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Dermal Fillers for Facial Rejuvenation and Restoration: Integrating New Therapies Into Clinical Practice

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TARGET AUDIENCE

This activity has been designed to meet the educational needs of cosmetic dermatologists and aesthetic surgeons involved in the management of patients with facial aging.

STATEMENT OF NEED

Facial lipoatrophy is a natural part of the aging process. It is important to address this condition, as it can stigmatize patients, causing them to suffer lower self-esteem and quality of life. As newer products become available, there is an ongoing need for physician education. This continuing medical education (CME) program will assist physicians in understanding how to combine toxins and fillers as part of an overall plan to achieve facial rejuvenation and restoration of patients in their practices. The authors discuss the treatments available to meet this goal.

EDUCATIONAL OBJECTIVES

After completing this activity, the participant should be better able to:

1. Define the techniques of assessment for the aging face
2. Identify a personal plan for diagnosing and prescribing therapy for the aging face
3. Describe the use of collagen stimulators for nonsurgical treatment of facial rejuvenation and restoration
4. Identify treatment options based on location and stage of lipoatrophy
5. Describe safety considerations and injection techniques for dermal fillers

FACULTY

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Combining Advanced Injection Techniques: Integrating New Therapies Into Clinical Practice

Wm. Philip Werschler, MD

Durability and longevity of effect are significant considerations in the choice of treatment for cosmetic dermatology patients. Equally important, if not more so, is the utility of a product to achieve and maintain an effect. In this supplement, my colleagues Gary Monheit, MD, and Chérie Ditre, MD, review the current treatment choices, filler techniques, and combinations that are available. In this article, I would like to introduce the concept of regional aesthetic volume enhancement as part of a comprehensive approach for developing treatment protocols for the youthful enhancement patient seeking obvious improvement of natural features, the transitional rejuvenation patient attempting to recapture youth, and the fully adult patient seeking restoration of both health- and age-appropriate facial beauty.

Today, there are many fillers available in the United States to enhance natural features, rejuvenate fading youth, and restore aged facial features (Table 1). Equally important, if not more so, in clinical practice is the ease of use and utility of a product and achieving and maintaining a desired effect over time.[1,2] Through both a thorough understanding of the mechanism of action of each product category and a judicious application of their unique features and benefits, it is possible to meet reasonable treatment expectations for the vast majority of patients seeking this nonsurgical total facial rejuvenation and restoration approach to aesthetic treatment.

Presented in part at the sixth annual meeting of the American Society of Cosmetic Dermatology & Aesthetic Surgery, Las Vegas, Nevada, December 1, 2007.

REGIONAL AESTHETIC VOLUME ENHANCEMENT

Regional aesthetic volume enhancement (RAVE) compartmentalizes facial areas or regions as discrete cosmetic units known as facial treatment zones (Figure 1). This approach facilitates a conceptual predetermination of the outcome desired for volume enhancement and aids in the selection, placement, and injection techniques of differing facial-shaping agents.

Inherent to this approach is the diagnosis of the relative contributory components of the aging face, with a treatment plan of which products are to be used in which areas and for what effect prior to their prescribing. This process requires effective communication between the provider and patient prior to any actual treatment, in a process best described by Werschler and Fried[3] in the CPS-D/STEP (cosmetic procedure screen—dermatology/stress, target, envision, proactive) protocol.

RAVE is best considered in the context of a comprehensive approach to desired cosmetic outcomes, whether they are principally for enhancement, rejunvenative, or restorative purposes.

Whereas the current overwhelming consumer trend is to favor nonsurgical procedures over surgical

TABLE 1

Application of Facial-Shaping Agents

- Enhance natural features
- Rejuvenate fading youth
- Restore aged facial features

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Figure 1. Regional aesthetic volume enhancement compartmentalizes facial areas or regions as discrete cosmetic units, or facial treatment zones, and seeks to rebalance and reharmonize facial features both within and between zones to achieve the desired cosmetic outcome. Illustration courtesy of Irene Matiatos Russo, PhD.

procedures, RAVE and nonsurgical total facial rejuvenation and restoration as volumetric-lifting procedures are alternatives and complement traditional surgical tension-lifting procedures (Table 2).

