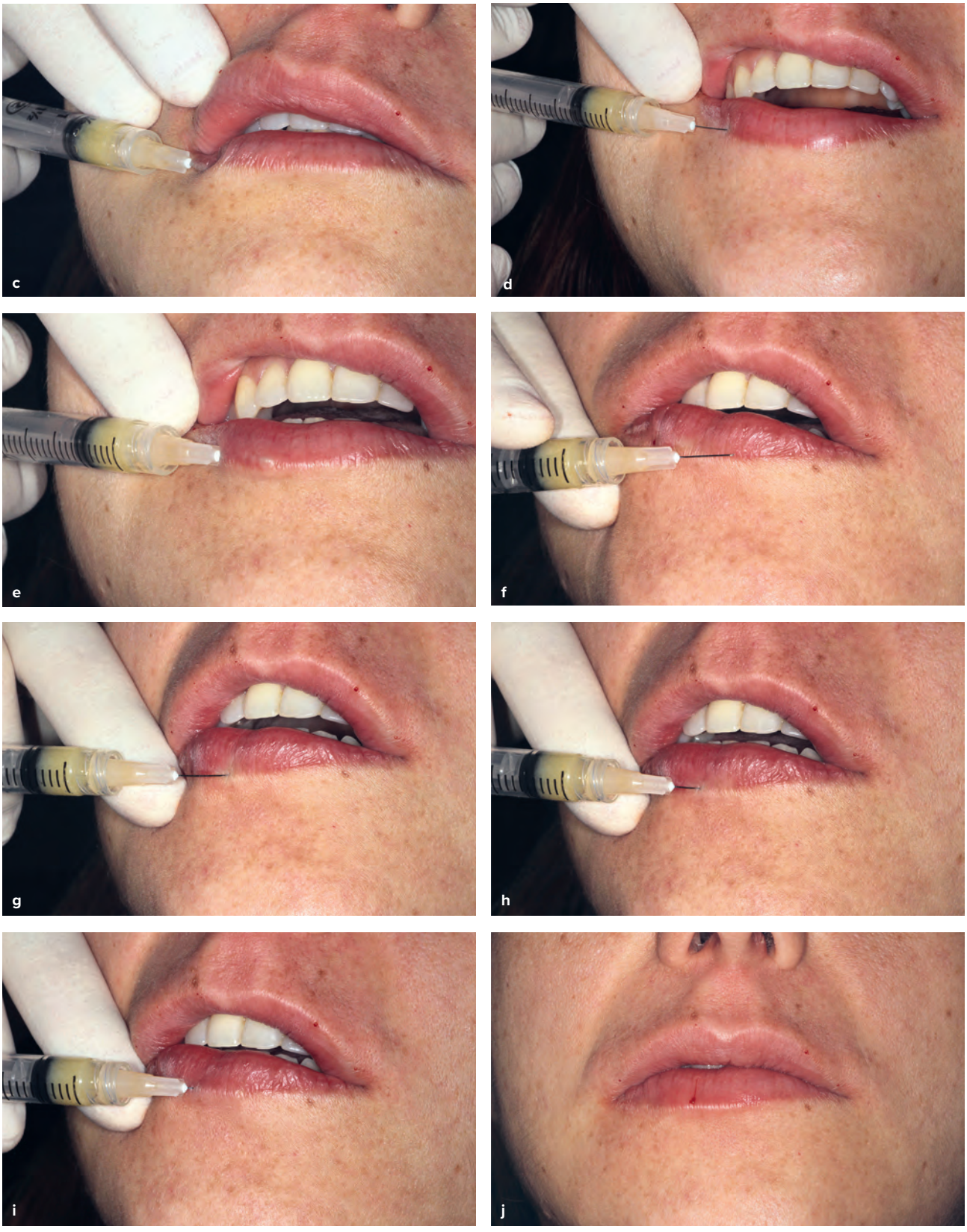


FIG 10-4 *(CONT)* *(c)* The needle should be inserted superficially with the bevel facing up. *(d)* We repeat the procedure by withdrawing the needle and then using it to measure the new insertion point. *(e)* The filler is injected beginning at the end of the first injection point. *(f)* We repeat the procedure by withdrawing the needle, then using it to measure the new insertion point. From here, we can proceed with the opposite corner or the center region. In this case, we proceed with the center region. *(g)* The insertion point must be made at the transition between the red vermilion border and the skin. *(h)* The filler is dispensed as the needle is removed. *(i)* Observe the change in the contour on the side that has been treated. *(j)* Final appearance of the right side. Observe the contour change.

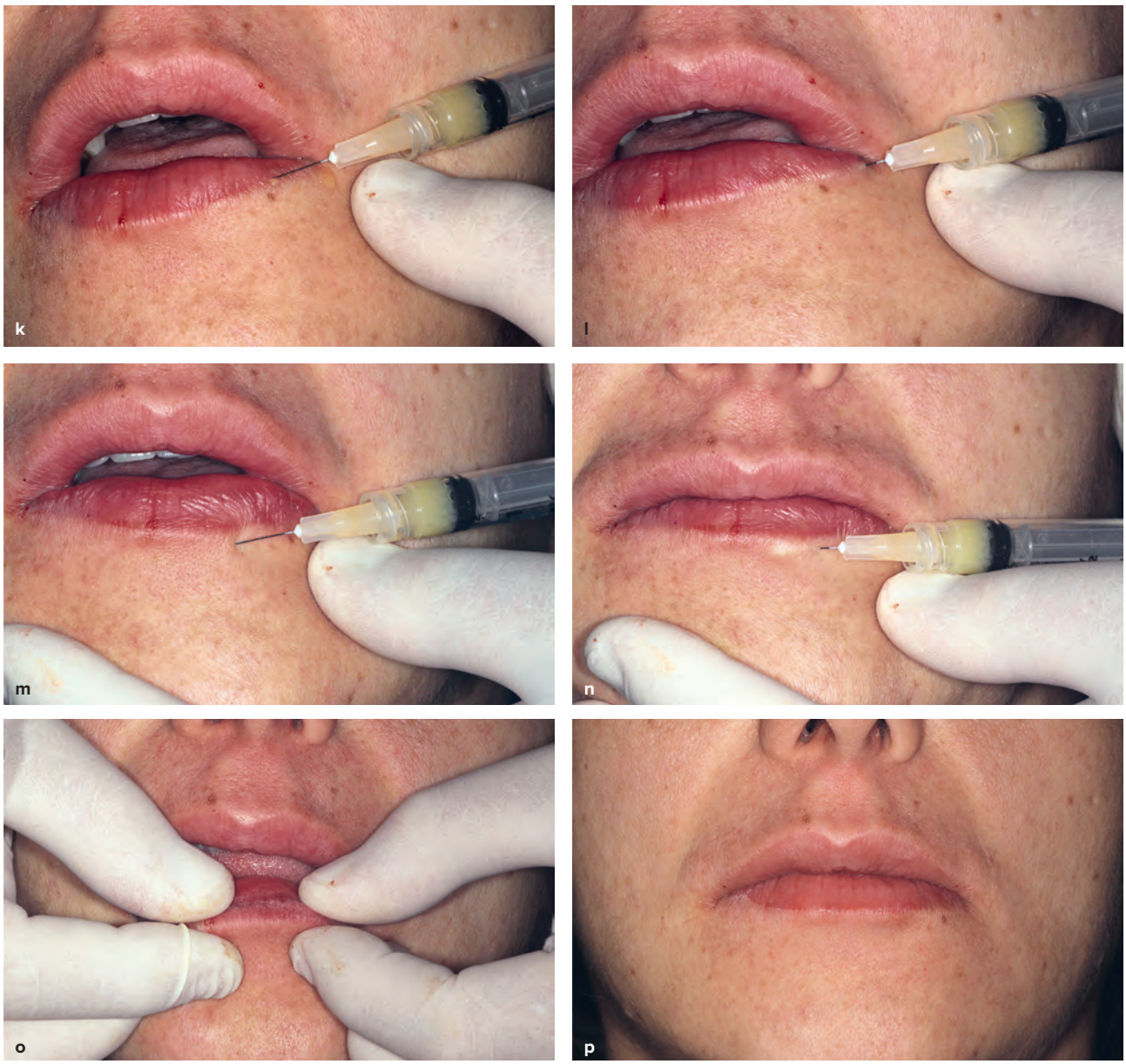


FIG 10-4 *(CONT)* *(k)* The filler is dispensed as the needle is removed. *(l)* We finish at the corner of the mouth. *(m)* We always use the needle to measure the new insertion point. *(n)* We continue to contour the lip, always injecting in the transition between the red vermilion border and the skin. *(o)* Using the thumbs, we compress the filler to give the appropriate shape to the lip border. *(p)* Final appearance. Observe the harmony of the new lip contour.

LIP BODY

Esthetically, the upper lip with its twin-peaked Cupid's bow beneath the philtral columns should appear half as large as the lower lip. Dermal filler lip augmentation often targets the Cupid's bow to emphasize the natural shape of the lip.

Indications and contraindications

- Lips (and the perioral region generally) require extensive patient assessment and review so that the patient and clinician may confirm exactly which esthetic enhancements can realistically be planned.
- Restoring the volume deficits in the lip border and lip body simultaneously can help improve conditions in patients requiring both of these dermal filler procedures.
- Frequently, only the upper lip needs treatment as it is more significantly affected by age-related volume loss.
- Lip border dermal filler treatment should precede lip body treatment.
- Rapid lip edema requires completion of treatment of one side at a time.

Anesthesia and filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 2.6 mL)
  - Upper lip: 1.2 mL
  - Lower lip: 1.2 mL
  - Lip corners: 0.2 mL
- 30-gauge, 0.5-inch needle
- A topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base
- Suggested dermal fillers:
  - Teosyal RHA 2
  - Restylane Silk
  - Restylane
  - Revanesse Versa (Prollenium)
  - Juvéderm Ultra XC
  - Juvéderm Volbella
  - PRP
- Suggested dermal filler quantity:
  - 0.5–0.8 mL total for the body of the upper and lower lips

Precautions

- Complications from lip augmentation can be profound, including substantial swelling and bruising.
- Dermal filler treatment of the lips can trigger recurrence of oral herpes simplex, which may be prevented with prophylactic antiviral therapy.
- Intravascular dermal filler injection of the labial arteries deep in the mucosa can result in vascular occlusion, ischemia, and necrosis.

Anesthesia technique

Any lipstick or other lip cosmetics must be removed. Then, alcohol pads are used to clean the area around the lips and the lips themselves. Because it is more sensitive, the upper lip should be pretreated at the injection sites with a 20% benzocaine topical anesthetic. A lip ring block is performed using 1.2 mL 2% lidocaine-epinephrine solution for each of the upper and lower lips; the lip corners receive a total volume of 0.2 mL 2% lidocaine-epinephrine solution. The anesthesia should take effect in 3–5 minutes.

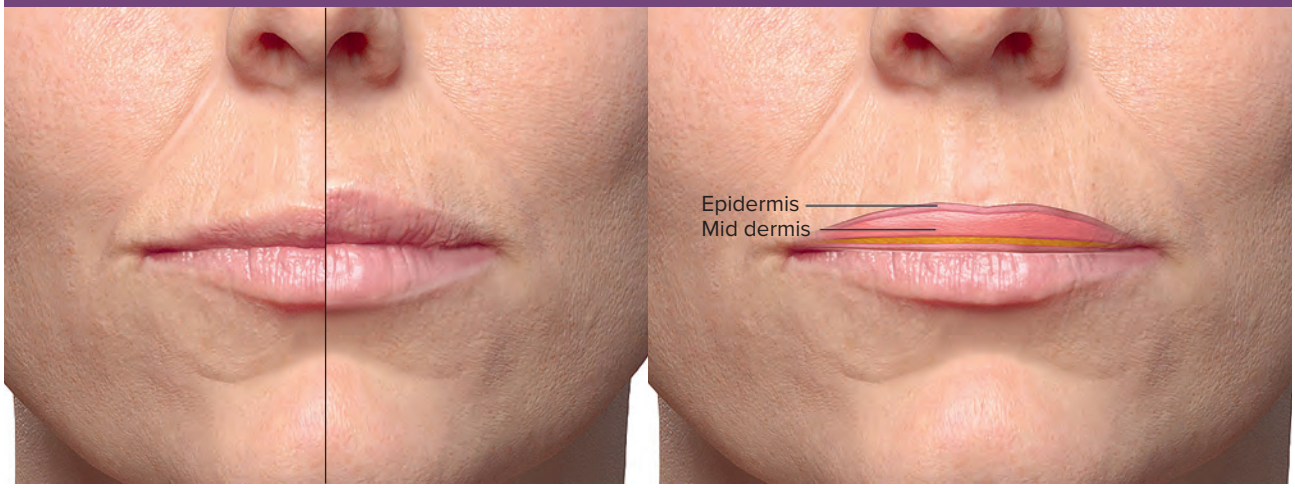
Upper lip body injection technique

The patient is reclined at a 60-degree angle, and the lips are cleaned with alcohol. A 30-gauge, 0.5-inch needle is firmly attached to the prefilled dermal filler syringe to withstand full plunger pressure.

Standing on the same side of the patient as the lip area to be treated, the clinician places the needle over the mucosa of the wet-dry lip border so that the tip reaches the ipsilateral peak of Cupid's bow. The needle hub marks the first injection point. The clinician primes the needle by extruding a small amount of filler from the tip and then inserts it into the lip mucosa, parallel to the lip body and medially toward the ipsilateral peak. Once advanced to the hub, the needle is slowly withdrawn as a linear thread of filler is evenly deposited, visibly plumping the lip. A second linear thread is then injected at a point located one needle length lateral to the first.

To smooth any unevenly distributed filler, the clinician gently palpates the treated lip area mediolaterally between the first finger (placed intraorally) and the thumb. Stubborn areas can be moistened with water and gently pulled between the fingers and thumb. Such smoothing often results in increased swelling and bruising in the area.

FIG 10-5 Step-by-step procedure for upper lip body



The clinician then moves to the opposite side of the patient to treat the other half of the upper lip using the same injection techniques.

Lower lip body injection technique

The patient is prepared in the same fashion as for the upper lip border procedure, with the clinician standing on the same side of the patient as the lip area being treated. For the lower lip, the clinician places the needle against the mucosa at the wet-dry border so that the length of the needle covers the center zone of the lower lip. The first injection point is at the hub of the needle. The clinician primes the needle and then inserts it parallel-medial to the center of the lip body. Once it has been advanced to the hub, the needle is then slowly withdrawn as an even thread of filler is deposited in the body of the lower lip. A second linear thread is then injected at a point located one needle length lateral to the first.

To smooth any unevenly distributed filler, the clinician gently palpates the treated lip area mediolaterally between the first finger (placed intraorally) and the thumb. Stubborn areas can be moistened with water and gently pulled between the fingers and thumb. Such smoothing often results in increased swelling and bruising in the area.

The clinician then moves to the opposite side of the patient to treat the other half of the lower lip using the same injection techniques.

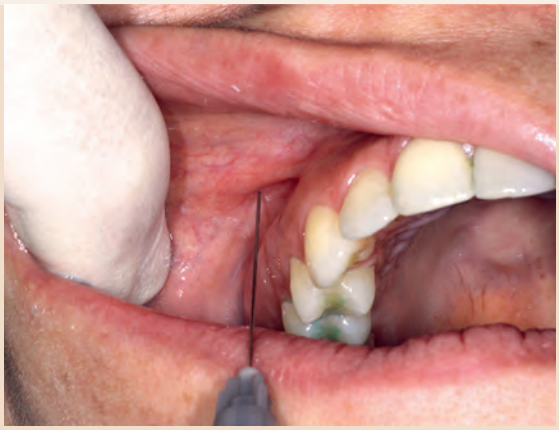
Expected duration of results

- Treatment results for lips usually last approximately 6 to 9 months.

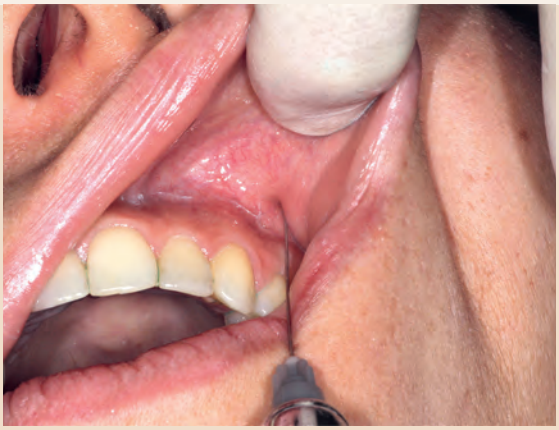
Figures 10-5 and 10-6 demonstrate the step-by-step techniques for the upper and lower lip body, respectively, and Figs 10-7 and 10-8 demonstrate case examples.