Through careful examination, assessment, and analysis of the patient's underlying contributory factors (eg, biometric volume loss, the aging dermal effects of photodamage), RAVE can assist in restoring the loss of youthful balance, symmetry, and harmony leading to geometric inversion of the facial triangle in order to achieve desired contours and minimize the atrophy and redistribution of subsurface tissues that combine to result in an aged appearance (Table 3). The goal with RAVE is restoration of facial volume and contours rather than simply filling in wrinkles and lines.

TABLE 2

Regional Aesthetic Volume Enhancement

- A technique concept, not product dependant
- A method of assessing, planning, and performing volume enhancement to replace (augment) biometric volume loss/alteration—a primary intrinsic component of the aging face
- Uses facial-shaping agents to reharmonize, rebalance and restore symmetry to the facial treatment zones
- The volume component volumetric lifting of nonsurgical total facial rejuvenation and restoration

RAVE IN RELATION TO PATIENT AGE

The issues faced by cosmetic dermatology patients follow a spectrum of fairly simple and straightforward complaints from aging to more complex issues. Although facial changes occur gradually as a continuum, in practice there are 3 fairly disparate groups that can be defined psychodynamically by their respective motivational drivers: the youthful enhancement patient, the transitional rejuvenation patient, and the fully adult restoration patient (Figure 2). It is instructive to understand the needs and expectations of each group.

Youthful Enhancement Patient

The youthful enhancement patient population generally ranges from 18 to 35 years of age. They seek enhancement of certain features with a goal of maximizing natural youth and beauty. For example, the patients might consider the lips too small, or the mental crease too distinctive. Also, the nasal tip might be a bit asymmetric, the eyebrows flatter than desired, or the cheeks somewhat depressed. The youthful enhancement patient may also request the addition of features that he or she never had, such as enhanced cheek projection, the appearance of wider eyes, or voluptuous lips.

Success is achieved when the end result is aesthetic improvement (or enhancement) from the youthful patient's perspective—creating natural-looking contours or augmenting more modest physical traits. This nonsurgical option has advantages compared to permanent implants so that as fashions or desires change, the effect of the enhancement gradually resolves if not maintained. Nonpermanent options also allow for subsequent modifications to meet age- and appearance-related changes that will occur

TABLE 3

Cumulative Changes in Facial Geometry Over Time

- Dermal atrophy
- Muscle atrophy
- Lipoatrophy and redistribution (ie, lipoalteration)
- Bone and cartilage loss and remodeling (ie, osteoalteration)
- Hairline changes

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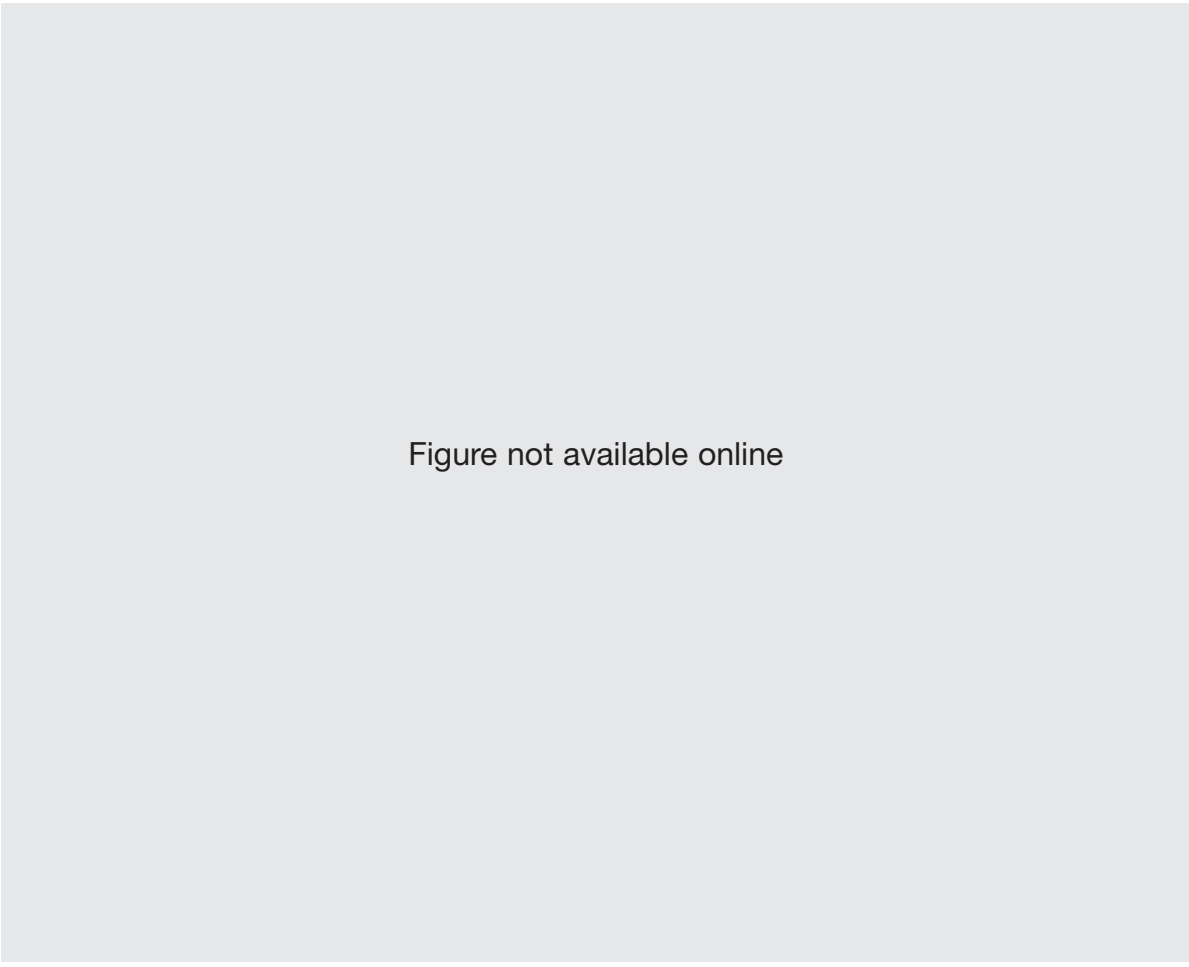

Figure 2. Although facial changes occur gradually as a continuum, in practice there are 3 fairly disparate groups: the youthful enhancement patient (A), the transitional rejuvenation patient (B, C), and the fully adult restoration patient (D, E). Illustrations courtesy of Irene Matiatos Russo, PhD.

over time as a consequence of both intrinsic and extrinsic aging.

It has been said that the youthful enhancement patient seeks to look better than his or her natural appearance.

Transitional Rejuvenation Patient

Transitional rejuvenation patients are approximately 35 to 55 years of age. This age group is sometimes referred to as the "youth corridor" where, given good genetics, good health, good skin care, and good luck, there are minimal aging changes that occur in facial appearance. This group psychodynamically desires rejuvenation of features in order to recapture as much of their youthful appearance as possible. The most common structural facial changes include an overall flattening and laxity of the mid face with a more pronounced vertical dimension of the lower eyelid, overly defined nasolabial folds, and a diminution of the projection of the perioral region, including the lips. In addition, there may be pronounced marionette lines, drooping oral commissures, and development of the prejowl sulcus with loss of the curvilinear sweep of the mandible.

Rejuvenation of these features in the mid to lower face can be accomplished by using soft tissue fillers. When dermal atrophy and laxity are evident, stimulatory fillers used for pan-facial dermal augmentation are especially helpful to repair the foundation prior to more defining contour treatments. Success is achieved when patients recapture a healthier age-appropriate appearance that is more consistent psychologically with their perceived age and youthfulness and physiologically with their physical conditioning.

It is has been said of this group that the desire is to look as good as they feel.