STEP 1

Administer anesthesia via a ring block procedure



- The injection is made at the bottom of the lip crease toward the distal of the canine.
- The needle is inserted until it reaches the proximity of the infraorbital foramen. Approximately one quarter of the carpule is injected.

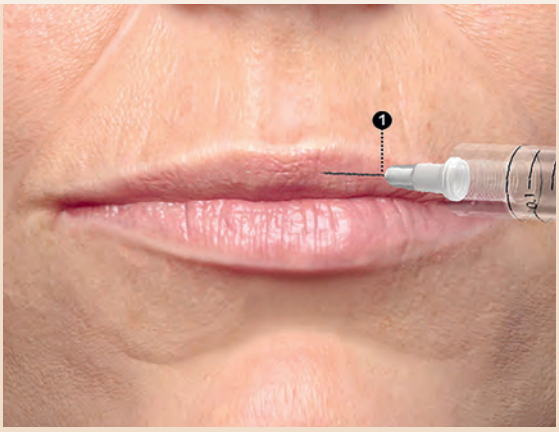


- The procedure is repeated to block the left side.
- The upper lip should be pretreated at the injection sites with a 20% benzocaine topical anesthetic.
- Allow 10 minutes for anesthesia to take effect.

STEP 2

Locate the first injection site

- Lay the needle against the mucosa at the wet-dry border so that the needle tip is at the ipsilateral peak of Cupid's bow.
- The first injection point is at the needle hub.



STEP 3

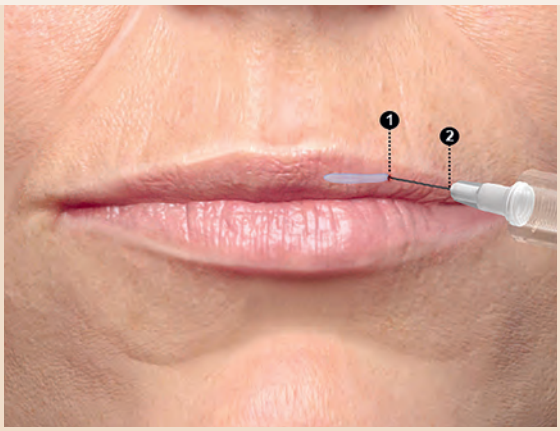
Make a linear thread injection

- Insert the needle into the lip mucosa so that it is parallel to the lip body, directing it medially toward the ipsilateral peak of Cupid's bow, and advance to the hub.

- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the body of the upper lip.

STEP 4

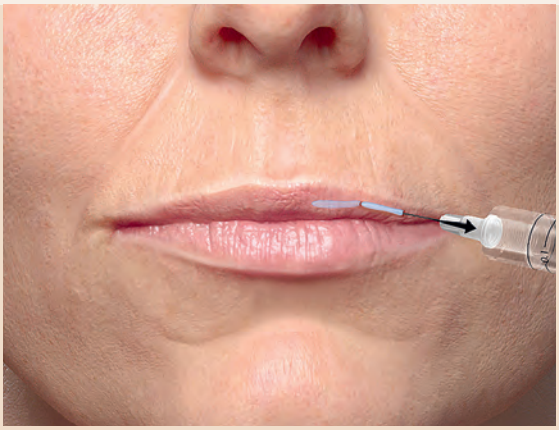
Locate the second injection site



- The second injection point in the upper body is one needle length lateral to the first injection point.

STEP 5 Make a second linear thread injection

- Insert the needle into the body of the upper lip parallel-medial to the lip mucosa, directing it toward the opposite side, and advance to the hub.



- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the lip body

STEP 6 Compress the lip

- Gently grasp the lip with the thumb on the skin and the first finger under the lip, and slowly compress from medial to lateral along the length of the lip to smooth any visible or palpable bumps of filler product.
- If bumps do not easily compress, the area may be moistened with water and stretched between the fingers.

STEP 7 Move to the other side of the patient and repeat

- Repeat steps 2 to 6 on the contralateral side of the lip.

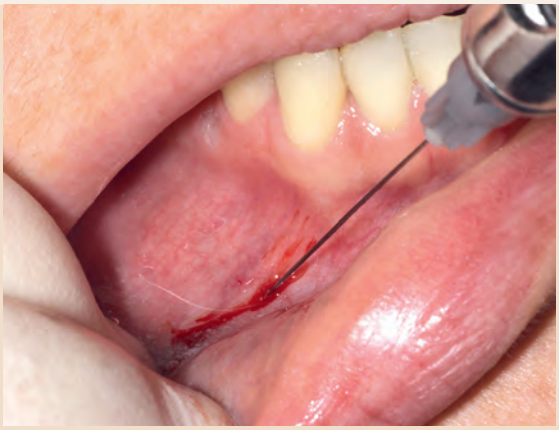
STEP 8 Eliminate gaps

- Inject filler into any empty areas that are noted in order to eliminate all gaps, if needed.
- Compress the lip to smooth out any lumps of filler.

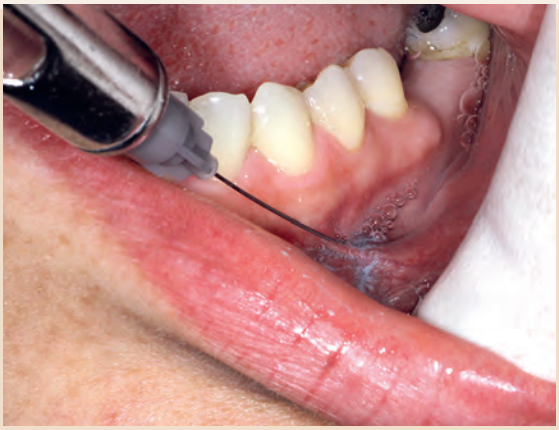
FIG 10-6 Step-by-step procedure for lower lip body

STEP 1

Administer anesthesia via a ring block procedure



- The lower lip is blocked with anesthesia of the mental nerve.

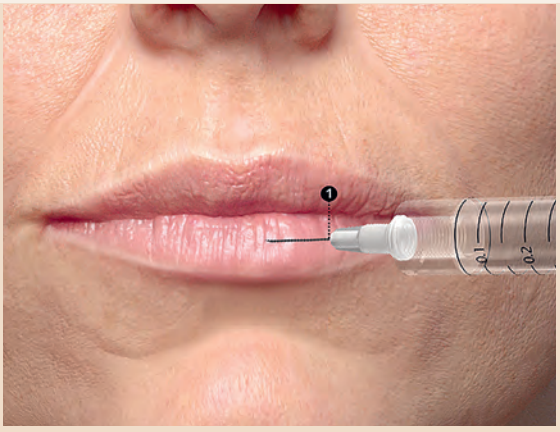


- The procedure is repeated to block the left side.
- Allow 10 minutes for the anesthesia to take effect.

STEP 2

Locate the first injection site

- Lay the needle on the mucosa at the wet-dry border so that the tip of the needle is aligned with Cupid's bow.
- The first injection point is at the needle hub.



STEP 3

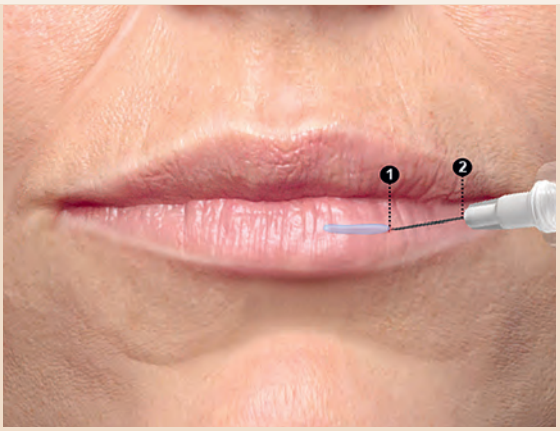
Make a linear thread injection

- Insert the needle into the body of the lower lip parallel-medial to the lip mucosa, directing it toward the opposite side, and advance to the hub.

- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the body of the lower lip.

STEP 4

Locate the second injection site



- The second injection point in the lower lip body is one needle length lateral to the first injection point.

STEP 5 Make a second linear thread injection

- Insert the needle until the tip is adjacent to the first injection point.

- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the body of the lower lip.

STEP 6 Compress the lip

- Gently grasp the lip with the thumb and the first finger, and slowly compress from medial to lateral along the length of the lip to smooth any visible or palpable bumps of filler product.
- If bumps do not easily compress, the area may be moistened with water and stretched between the fingers.

STEP 7

Move to the other side of the patient and repeat

- Repeat steps 2 to 6 on the contralateral side of the lip.

STEP 8

Eliminate gaps

- Inject filler into any empty areas that are noted in order to eliminate all gaps, if needed.
- Compress the lip to smooth out any lumps of filler.

Case 3

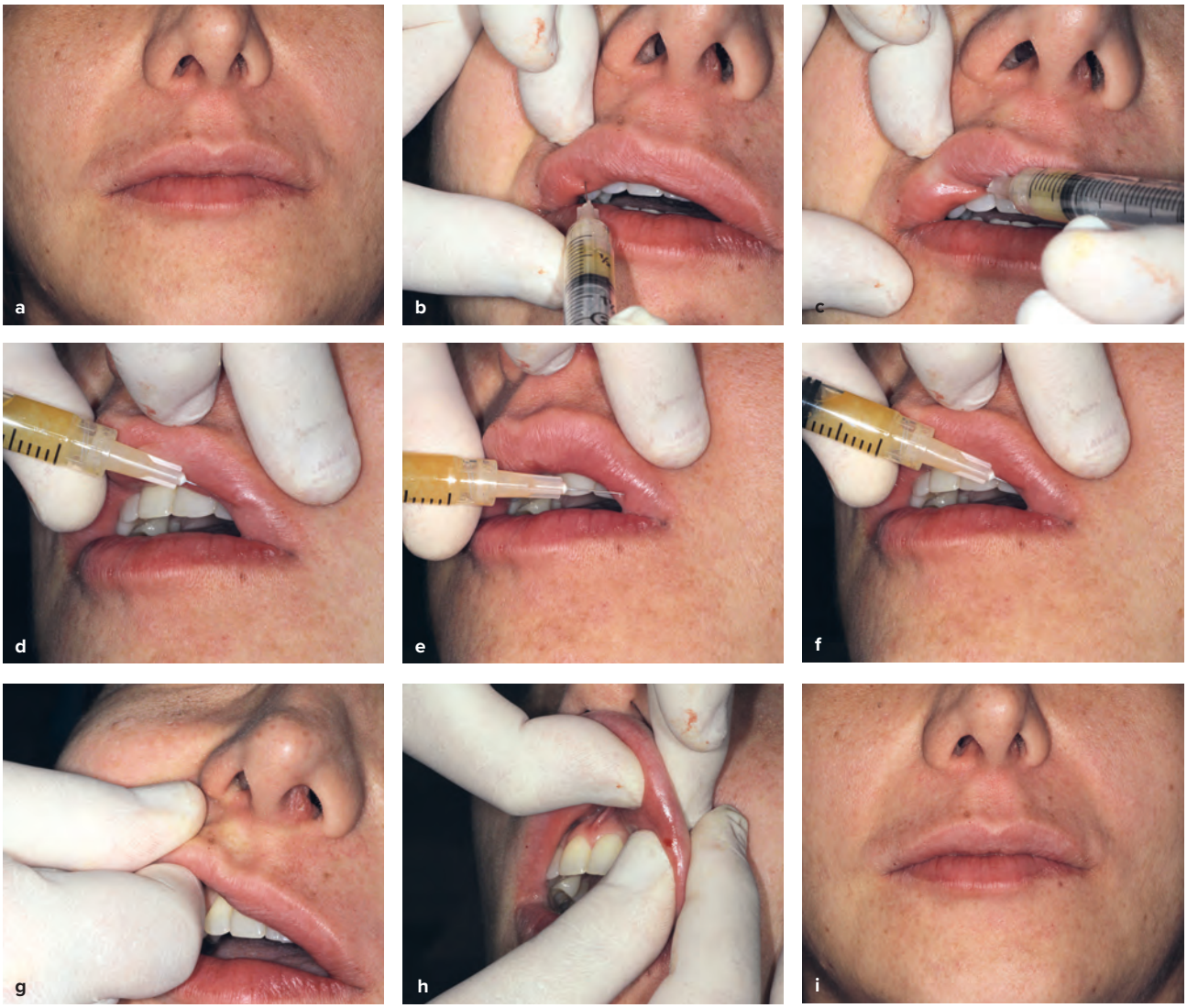


FIG 10-7 Case 3. *(a)* Pretreatment appearance. After the lip border has been defined, volume can be added to the body of the lip. In this case, the patient already had good protrusion of the median region of the upper lip, so only the lateral and angle volume will be increased. *(b)* The first injection will be made in the lateral portion of the lip. *(c)* A linear thread injection is made in the transition between the wet and dry portion of the lip. *(d)* A second linear thread injection is made in the lateral portion of the contralateral side. It receives the same volume as the treated side to maintain symmetry. *(e)* A linear thread injection is made at the angle of the mouth so that the volume reverses the commissure. *(f)* Care must be exercised not to increase the angle excessively. *(g)* To compress the filler material, the thumb is fixed in place on the outer lip while the index finger massages the treated area. The inner mucosa of the lip is lubricated by saliva and slides more easily and with less trauma. *(h)* With both the thumb and index fingers, the entire lip is massaged to spread the filler and give the lip its final shape. We call this technique *labial sculpture*. *(i)* Final appearance. Note that the labial commissures became evident and the volume of the lip increased without being excessive.

Case 4

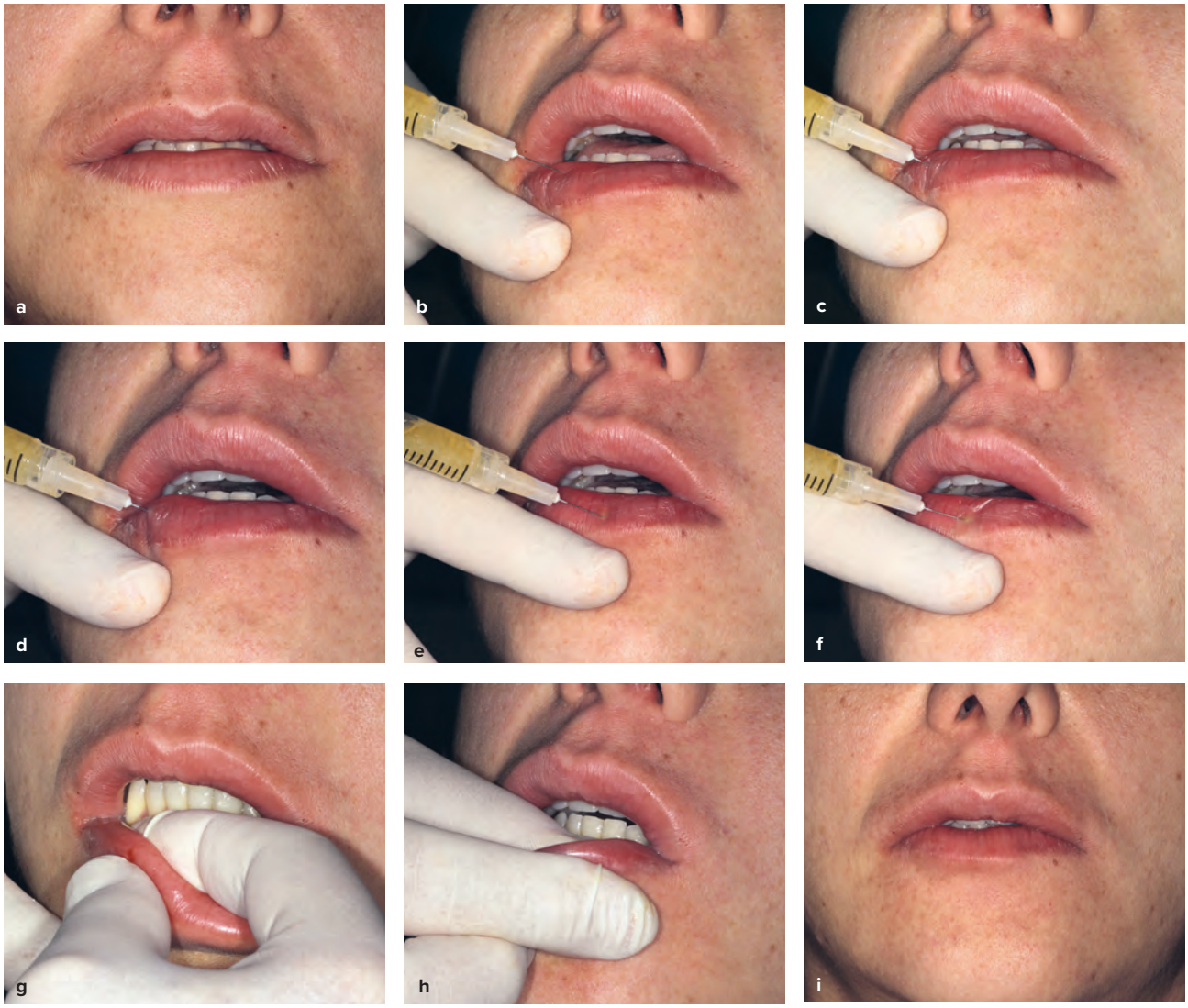


FIG 10-8 Case 4. *(a)* Pretreatment view. *(b)* To add volume to the lower lip, filler is injected only in the lateral aspects. *(c)* A linear thread injection is made somewhat deeper than usual in the transition of the wet portion and the dry portion of the vermilion. *(d)* The volume injected should be enough to improve the projection of the lip but without being excessive. *(e)* The second linear thread injection is made in the transition between the dry and wet portion. Care must be taken to inject the same volume as was used on the side already treated. *(f)* The same amount is injected on both sides. *(g)* With both thumbs and the index fingers, the lip is massaged to spread and contour the injected material. We call this the *lip sculpture technique*. *(h)* The other side of the lip is massaged in the same manner. *(i)* Final appearance of the lower lip. Note that after we inject the lateral portions, the median region is smaller, which gives the mouth a more youthful and sensual appearance.