Fully Adult Restoration Patient

Patients who are 55 years of age or older comprise this final demographic. They experience marked changes in the upper, mid, and lower face. The original triangular facial shape has morphed to a trapezoidal shape or perhaps even to an inverted triangle.

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Correction of descent of the facial soft tissues will help return the patient to a more aesthetically appealing, age-appropriate appearance. However, these patients may also require treatment to return the skin to a healthy appearance as well. This is especially true following disease-related events such as skin cancer, precancerous lesions, and rosacea.

Typically, these patients have experienced significant amounts of both intrinsic and extrinsic (photodamage) aging changes and will commonly need dermal structural support and volume replacement with collagen stimulating fillers as a baseline prior to contouring specific features. Additionally, resurfacing options to both repair and enhance surface texture and pigmentation changes resulting from age and to stimulate epidermal cell turnover are commonly employed.

Thus, multiple regions of the face, both inside and outside, must be addressed to achieve the desired outcome. In addition to the lower third of the face, especially the perioral area, the mid face is likely to require added volume. The use of facial-shaping agents in the malar and infraorbital areas, as well as the prejowl sulcus, can bring the patient closer to restoration of the triangle of beauty associated with a younger and healthier face. Typically, this population is more likely than the others to require combined surgical and nonsurgical approaches to achieve the desired end result.

Fully adult restoration patients are typified by not wanting to look especially younger, but rather especially good for their age when compared to their peers.

TREATMENT OPTIONS

Robert Jackson, MD, past president of the American Academy of Cosmetic Surgery, has stated, "The science and technology we have today allow us to do many things and create aesthetically pleasing changes for our patients."

As the resources, capabilities, and skill sets of aesthetic dermatologists continue to develop and improve, it is time to move on from simply correcting superficial facial lines and wrinkles to a more global understanding and approach of the dynamics of facial aging. Combined with a deeper appreciation of the psychological motivations of patients seeking cosmetic procedures, a comprehensive approach to patient satisfaction can be crafted. This approach should be well within the treatment domain of aesthetic dermatologists as well as cosmetic and plastic surgeons.

The framework of nonsurgical total facial rejuvenation and restoration, using facial-shaping agents to correct and balance facial treatment zones and working in the context of RAVE where applicable, helps physicians to dynamically balance the face to address patient desires across the age spectrum. By using multiple products, each with unique attributes, in combination to create natural-looking youthful contours, symmetry, and balance, RAVE offers a more aesthetically holistic approach to optimizing facial shaping with minimally invasive approaches. RAVE is independent of any single product or injection style. Rather, it is the logical culmination of careful patient assessment, visualization of the desired outcome, and a specifically chosen armamentarium of products. In this context, fillers used alone and in combination become a foundation treatment that is complementary to toxins, lasers, and other procedures.

As part of a comprehensive approach to the cosmetic patient, careful discussion and determination of the desired outcome is essential for success. Guidelines for cosmetic dermatology patient screening are especially helpful to prevent unintended expectations and performance mismatches and to assist in keeping both the patient and provider on the same page.

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Current Treatment Options: What's In and What's Out?

Gary D. Monheit, MD

Fillers are important tools in combating the aging phenomenon. A variety of formulations are available, and each has its benefits and limitations. In this article, popular forms of temporary synthetic injectable fillers are compared, including human collagen, hyaluronic acid, poly-L-lactic acid, and calcium hydroxylapatite. In addition, 2 nondegradable injectable fillers, silicone and polymethylmethacrylate, are compared.

Success in nonsurgical facial rejuvenation starts by selecting the right fillers. Ultimately, success lies in recognizing the facial defects and applying expertise in injection techniques. In addition, it is essential to understand the goals of treatment from the patient's perspective. The focus of this article is on fillers available to clinicians practicing in the United States.

THE AGING PROCESS

As we age, 2 distinct types of changes combine to cause facial aging: intrinsic changes, mediated to a significant extent by genetic factors, and extrinsic changes, the results of environmental factors (eg, exposure to the sun's rays).