PHILTRUM

The *philtrum* is the vertical groove that runs from the nose to the upper lip, bordered on each side by ridges known as *philtral columns*. The philtrum adds expression to the face and helps us speak clearly. A well-defined philtrum is also considered an attractive facial feature because it gives the mouth a sexy, perky look.

As we age, the space between the nostrils and the upper lip tends to increase, contributing to changes in the shape of the mouth and lips. This flattening of the philtral columns is often accompanied by blunting of the upper lip and loss of projection of Cupid's bow. The upper lip tends to roll under and, in some cases, completely disappears.

Indications and contraindications

- Having lip injections can help enhance the illusion that the distance between the bottom of the nose and the upper lip is shorter.
- If the space between the nose and upper lip is unusually long and beyond the help of fillers, a surgical lip lift and rebuilding of the philtrum may be necessary.

Anesthesia and dermal filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 2.6 mL)
  - Upper lip: 1.2 mL
  - Lower lip: 1.2 mL
  - Lip corners: 0.2 mL
- 30-gauge, 0.5-inch needle
- Suggested dermal fillers:
  - Teosyal RHA 2
  - Restylane Silk
  - Juvéderm Ultra XC
  - Juvéderm Volbella
  - PRP
- Suggested quantity of fillers:
  - 0.1 mL per philtral column

Precautions

- As with the lips themselves, substantial volumes of anesthesia are required for pain management in this area using a ring block technique.

Anesthesia technique

Any lipstick or other lip cosmetics must be removed. Then, alcohol pads are used to clean the area around the lips and the lips themselves. A lip ring block is performed, using 1.2 mL 2% lidocaine-epinephrine solution for each of the upper and lower lips; the lip corners receive a total volume of 0.2 mL 2% lidocaine-epinephrine solution. The anesthesia should take effect in 3–5 minutes.

Dermal filler injection technique

The patient is placed in a supine position, and the philtrum and lips are cleaned with alcohol. A 30-gauge, 0.5-inch needle is firmly attached to the prefilled dermal filler syringe to withstand full plunger pressure.

Standing on one side of the patient, the clinician places the thumb and index finger of the nondominant hand on either side of the philtrum and gently pinches the skin together. This causes the natural path of the philtral columns to become prominent, providing a road map for injecting the filler. (If desired, a white pencil can be used to mark these locations.) Note that the philtral columns are not parallel to each other, but rather form an inverted "V" that narrows as it approaches the columella of the nose. Using the dominant hand, the clinician places the needle over one of the philtral columns to gauge the distance from the tip of Cupid's bow to the columella of the nose. The needle should be long enough to cover this span with a single entry point and one injection.

The insertion point for the philtrum is at the vermilion border between the lip and the skin. The clinician primes the needle by extruding a small amount of filler from the tip and then inserts it into the closest raised ridge. The fingers pinching the philtrum are relaxed as the needle advances to the columella of the nose. The needle is then slowly withdrawn and a steady, even linear thread of filler is injected into the philtral column. Definition of the column and enhancement of Cupid's bow should be immediately visible.

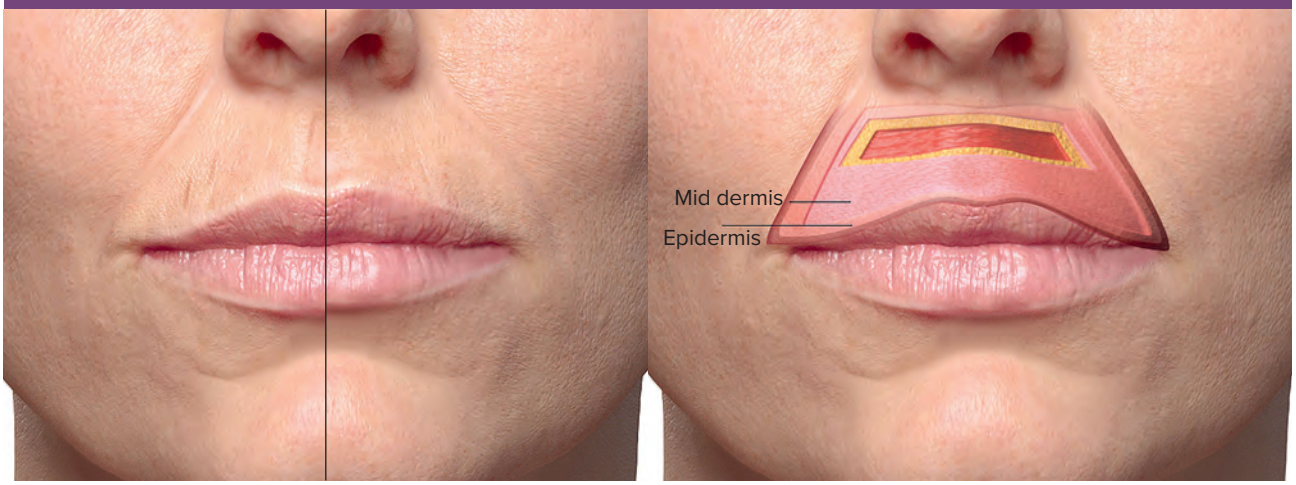
The clinician moves to the other side of the patient and repeats the procedure on the contralateral philtral column. Afterward, the clinician places the cap of the needle between both philtral columns and squeezes them together to add shape and further definition to the philtrum.

Expected duration of results

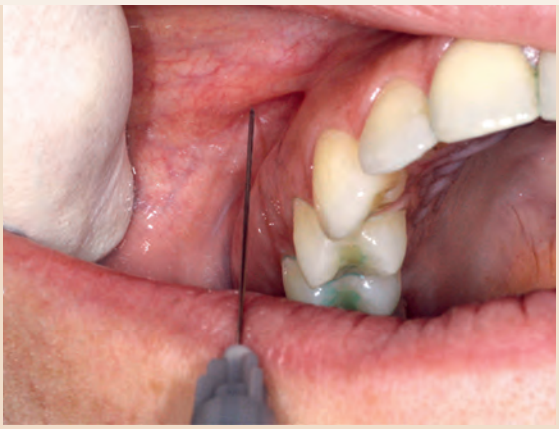
- Treatment results for the philtrum usually last approximately 6 to 9 months.

Figure 10-9 demonstrates the step-by-step procedure for the philtrum, and Figs 10-10 and 10-11 demonstrate case examples.

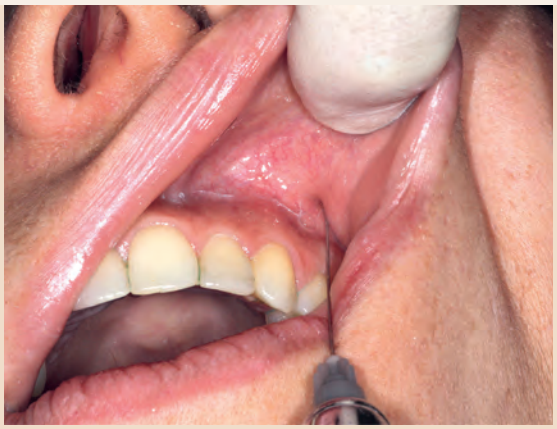
FIG 10-9 Step-by-step procedure for philtrum



STEP 1 **Administer anesthesia via a ring block procedure**



- The injection is made at the bottom of the lip crease toward the distal of the canine.
- The needle is inserted until it reaches the proximity of the infraorbital foramen. Approximately one quarter of the carpule is injected.

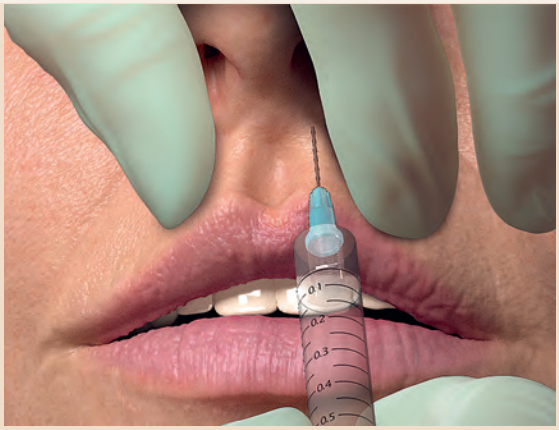


- The procedure is repeated to block the left side.
- Allow 10 minutes for anesthesia to take effect.

STEP 2

Locate the injection site

- To find the natural path of the philtrum, pinch the skin below the nose. This makes the fibrous ridges more prominent and visible.



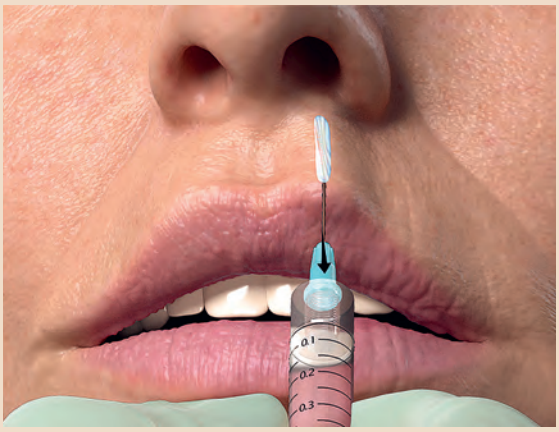
- Lay the needle on the skin to determine whether it will cover the full span of the philtrum.

STEP 3

Make a linear thread injection

- Horizontally, the insertion point for the philtrum is at the vermilion border between the lip and the skin.

- Relax the philtrum as the needle advances through the superficial dermis.
- The shape of the needle should be discernible through the skin.



- As the needle is withdrawn, inject a thin linear thread of filler into the philtrum area.

STEP 4

Move to the other side of the patient and repeat

- Repeat steps 2 and 3 on the contralateral side of the philtrum.

STEP 5

Define the philtrum

- Use the lid of the needle to shape the philtrum and provide more definition.

Case 5

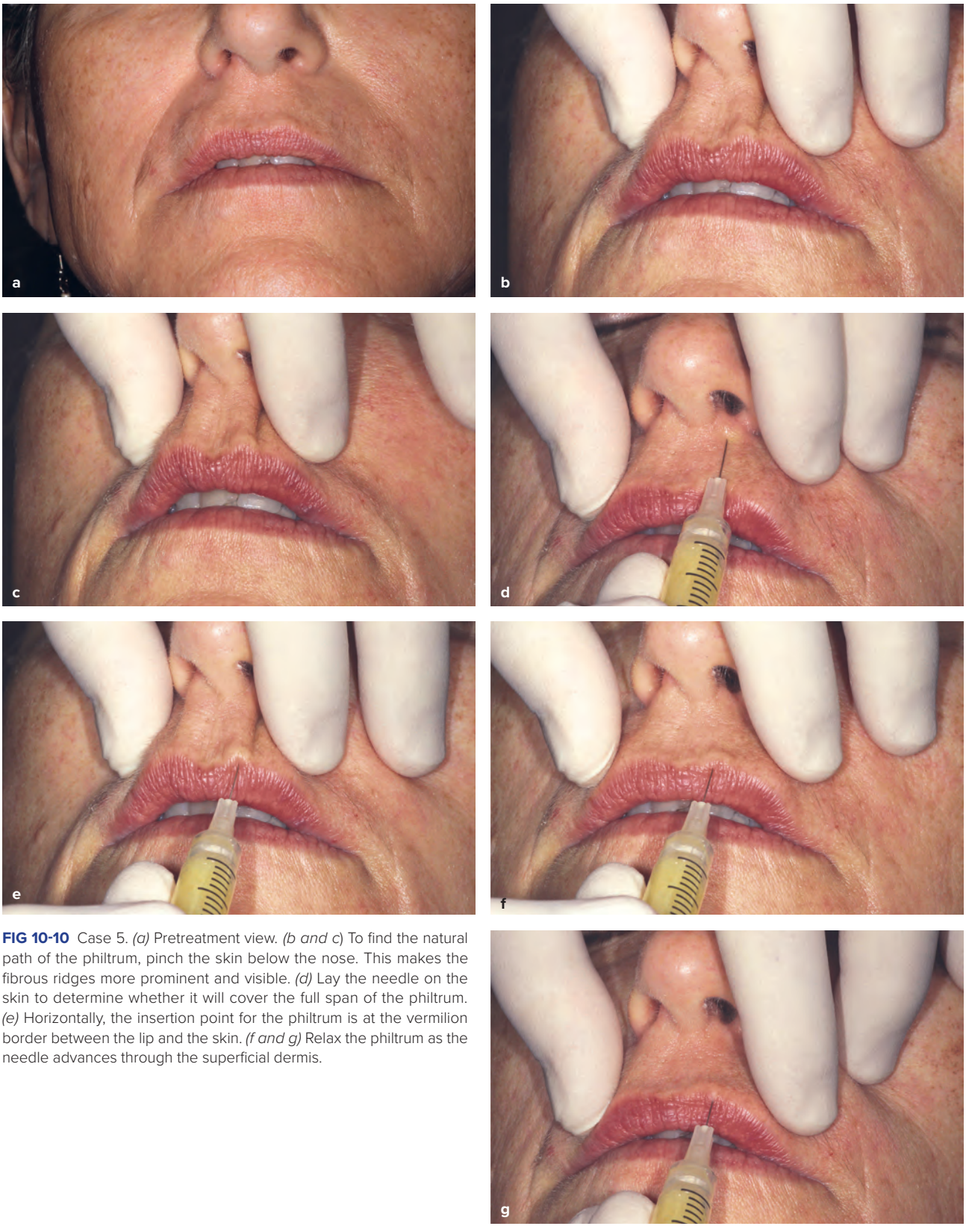


FIG 10-10 Case 5. *(a)* Pretreatment view. *(b and c)* To find the natural path of the philtrum, pinch the skin below the nose. This makes the fibrous ridges more prominent and visible. *(d)* Lay the needle on the skin to determine whether it will cover the full span of the philtrum. *(e)* Horizontally, the insertion point for the philtrum is at the vermilion border between the lip and the skin. *(f and g)* Relax the philtrum as the needle advances through the superficial dermis.