Intrinsic aging is a continuous process whereby skin and collagen production slows and changes in elastin result in a loss of tone. Dead skin cells do not shed as quickly, and the turnover of new skin cells may decrease slightly. Although these changes begin during the third decade of life, the signs of intrinsic aging are usually not visible for many years thereafter. By comparison, extrinsic aging is caused by sun exposure (photoaging), with contributions by repetitive facial expressions, gravity, sleeping positions, and smoking (Table 1).[1]

The extent of photoaging depends on a person's skin color and history of sun exposure over many years. Fair-skinned individuals with a history of sun exposure are at greatest risk for developing the signs of photoaging, which include fine wrinkles and a mottled complexion.

Repeated UV exposure breaks down collagen and impairs collagen synthesis. Changes in elastin (as in intrinsic aging) result in a loss of tone. In addition, the skin becomes loose, wrinkled, and leathery much earlier with unprotected exposure to sunlight.[1]

CHOOSING THE PROPER FILLER

A variety of filler formulations are available for managing the aging phenomenon. Each has its benefits and limitations. Table 2 lists the fillers that have been introduced in the United States over the past 35 years.[2]

HUMAN-DERIVED COLLAGEN

Human-derived collagens (ie, CosmoDerm and CosmoPlast) are harvested from bioengineered human skin cells and then seeded on a 3-dimensional mesh that is identical to the human dermis but lacks immune cells.[3]

CosmoDerm is injected into the upper papillary dermis to correct fine lines. CosmoPlast is used to treat deeper rhytides, smooth scars, and enhance the lips. Unlike CosmoDerm, CosmoPlast is cross-linked with glutaraldehyde to increase its strength and longevity.[3] The results are immediate and last 2 to 5 months.[4] Initial swelling resolves in a few days and can be minimized by avoiding strenuous exercise, alcoholic beverages, and sun exposure in the first 24 hours.

Neither product requires skin testing prior to use. However, patients with an allergy to lidocaine or with a history of anaphylaxis to any allergen should not receive CosmoDerm or CosmoPlast. These products should also be used cautiously in patients with

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Table 1

Facial Signs of Intrinsic and Extrinsic Aging[1]

Type of Aging	Signs
Intrinsic	Fine wrinkles Thin, transparent skin Loss of underlying fat Hollowed cheeks and eye sockets Loss of firmness on the hands and neck Bone loss Sagging skin Dry skin
Extrinsic	Dry texture Fine and coarse wrinkling Sallow color, dyspigmentation Loss of tone

autoimmune diseases such as lupus, scleroderma, or rheumatoid arthritis.[3] A summary of the uses of human collagen and common adverse reactions are listed in Table 3.

TEMPORARY SYNTHETIC INJECTABLE FILLERS

Three popular forms of temporary synthetic injectable fillers are hyaluronic acid, poly-L-lactic acid, and calcium hydroxylapatite.

Upon injection, hyaluronic acid fillers provide an immediate response. However, the duration of effect is the shortest among the temporary synthetic injectable fillers—between 3 and 9 months.[6]

Hyaluronic acid is extremely hydrophilic, binding water up to 1000 times its volume and attracting water into the extracellular matrix that produces turgor.[7] There are 4 available forms of hyaluronic acid injectables in the United States that have been approved by the US Food and Drug Administration: Captique, Hylaform, Juvéderm, and Restylane. Table 4 lists their uses and adverse reactions.

Despite the fact that each product is hyaluronic acid, they are not identical formulations. However, each may be used to fill the nasolabial folds, glabellar lines, and distensible scars. They are not recommended for use on the lips. Although rare, there have been reports of delayed inflammatory skin

Table 2

Introduction of Fillers in the United States since 1972

Year	Product
1972–1975	Collagen Fibril
2002	CosmoDerm, CosmoPlast (collagen) Restylane, Hylaform (hyaluronic acid)
2004	Calcium hydroxylapatite Poly-L-lactic acid
2006	Juvéderm (hyaluronic acid) Polymethylmethacrylate microspheres

reactions following hyaluronic acid filler procedures. Other adverse reactions include transient erythema, localized swelling, bruising, and tenderness. If the hyaluronic acid is injected too superficially in the dermis, there may be an apparent blue mark caused by the Tyndall effect.[3]