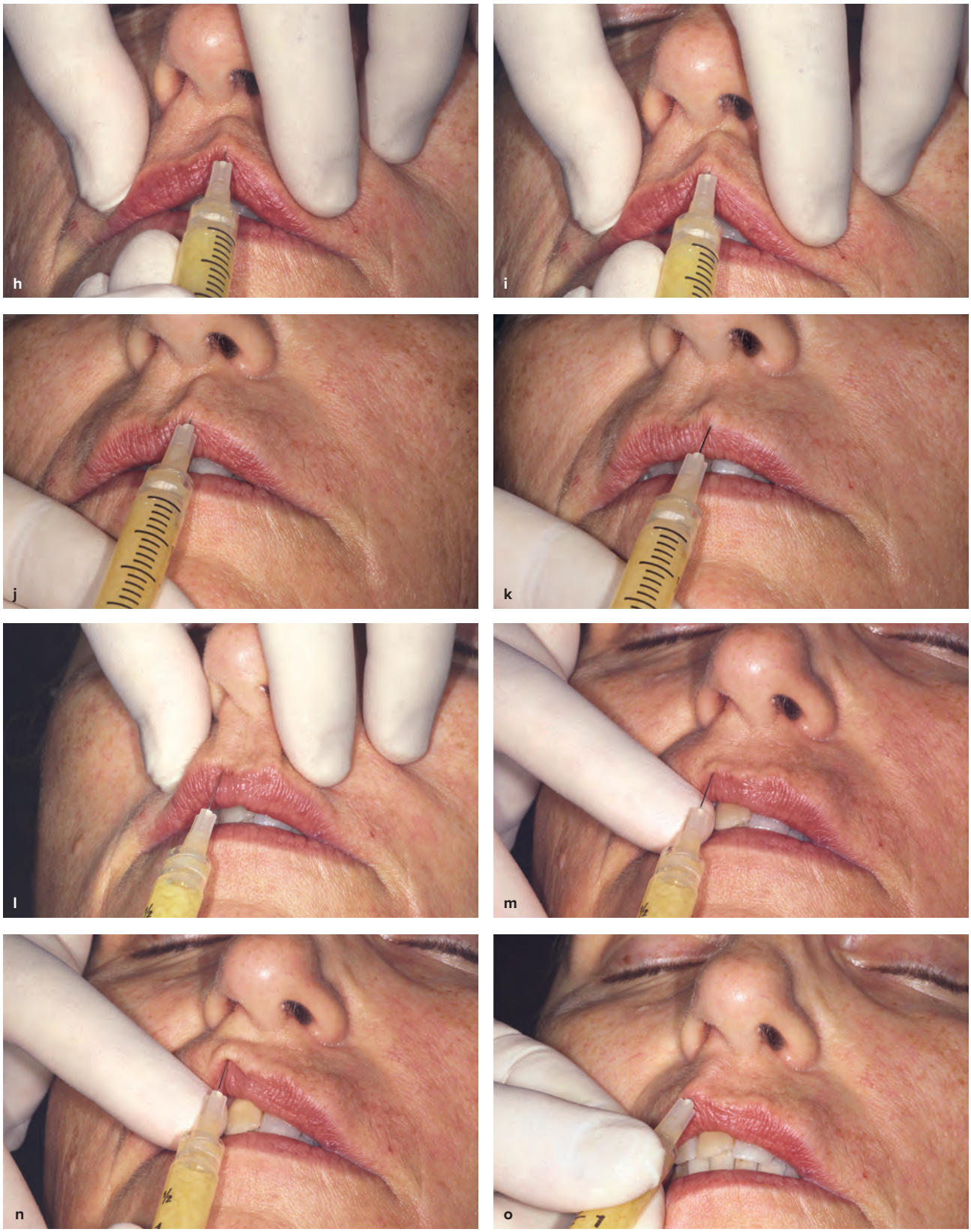


FIG 10-10 *(CONT)* *(h and i)* The shape of the needle should be discernible through the skin. *(j and k)* As the needle is withdrawn, inject a thin linear thread of filler into the philtrum area. *(l)* Repeat the procedure on the contralateral side: Locate the philtrum by pinching the skin together. *(m)* Relax the upper lip as you locate the horizontal insertion point. *(n)* Insert the needle into the philtrum. *(o)* Pull the needle outward in a parallel position as a linear thread of filler is inserted in a retrograde fashion.

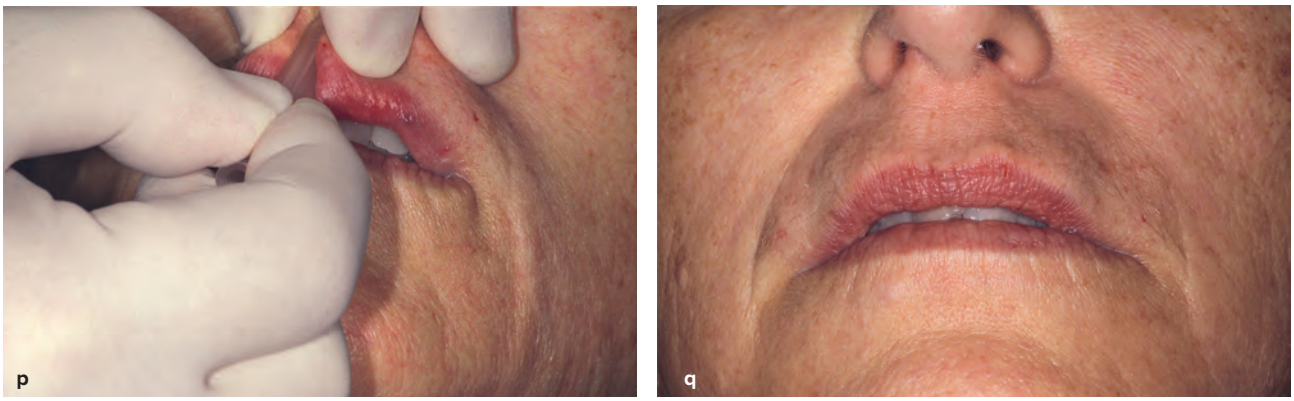


FIG 10-10 *(CONT)* *(p)* Use the lid of the needle to shape the philtrum and provide more definition. *(q)* Posttreatment appearance.

Case 6

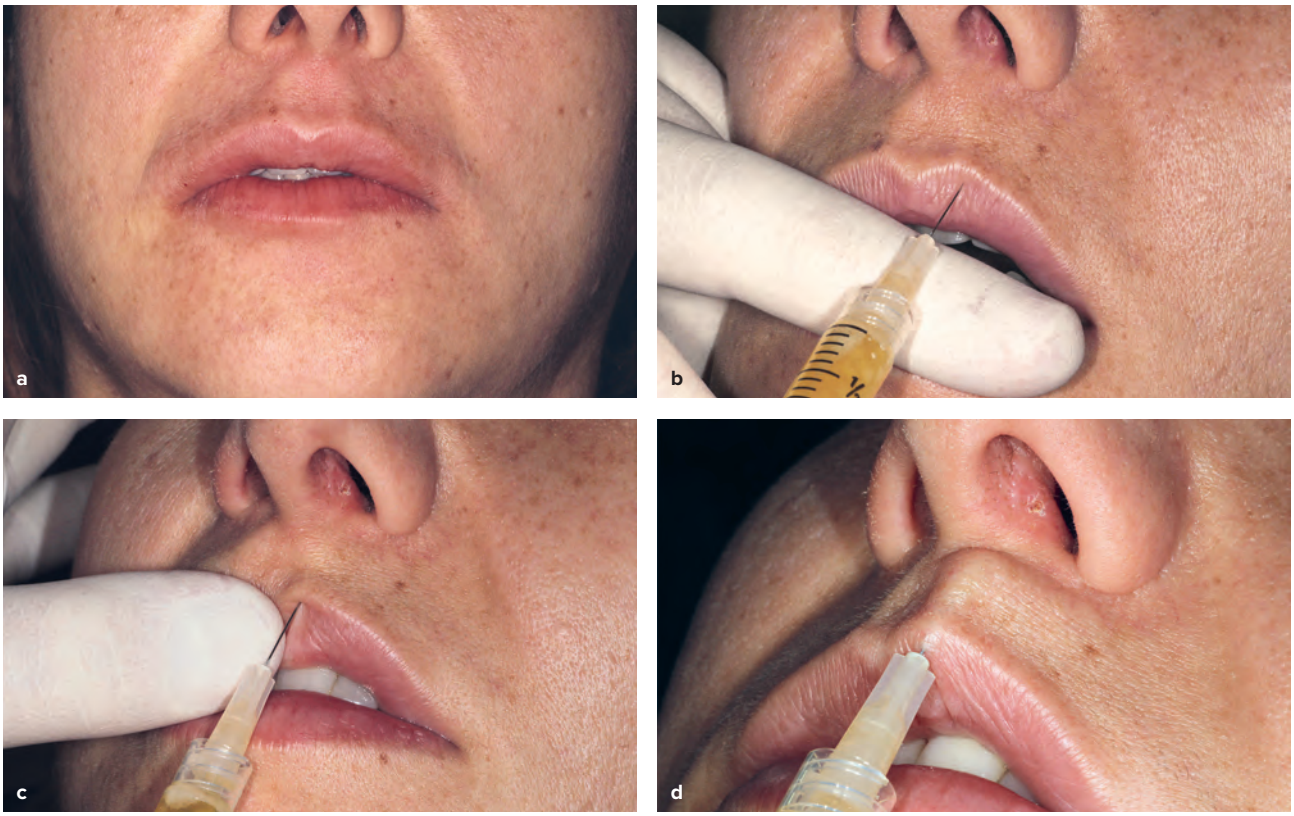


FIG 10-11 Case 6. *(a)* Pretreatment appearance. *(b)* The location of the injection point is on the border between the skin and the lip, in the mid dermis layer. *(c)* The point of entry. *(d)* The needle goes all the way into the philtrum. A linear thread injection is made using a retrograde technique.

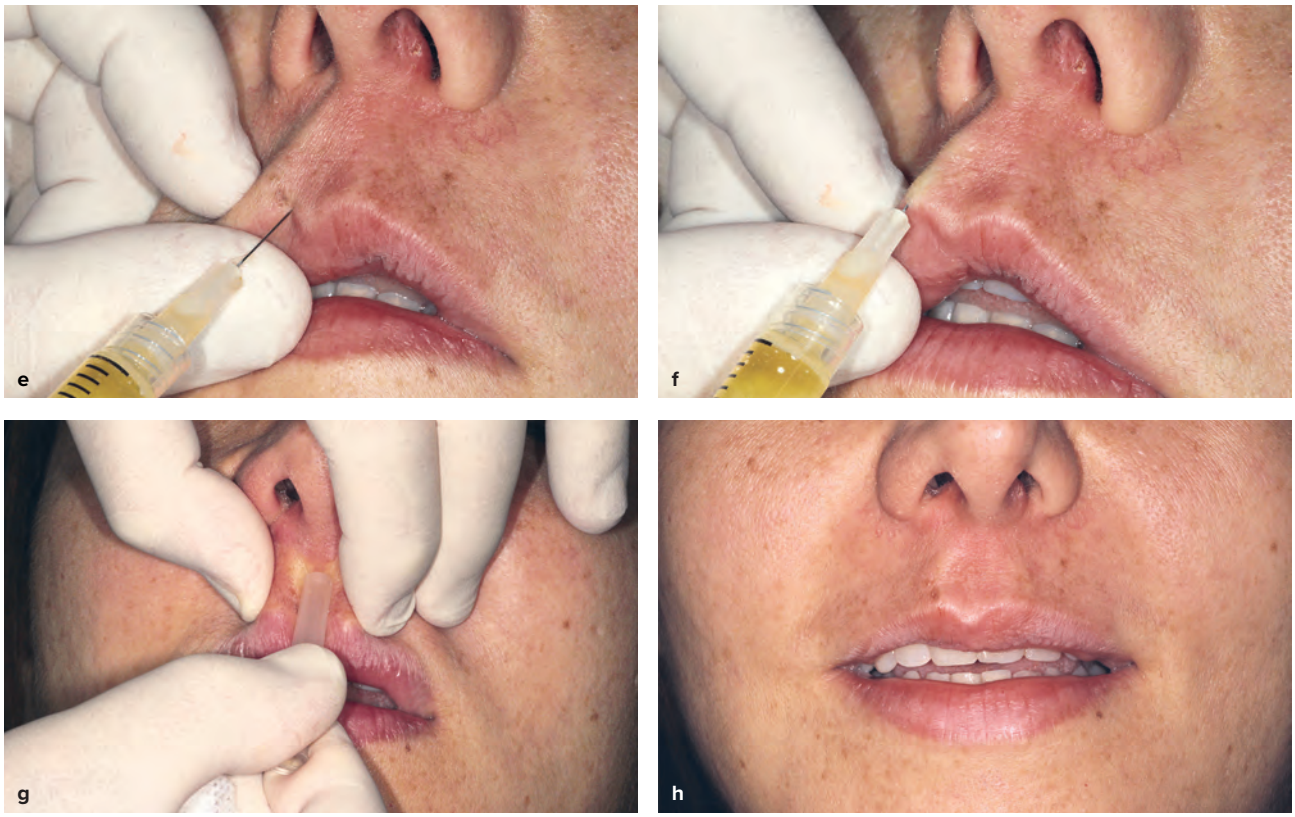


FIG 10-11 *(CONT)* *(e)* The second philtral column is treated using the same technique. *(f)* Insert the needle all the way into the column and make a second linear thread injection. *(g)* Use the needle cap to shape both sides of the philtral column. Pinch the philtrum together and hold for about 30 seconds. *(h)* Posttreatment appearance.

LIP LINES

Lip lines (also known as *perioral rhytids*) form and radiate perpendicularly above the vermilion border due to the hyperdynamic action of perioral muscles and the loss of soft tissue volume in the perioral region. Other contributors include lip atrophy and mandibular bone and alveolar process resorption.

Indications and contraindications

- Because recurrent contraction of the orbicularis oris muscle facilitates not only reduced lip volume but also formation of radial lip lines, botulinum toxin treatment of the muscle can complement dermal filler lip augmentation by creating slight eversion of the lips and increasing lip fullness.
- Dermal filler reduction of lip lines can be performed after patient recovery from more aggressive skin resurfacing and collagen stimulation, such as ablative/nonablative lasers, dermabrasions, and chemical peels, or simultaneously with (or prior to) less aggressive versions of those procedures.
- For static folds and lines, an additional dermal filler treatment may be required.
- Subsequent to lip line dermal filler injections, edema may cause anterior projection of the upper lip; however, lip definition will return as edema lessens (usually in 3–5 days, with the assistance of ice applications), along with diminishing radial lip lines.
- Rapid lip and perioral edema after the procedure may prevent accurate assessment until the next office visit, particularly for the perioral area, where substantial edema requires the clinician to stop the procedure and assess lip lines in 2 to 4 weeks.

Precautions

- Perioral and lip edema can occur rapidly. If significant edema is evident after placing dermal filler above the upper lip, discontinue further treatment and assess lip lines at the follow-up visit in 2 to 4 weeks.
- The side injected first may appear larger at the completion of treatment due to edema. If asymmetry is evident at the completion of treatment, and injection volumes and palpable product have been consistent for both sides, then it is advisable to reassess symmetry at the follow-up visit once edema has resolved.

Anesthesia and filler supplies

- Buffered 2% lidocaine-epinephrine (total volume of 2.6 mL)
  - Upper lip: 1.2 mL
  - Lower lip: 1.2 mL
  - Lip corners: 0.2 mL
- 27-gauge, 1.5-inch needle
- Suggested dermal fillers:
  - Teosyal RHA 2
  - Teosyal RHA 3
  - Restylane Silk
  - Revanesse Versa
  - Juvéderm Ultra XC
  - Juvéderm Volbella
  - Belotero Balance (Merz Aesthetics)
  - Radiesse Plus (Merz Aesthetics)
  - PRP
- Suggested dermal filler quantity:
  - 0.3–0.4 mL for the lines above the upper lip

Anesthesia technique

Any lipstick or other lip cosmetics must be removed. Then, alcohol pads are used to clean the area around the lips and the lips themselves. Because it is more sensitive, the upper lip should be pretreated at the injection sites with a 20% benzocaine topical anesthetic. A lip ring block is performed using 1.2 mL 2% lidocaine-epinephrine solution for each of the upper and lower lips; the lip corners receive a total volume of 0.2 mL 2% lidocaine-epinephrine solution. The anesthesia should take effect in 3–5 minutes.

Dermal filler injection technique

The patient is reclined at a 60-degree angle and the lips are cleaned with alcohol. A 27-gauge, 1.5-inch needle is firmly attached to the prefilled dermal filler syringe to withstand full plunger pressure.

Positioned on the same side of the patient as the lip area to be treated, the clinician places the needle 3–4 mm above and parallel to the vermilion border, with the needle tip reaching the ipsilateral peak of Cupid's bow. The first injection point is at the needle hub. The clinician primes the needle by extruding a small amount of filler from the tip and then inserts it parallel to the lip body and medially toward the ipsilateral peak. Once advanced to the hub, the needle is slowly withdrawn as a linear thread of filler is evenly deposited in the mid to deep dermis.

The second injection is made lateral to the first one and often requires more volume. The needle is laid on the skin so that the tip reaches the point of the first injection. The insertion point is at the needle hub. A linear thread of filler is injected as the needle is withdrawn, resulting in visible lift of the tissue. A third linear thread injection is made superior and parallel to the first injection. If needed, a fourth linear thread injection can be made superior and parallel to the second injection, and a fifth injection can be made lateral to the second injection.

To smooth any unevenly distributed filler, the clinician gently palpates the treated area mediolaterally between the first finger (placed intraorally) and the thumb. Stubborn areas can be moistened with water and gently pulled between the fingers and thumb. Such smoothing often results in increased swelling and bruising in the area.

The clinician then moves to the opposite side of the patient to treat the lip lines on the other side of the face using the same injection techniques.

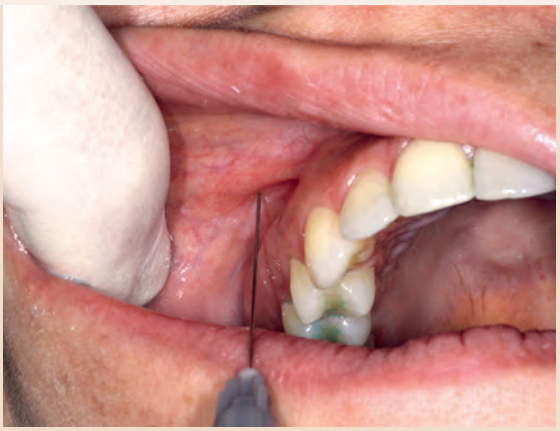
Expected duration of results

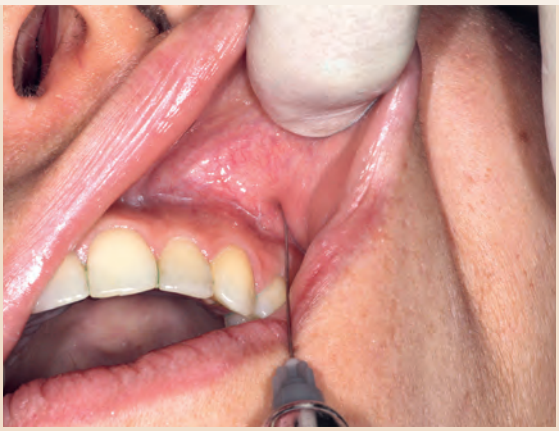
- Treatment results for lip lines usually last approximately 6 to 9 months.

Figure 10-12 demonstrates the step-by-step procedure for lip lines, and Fig 10-13 demonstrates a case example.

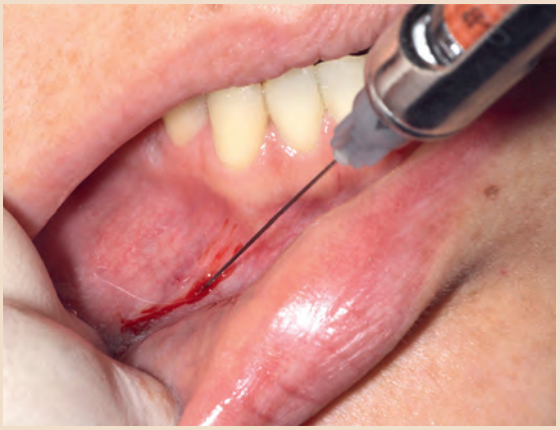
FIG 10-12 Step-by-step procedure for lip lines (rhytids)

STEP 1 **Administer anesthesia via a ring block procedure**





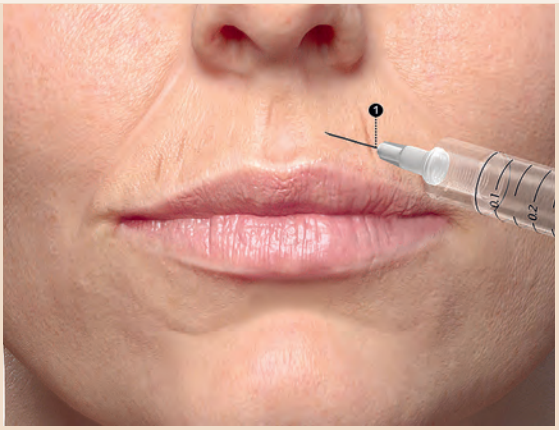
- Infraorbital nerve block for right upper lip anesthesia. The injection is made at the bottom of the lip crease toward the distal of the canine.
- The needle is inserted until it reaches the proximity of the infraorbital foramen. Approximately one quarter of the carpule is injected. The procedure is repeated to block the left side.



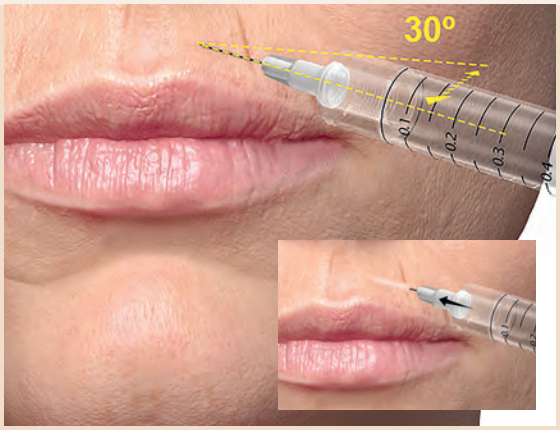
- The lower lip is blocked with anesthesia of the mental nerve on both sides.

STEP 2 Locate the first injection site

- Lay the needle 3–4 mm above and parallel to the upper lip vermilion border, with the needle tip at the ipsilateral peak of Cupid's bow.
- The first injection point is at the needle hub.



STEP 3 Make a linear thread injection

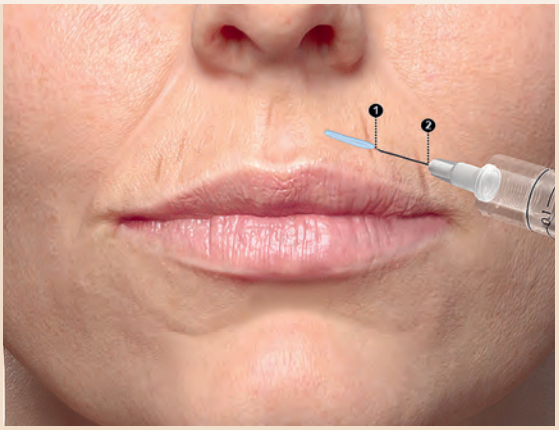


- Insert the needle at a 30-degree angle to the skin, medially toward the ipsilateral peak, and parallel to the lip. Advance to the hub.

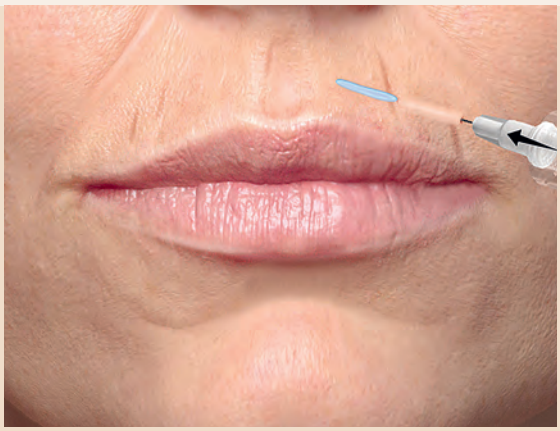
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the mid to deep dermis.

STEP 4 Locate the second injection site

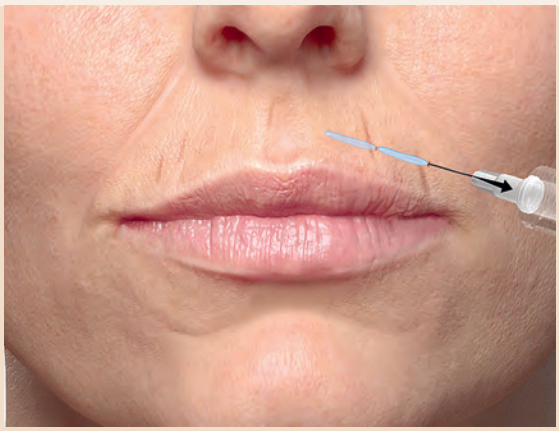
- The second injection is made lateral to the first injection.
- Lay the needle 3–4 mm above and parallel to the upper lip vermilion border so that the tip is immediately adjacent to the first injection. The second injection is made at the needle hub.



STEP 5 Make a second linear thread injection

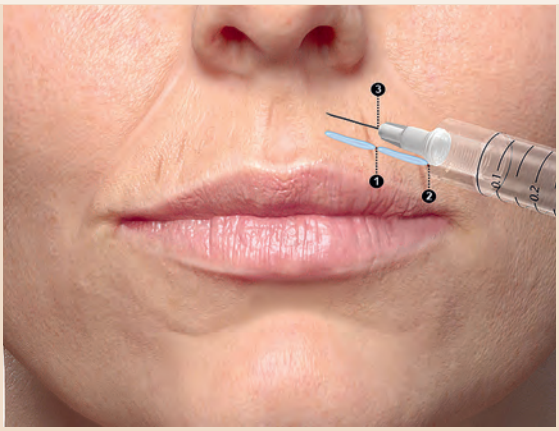


- Insert the needle at a 30-degree angle to the skin, medially toward the ipsilateral peak, and parallel to the lip. Advance to the hub.



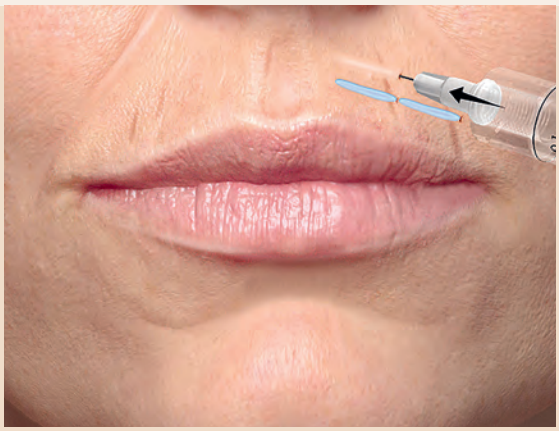
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the mid to deep dermis.

STEP 6 Locate the third injection site



- The third injection is made superior to the first injection.
- Lay the needle 2–3 mm above and in alignment with the first linear thread injection. The third injection is made at the needle hub.

STEP 7 Make a third linear thread injection

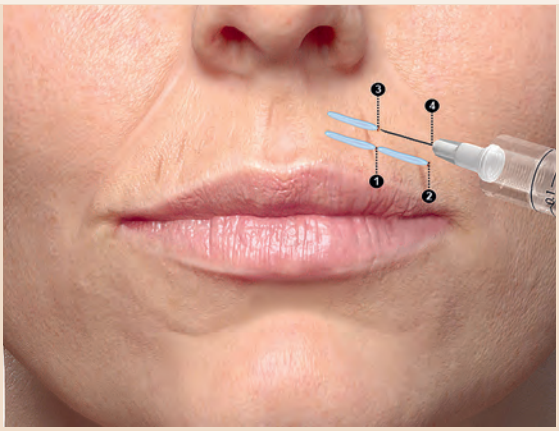


- Insert the needle at a 30-degree angle to the skin, medially toward the ipsilateral peak, and parallel to the lip. Advance to the hub.

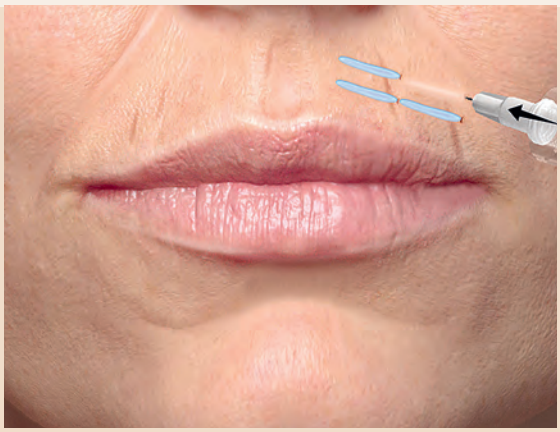
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the mid to deep dermis.

STEP 8 Locate the fourth injection site

- The fourth injection is made superior to the second injection.
- Lay the needle 2–3 mm above and in alignment with the second linear thread injection. The fourth injection is made at the needle hub.



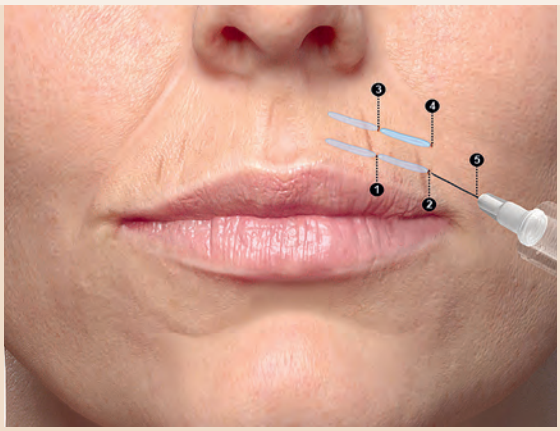
STEP 9 Make a fourth linear thread injection



- Insert the needle at a 30-degree angle to the skin, medially toward the ipsilateral peak, and parallel to the lip. Advance to the hub.

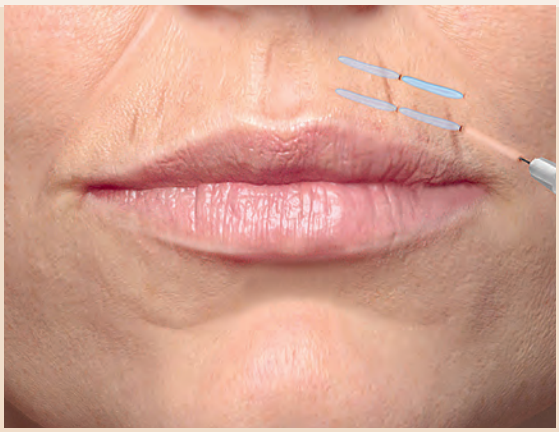
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the mid to deep dermis.

STEP 10 Locate the fifth injection site

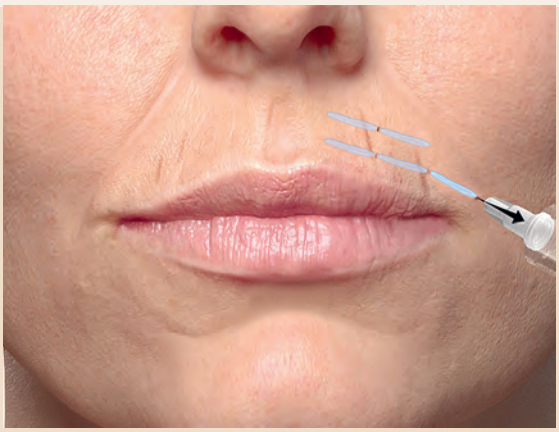


- The fifth injection is made above the corner of the mouth, so that it is contiguous with the second injection.

STEP 11 Make a fifth linear thread injection



- Insert the needle at a 30-degree angle to the skin, medially toward the ipsilateral peak, and parallel to the lip. Advance just until you reach the point where the fourth injection was made.



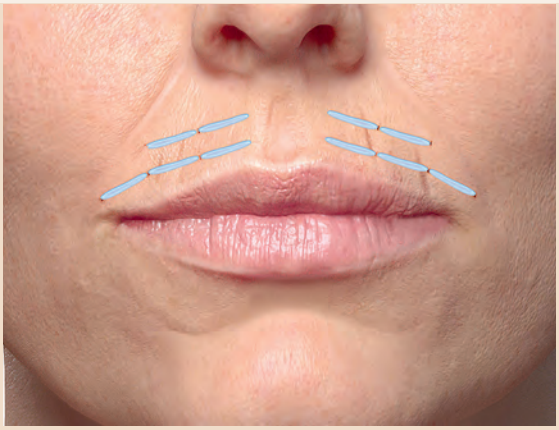
- Apply firm and constant pressure on the syringe plunger while gradually withdrawing the needle to inject a linear thread of filler into the mid to deep dermis.

STEP 12 Compress the lip

- Gently grasp the lip with the thumb on the skin and first finger under the lip, and slowly compress from medial to lateral along the length of the lip to smooth any visible or palpable bumps of filler product.
- If bumps do not easily compress, the area may be moistened with water and stretched between the fingers.

STEP 13

Move to the other side of the patient and repeat



- Repeat steps 2–12 on the contralateral side of the upper lip.

STEP 14

Eliminate gaps

- Inject filler into any empty areas that are noted in order to eliminate all gaps, if needed.
- Compress the lip to smooth out any lumps of filler.

Case 7

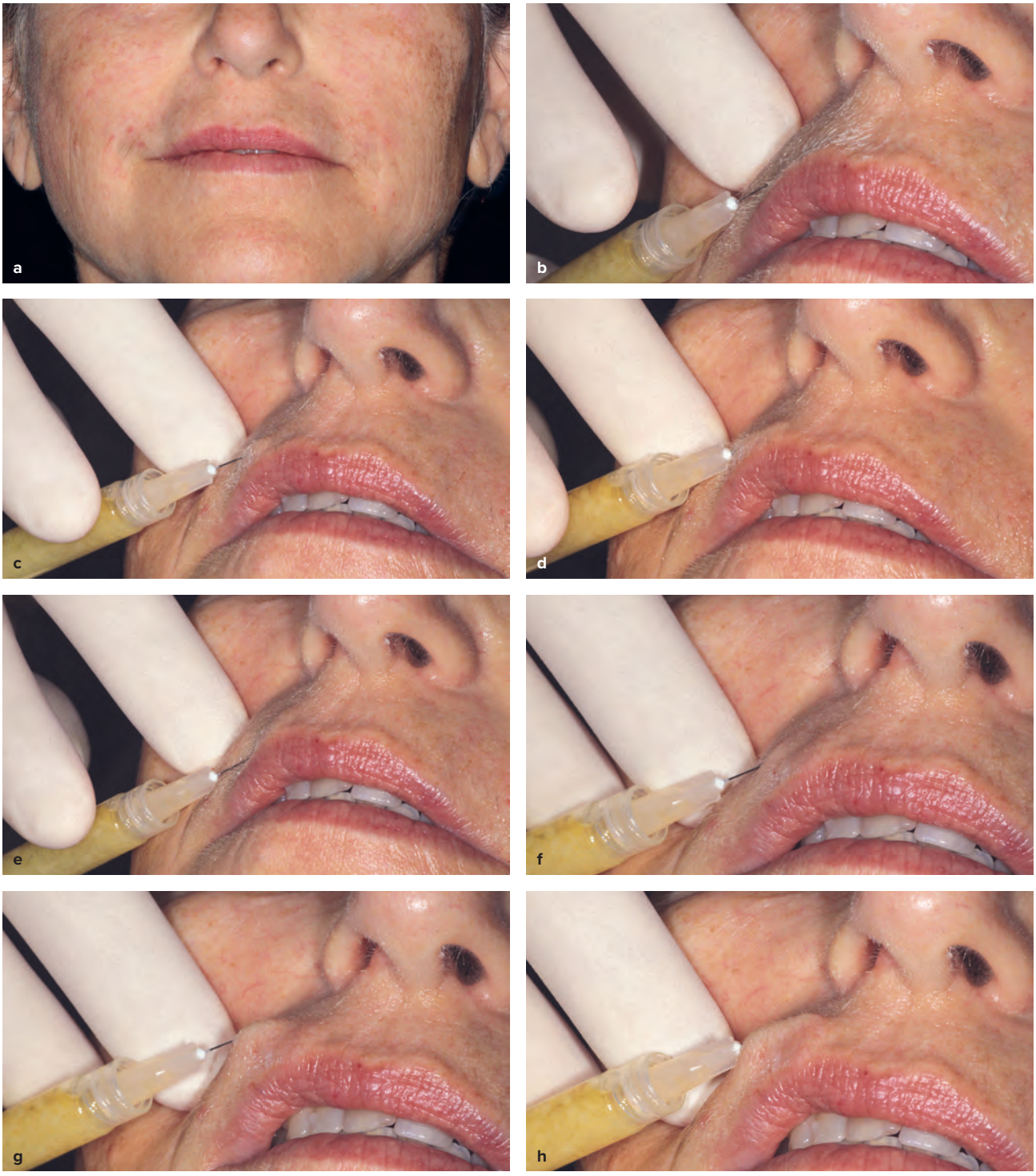


FIG 10-13 Case 7. *(a)* Pretreatment view. *(b)* The needle is laid on the skin to determine the injection point. The first fill line will be made close to the lip edge. *(c)* Filler material should be injected a little deeper in the dermis without being intramuscular. *(d)* The first linear thread injection is made using a retrograde filling technique—that is, while the needle is being withdrawn from the skin. *(e)* The injection is made perpendicular to the direction of the line or wrinkle. The volume of material should be enough to lift the skin and smooth the wrinkle. *(f)* The second linear thread injection requires more filler volume than the first one. *(g)* A retrograde technique is used to deposit the filler. *(h)* A third linear thread injection is made superior to the first one.

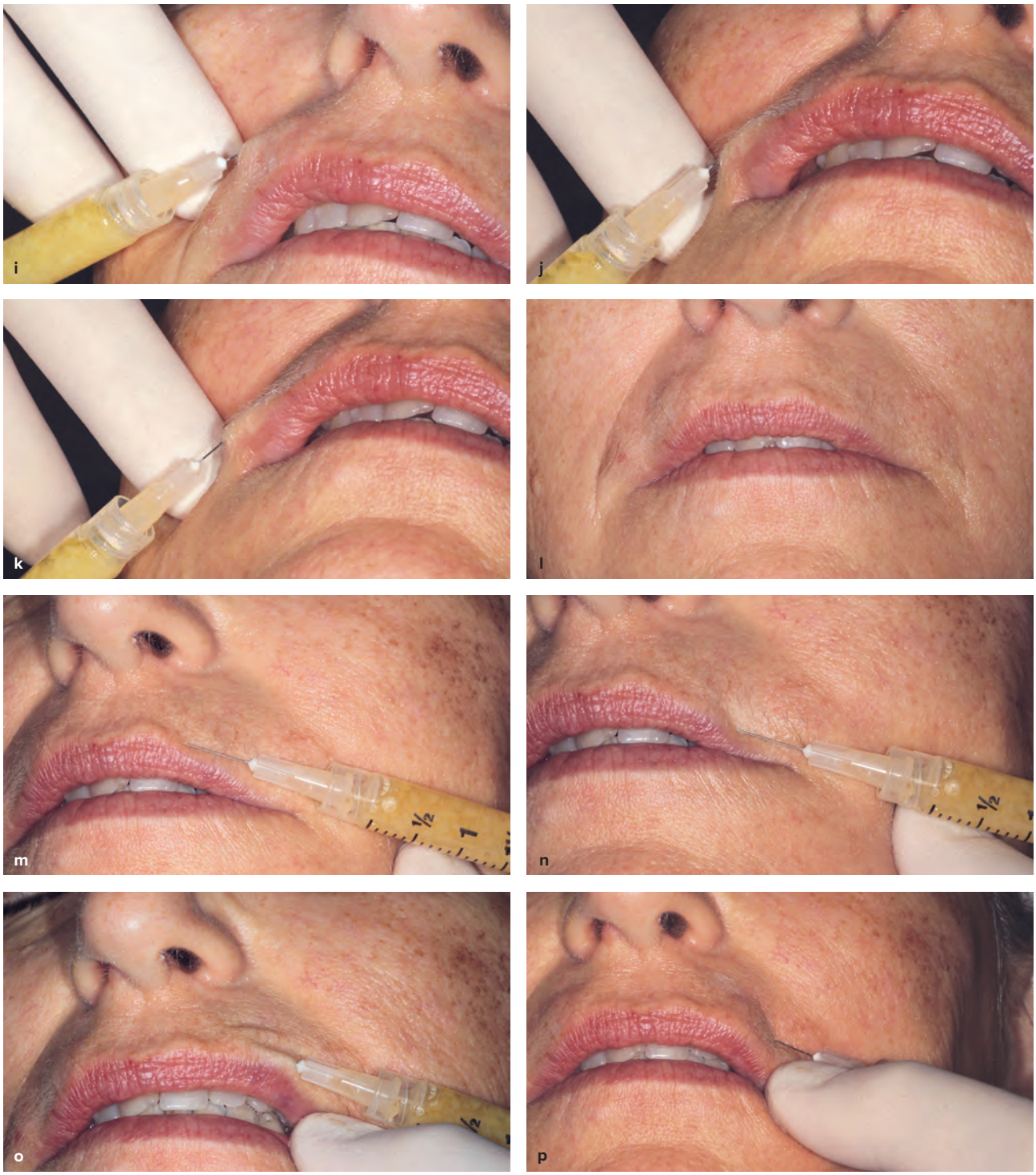
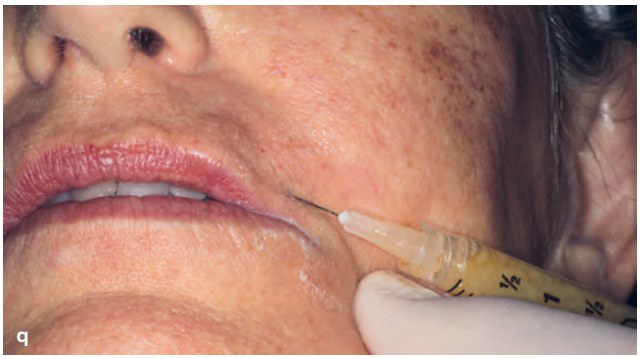
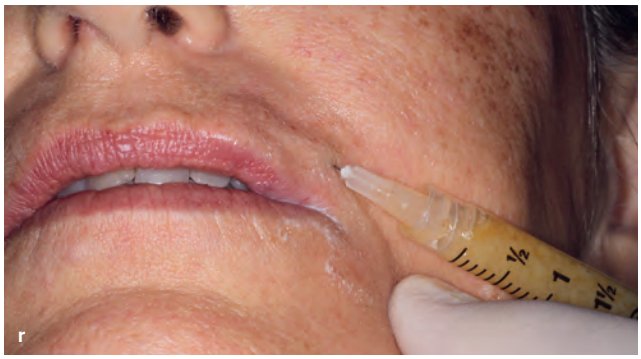
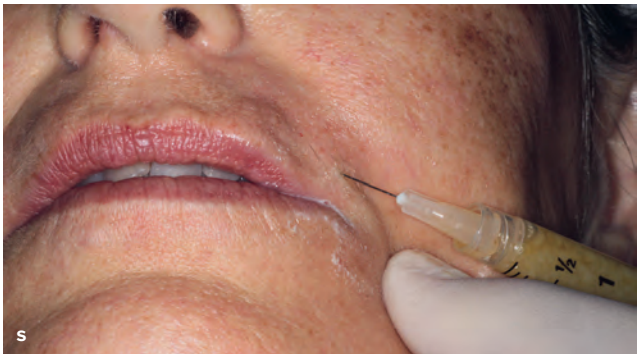
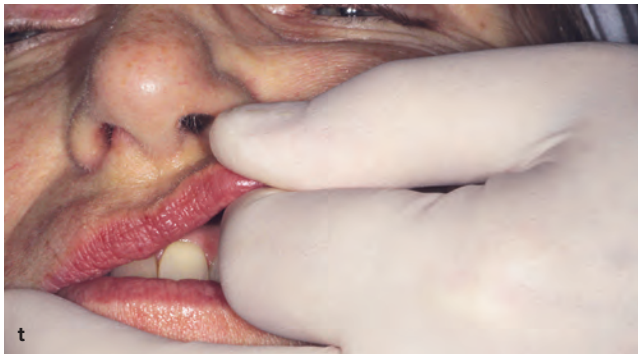


FIG 10-13 *(CONT)* *(i)* The volume of material should be just enough to lift the skin and smooth out the wrinkles. *(j)* The procedure is repeated laterally. *(k)* The same volume must be injected to make the skin harmonic and also correct the wrinkles. *(l)* The right side has been corrected. Note that the lip contour is also better defined. *(m)* The procedure is repeated on the opposite side. The needle is placed on the skin to determine the injection point. *(n)* The puncture point is located 3 mm above the lip transition. This also improves the lip contour, giving it more harmony. *(o)* The retrograde filling technique is used. *(p)* As on the first side, a second injection is made more superiorly.









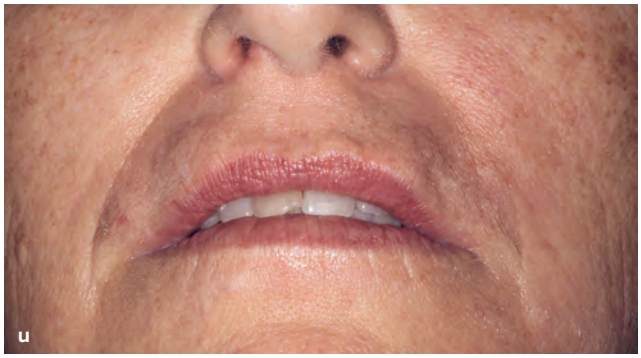


FIG 10-13 *(CONT)* *(q)* Filler is injected into the corner of the lips. *(r)* The injection volume should be enough to lift the skin. *(s)* The most lateral portion is also filled. *(t)* The area is massaged to regularize the filling. The thumb remains in place while the index finger moves back and forth on the inside of the lip. *(u)* Final appearance. Note that the wrinkles were smoothed and the lip contour was well defined.

TEAR TROUGHS

Tear troughs are dark circles below the crease beneath the eye. They often appear as the face ages. This condition can be exacerbated by skeletonization of the infraorbital rim.

Indications and contraindications

- Dermal fillers can be used to address shadows beneath the eyes as well as to postpone blepharoplasty for patients with mild fat protrusion under the eyes.
- Classically, the tear trough referred to the most medial segment of the under-eye crease; however, with aging, the infraorbital rim becomes more skeletonized, and filler may be placed at the top of the rim along its entirety.

Precautions

- Tear trough injections can increase instances of patients becoming faint.
- Tear trough procedures may result in increased bruising if dermal filler is injected superficially or in thin skin. A blue hue known as the *Tyndall effect* also can develop (see chapter 4).
- The periorbital region is surrounded by several major facial vessels. To avoid vascular injury, the use of a microcannula in this region is strongly recommended.

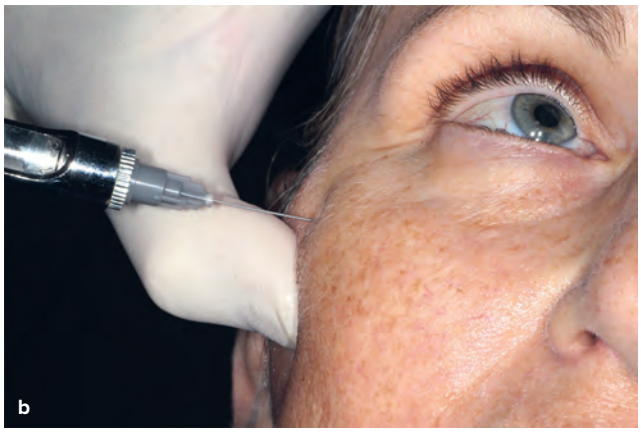


FIG 10-14 *(a)* Zygomatic nerve, which is a branch of the mental nerve. *(b)* Injection of the zygomatic nerve in preparation for dermal filler treatment of tear trough.

- If the injection is made below the orbital rim, it can result in a deeper trough by augmenting the cheek while neglecting the deep valley.
- Lumpiness and unevenness of the lower lid should not be seen if the injection has been done properly, unless a hematoma occurs.
- If lumpiness persists for more than 2 weeks, have the patient place a warm compress over the lid for 20 minutes while applying firm pressure. This can help flatten lumps and improve minor irregularities.
- Swelling and discoloration can be greatly reduced via subcutaneous tissue injection of hyaluronidase.

Anesthesia and filler supplies

- Buffered 2% lidocaine-epinephrine solution
- 30-gauge, 0.5-inch needle
- 18-gauge, 1.5-inch needle
- Topical anesthetic cream, such as a compounded formula of 10% benzocaine, 20% lidocaine, 10% tetracaine, and 10% DMSO in a Lipoderm base
- Suggested dermal fillers:
  - Restylane Silk
  - Restylane Refyne
  - Juvéderm Volbella
  - Belotero Balance
  - PRP
- Suggested dermal filler quantity:
  - 0.1–0.45 mL light-bodied filler per eyelid
- 22-gauge 1.0-inch needle to nick the skin
- Blunt-tipped 27-gauge cannula

Anesthesia technique

Anesthesia for this area includes infraorbital nerve block, zygomatic nerve block, and/or topical cream. For the infraorbital nerve block, a 30-gauge, 0.5-inch needle should be used. For the zygoma nerve block, an 18-gauge, 1.5-inch needle should be used. After the injection site has been cleaned with alcohol, 0.1 mL of the solution is injected at a time (Fig 10-14). Subsequent injections are administered on both sides of the face in accordance with the complexity of the site. Compression of the injected solution away from the treatment site can help reduce edema.

FIG 10-15 Step-by-step procedure for tear troughs

Dermal filler injection technique

This is not a painful area to inject, but it is quite unsettling for many patients. It is also one of the most difficult areas to inject well. To minimize bruising, the clinician should use a blunt-tipped cannula instead of a needle for injecting the filler. The cannula should be long enough so that the entire tear trough region can be filled with a single, remote skin nick incision or as few penetrations of the skin as possible. A 22-gauge needle should be used for the skin nick and a blunt-tipped 27-gauge cannula for filler injection.

The patient should be placed in a sitting position. A 22-gauge, 1.0-inch needle is used to make an incision below the thin skin of the lower eyelid for cannula insertion. This greatly reduces the amount of bruising, as most of the blood vessels are in the orbicularis muscle. The cannula is then passed upward at an angle until it comes to rest at the top of the orbital rim. The finger of the opposite hand is positioned so as to direct the cannula, confirm the location, and protect the contents of the orbit. Injection should not proceed until the tip of the cannula has been placed against the bone and its precise location has been verified. Inject very slowly and deeply onto the bone. It is very important that the product be precisely placed at the highest point along the upper edge of the maxilla at the top of the infraorbital rim. If, out of hesitation or fear, the injection is placed lower, one runs the risk of creating a deeper trough by augmenting the cheek while neglecting the deep valley. Massage the product as it is being injected in small 0.1- to 0.2-mL depot boluses to fill in the depressed areas. After the injection, the clinician should massage the deposited product, and the patient should frequently change eye position to help the clinician identify asymmetries.

Ice is necessary. Bruising is possible but less common with the technique described above. If filler is injected through the thin skin or superficially, then bruising will be very common.

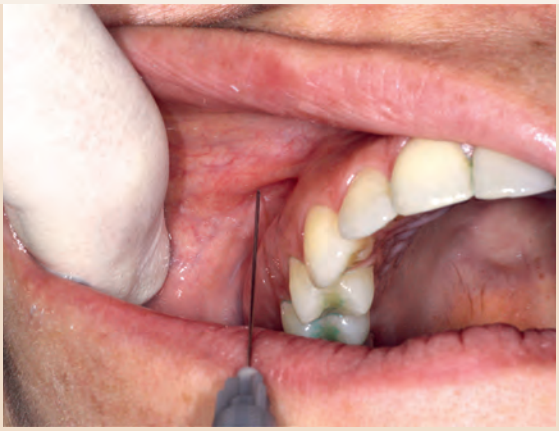
Expected duration of results

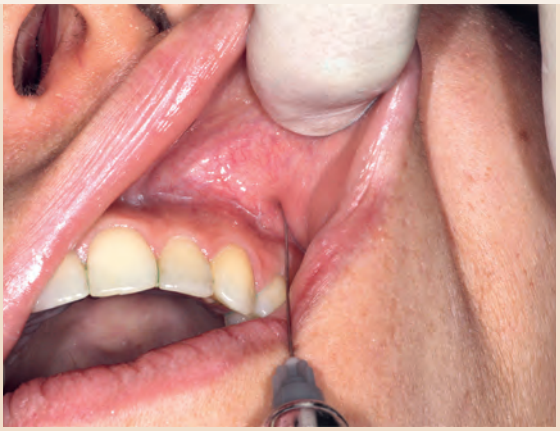
- Treatment results for tear troughs usually last approximately 6 to 9 months.

Figure 10-15 demonstrates the step-by-step procedure for tear troughs, and Figs 10-16 and 10-17 demonstrate case examples.

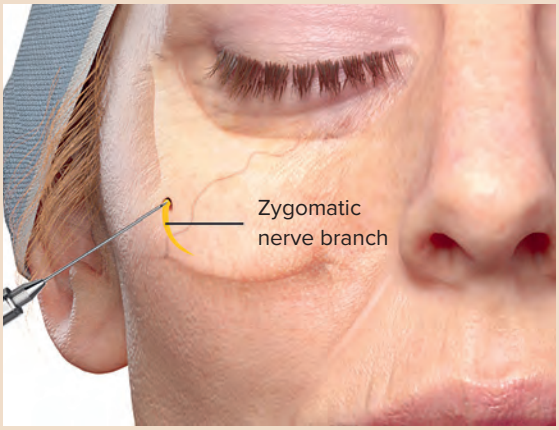
STEP 1

Administer anesthesia





- Use alcohol to clean the skin over and around the tear troughs.
- Using an infraorbital nerve block, inject 0.1– 0.45 mL buffered 2% lidocaine-epinephrine solution intraorally.

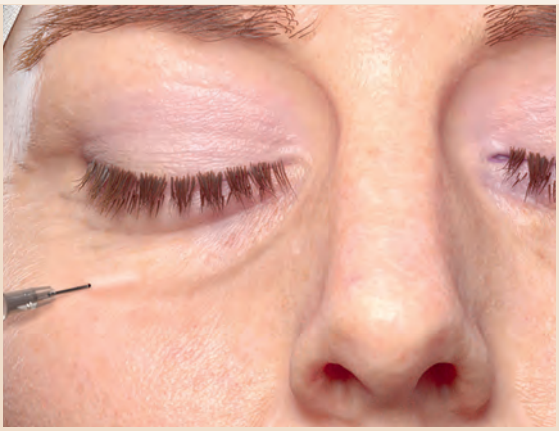


- Using a zygomatic nerve block, inject 0.1–0.45 mL buffered 2% lidocaine-epinephrine solution.
- Allow 10 minutes for the anesthesia to take effect.

STEP 2

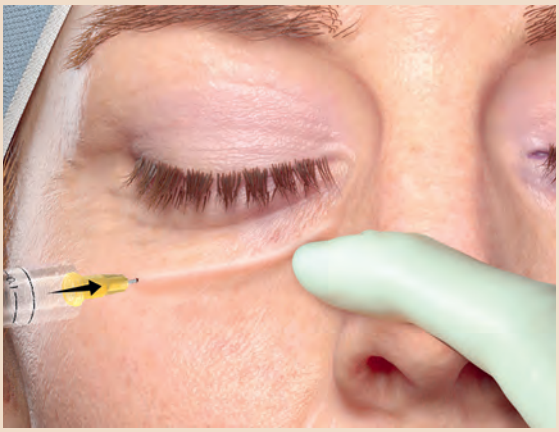
Locate the first injection site

- Palpating the lower eyelid, find the highest point along the upper edge of the maxilla at the top of the infraorbital rim.



- Use a 22-gauge needle to make a small skin nick and insert a blunt-tip 27-gauge cannula for filler injection.

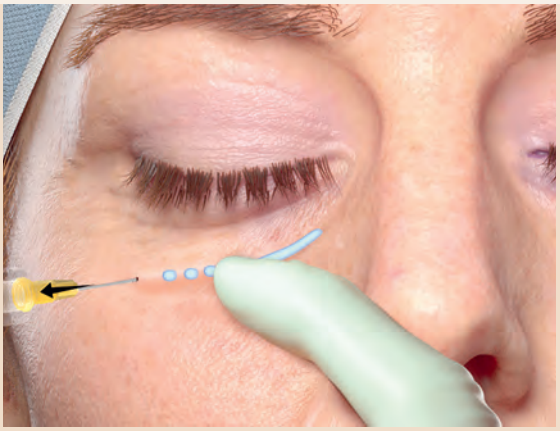
- Pass the needle through the cannula at an upward angle until it comes to rest at the top of the orbital rim.



- Place the index finger of the opposite hand on the tip of the needle and use it to direct the needle, confirm its location, and protect the contents of the orbit.

STEP 3 Inject very slowly and deeply into the bone

- Hold the tip of the needle against the bone at the top of the infraorbital rim.
- Make a series of small depot injections in 0.1- to 0.2-mL boluses.



- Massage the product as it is being injected to fill in the depressed areas.

- After the injection, continue massaging the deposited filler while the patient changes eye position to identify any asymmetries.

STEP 4 Move to the other side of the patient and repeat

- Repeat steps 2 and 3 on the contralateral tear trough.

Case 8

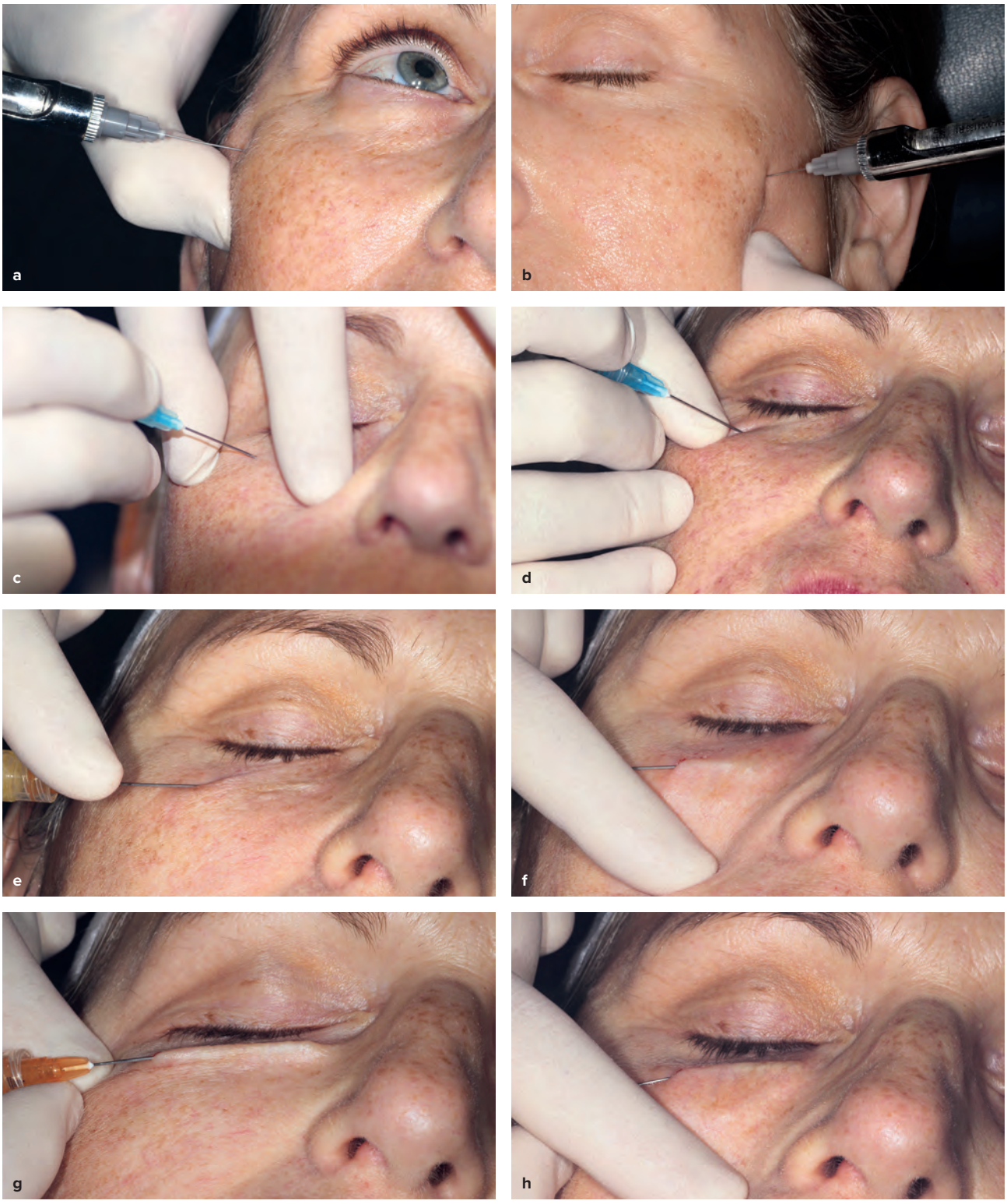


FIG 10-16 Case 8. *(a and b)* Anesthesia of the zygomatic nerve with 2% lidocaine eliminates pain in the suborbital region. *(c)* To fill the tear trough, a cannula is safer than a needle. However, because a cannula has a blunt tip, a slightly larger needle is used first to create access for the cannula. *(d)* The needle penetrates the skin just enough to reach the hypodermis and open the access. *(e)* The cannula is then inserted into the access and pushed in slowly, dividing the layers of the skin. *(f)* We fix skin around to allow good penetration control. *(g)* We penetrate with the needle until it reaches the side of the nose. *(h)* The filler is then injected while removing the needle.

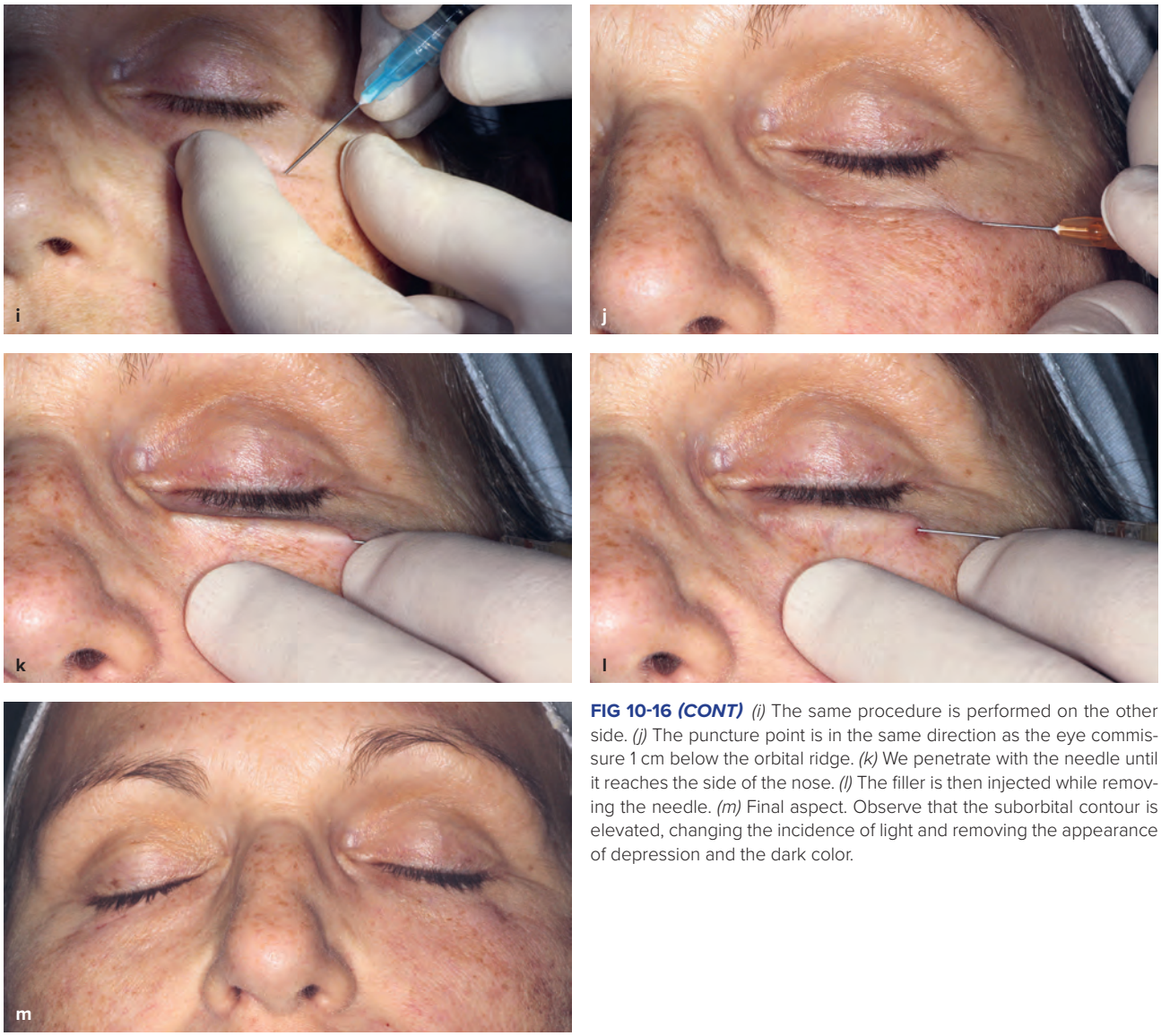


FIG 10-16 *(CONT)* *(i)* The same procedure is performed on the other side. *(j)* The puncture point is in the same direction as the eye commissure 1 cm below the orbital ridge. *(k)* We penetrate with the needle until it reaches the side of the nose. *(l)* The filler is then injected while removing the needle. *(m)* Final aspect. Observe that the suborbital contour is elevated, changing the incidence of light and removing the appearance of depression and the dark color.

Case 9

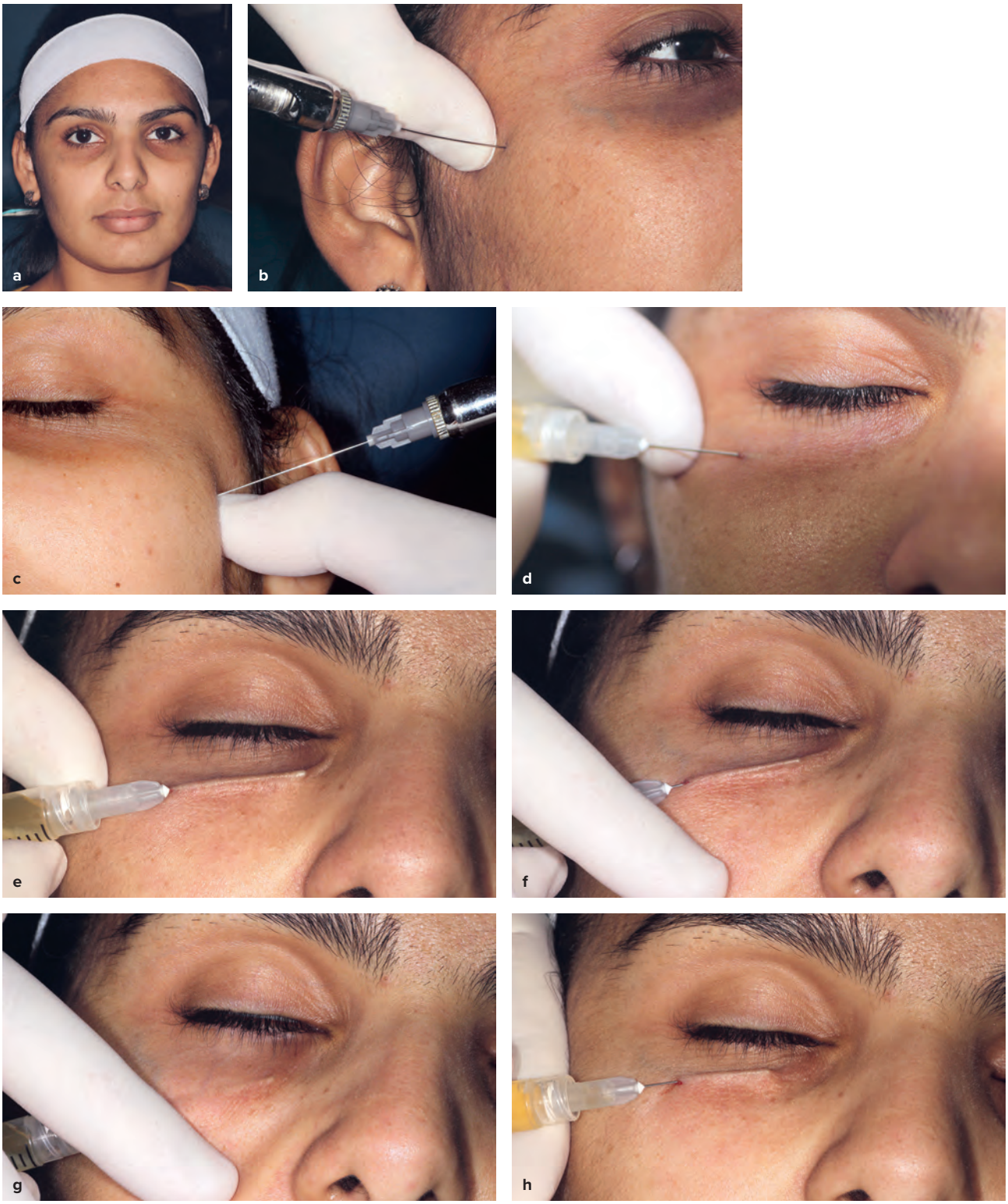


FIG 10-17 Case 9. *(a)* Young patient complaining of dark spot under the eyes. *(b and c)* Anesthesia of the zygomatic nerve with 2% lidocaine eliminates pain in the suborbital region. *(d)* Right side. The cannula is inserted into the access created with a needle of slightly larger diameter. The access slit is made 1 cm below the edge of the orbit toward the angle of the eye. *(e)* The cannula is inserted until it reaches a distance of 10 mm from the medial corner of the eye so as not to approach the tear duct. *(f to h)* The index finger is used to immobilize the skin as a fanning technique is applied to detach the skin from the base of the eyelid.

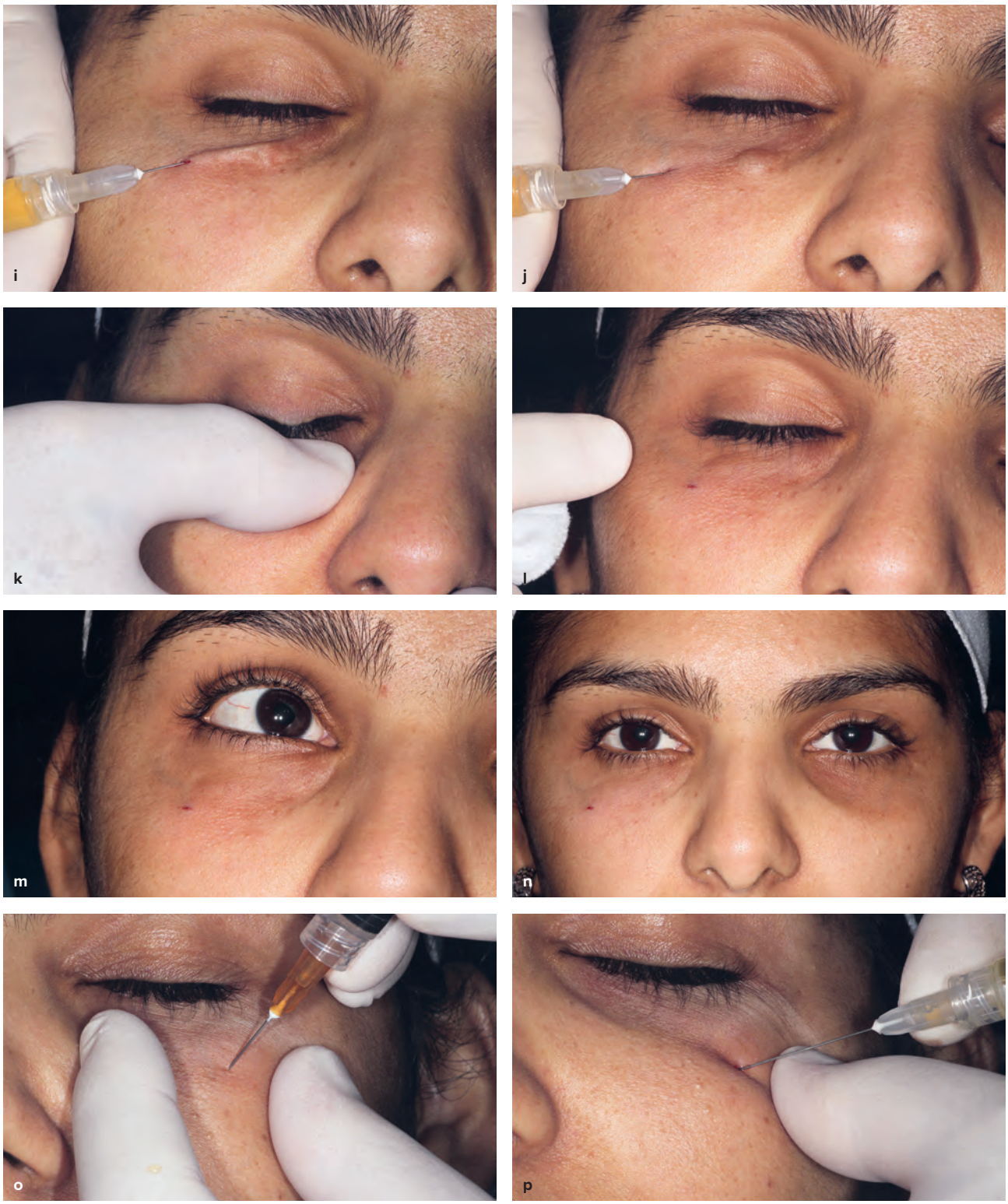


FIG 10-17 *(CONT)* *(i)* The filler is injected starting at the top, again using the fanning technique, as the cannula is being withdrawn. *(j)* The filler can be observed as it is deposited in the lower portion of the eyelid. *(k)* A compressive massage is performed to spread the filler and ensure a uniform appearance. *(l and m)* Posttreatment view of the right side. The darkness disappears because of the elevation of the skin and the resulting change in the refraction of light. *(n)* The contrast between the treated side and untreated sides is striking. *(o)* Left side. The cannula is initially inserted at a 45-degree angle until the skin barrier is broken. *(p)* The angle is changed to 15 degrees as the cannula is pushed through the skin.

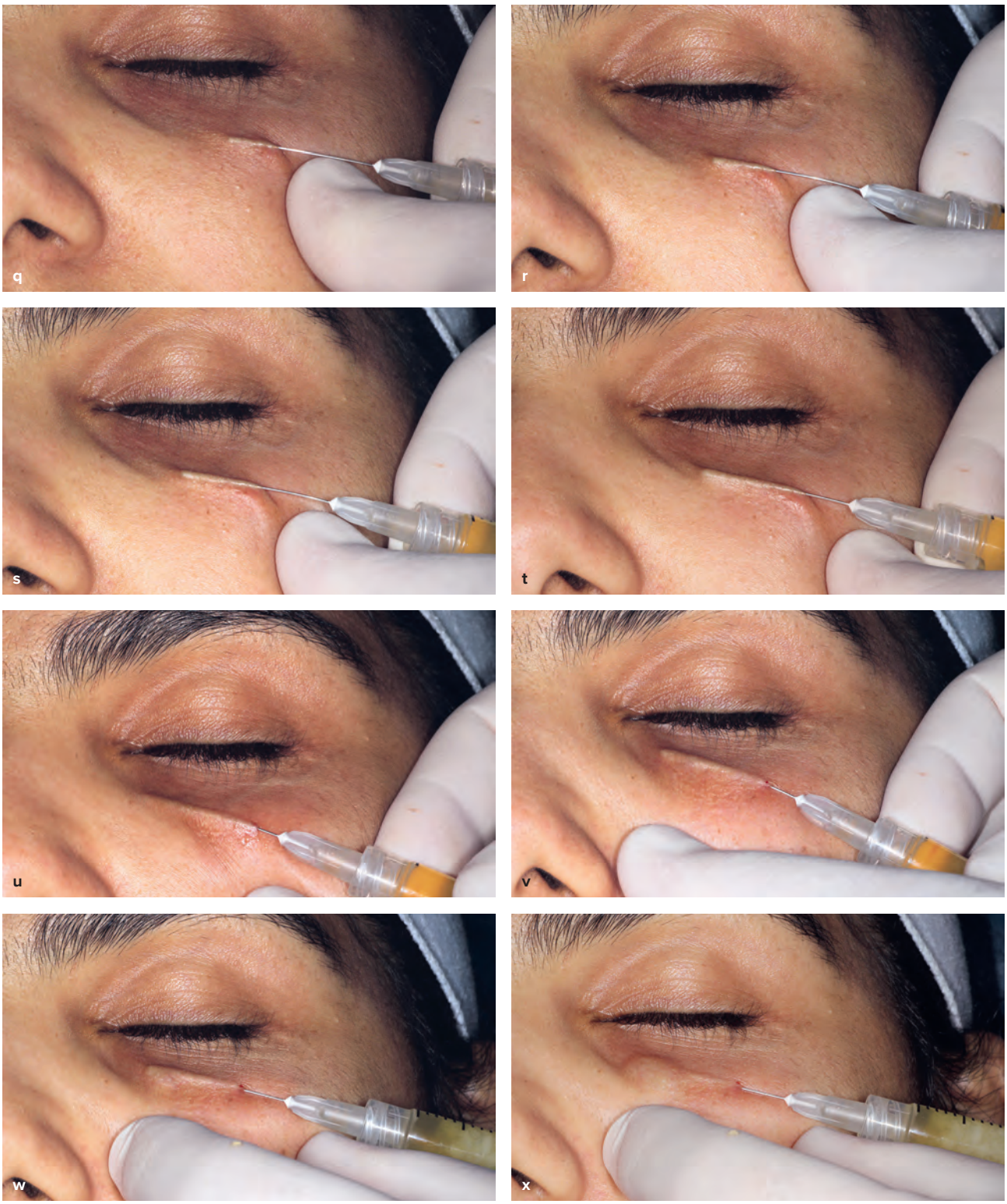
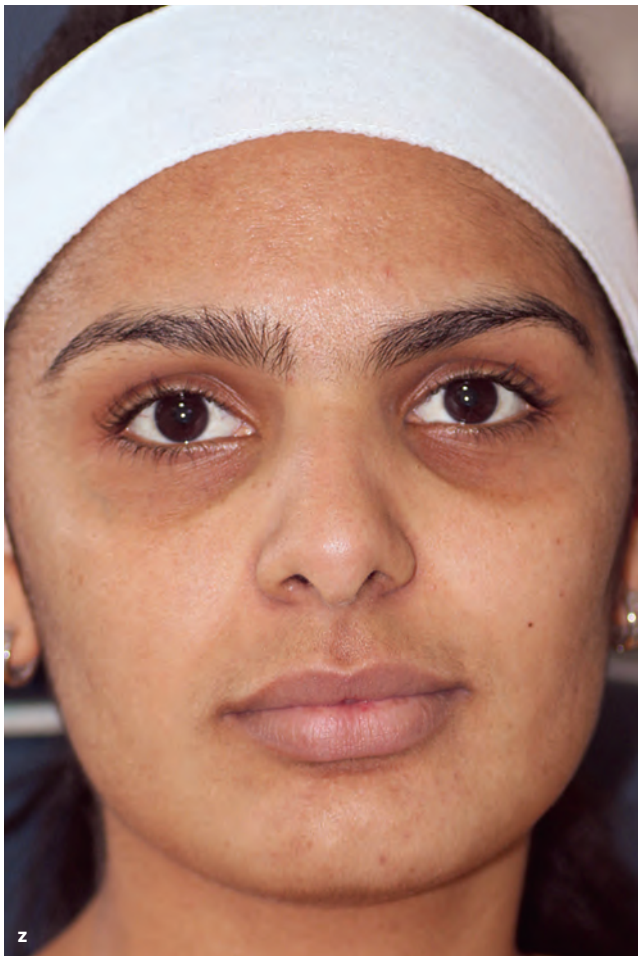
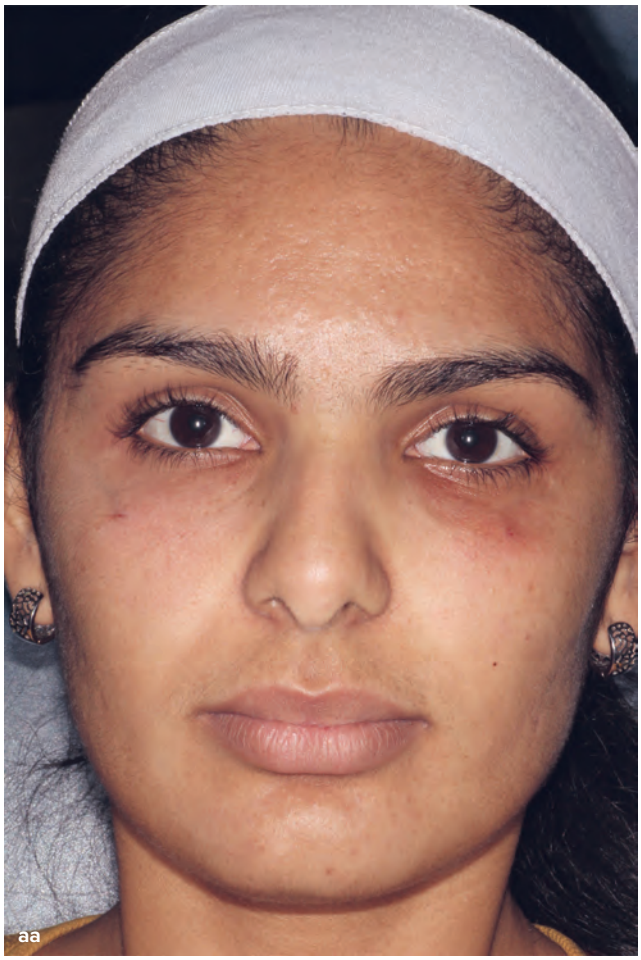


FIG 10-17 *(CONT)* *(q)* The ideal depth allows the shape of the cannula to be perceived under the skin. *(r and s)* A slight upward pressure is maintained as the cannula is being inserted. *(t)* The cannula is inserted until it reaches a distance of 10 mm from the medial corner of the eye so as not to approach the tear duct. *(u and v)* The index finger is used to immobilize the skin as a fanning technique is applied to detach the skin from the base of the eyelid. *(w)* The filler is injected starting at the top, again using the fanning technique, as the cannula is being withdrawn. *(x)* The filler can be observed as it is deposited in the lower portion of the eyelid.

FIG 10-17 *(CONT)* *(y)* A compressive massage is performed to spread the filler and ensure a uniform appearance. *(z)* Pretreatment view. *(aa)* Immediate posttreatment appearance. The dark spots disappear and the subpalpebral contour becomes more harmonious.





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