Two products—poly-L-lactic acid and calcium hydroxylapatite—are longer lasting than collagen (Table 5). They are sometimes referred to as semipermanent fillers, reflecting their comparatively durable response.[8,9]

Table 3

Uses of Human Collagen and Common Adverse Events[5]

Clinical Use
Rhytides, fine and coarse
Atrophic scars
Lip augmentation
Folds, grooves
Adverse Reaction
Soft tissue swelling
Bruising
Skin necrosis (rare)
Blindness (remote)

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TABLE 4

Uses of Short-Acting Hyaluronic Acid Fillers and Common Adverse Events[5]

Clinical Use
Coarse rhytides
Atrophic scars
Lip augmentation
Folds and grooves

Adverse Reaction
Soft tissue swelling
Bruising
Postoperative discomfort (rare)

Volume restoration with poly-L-lactic acid is gradual and incremental with subsequent treatments. Generally, 3 to 6 sessions are needed, and the results last up to 2 years with repeated treatment. The most commonly observed adverse event associated with the use of poly-L-lactic acid is delayed occurrence of subcutaneous papules at the injection site, which are typically palpable, asymptomatic, and nonvisible.[5,9]

By comparison, the response to calcium hydroxylapatite is related to the volume injected. Clinical results last for 9 to 12 months. Calcium hydroxylapatite is generally well tolerated. However, precise technique is required with lip augmentation in order to reduce the risk of submucosal nodules, which occur in approximately 10% of patients treated in the lips. Most often the nodules are not visible and resolve without intervention.[10]

NONDEGRADABLE INJECTABLE FILLERS

Silicone and polymethylmethacrylate are synthetic products that are not readily metabolized and removed by the body.[11,12]

Silicone is used for the treatment of atrophic scars, as well as lip and nasolabial fold augmentation. Polymethylmethacrylate is a permanent injectable implant for the treatment of soft tissue defects of the face. The value of a permanent product is obvious. However, facial changes that occur with aging continue after the nondegradable fillers are in place. Therefore, additional treatment might be required over time, and removal of these products is accomplished with difficulty, if at all.

CONCLUSIONS

Many treatment options are available for nonsurgical facial rejuvenation. With careful assessment, the appropriate intervention can be identified and employed to correct the inevitable effects of aging on appearance.

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TABLE 5

Longer-Acting Injectable Fillers[5]

Compound	Onset	Duration	Adverse Reactions
Calcium hydroxylapatite	Immediate	15–18 mo	Bruising Erythema Nodule formation (especially in lips) Granulomas If injected on bone (under periosteum), bone formation can occur
Poly-L-lactic acid	Full effects in weeks to months	Up to 24 mo with repeat treatments	Bruising Erythema Nodule formation Granulomas

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Choosing the Most Appropriate Filler: Safety, Techniques, and Combinations

Chérie M. Ditre, MD

Offering patients only one or two treatment options for rejuvenation of the aging face is rapidly becoming insufficient. This article presents my algorithm for combining nonsurgical treatments to correct changes to the mid face and lips that accompany advanced aged.

The most recent findings from the American Society of Plastic Surgeons[1] and the American Academy of Cosmetic Surgery[2] support the need for greater information and guidance on the safe and effective use of combined nonsurgical treatments for facial rejuvenation.

In this article, these relevant statistics are summarized and a personal algorithm for complete nonsurgical management of the aging face is provided as a guide to help clinicians advance their practices in this field.

INCREASE IN NONSURGICAL TREATMENTS

Data from the American Society of Plastic Surgeons survey reveal that from 2005 to 2006, the use of all fillers increased by 41% (Table 1).[1] The comparative increase in the use of calcium hydroxylapatite and poly-L-lactic acid was approximately the same at 19% and 18%, respectively. However, the greatest increase (59%) occurred with the shorter-acting hyaluronic acid products.[1]

Today, half of the members of the American Academy of Cosmetic Surgery (AACS) offer semipermanent fillers, such as poly-L-lactic acid and calcium hydroxylapatite, and more than 9 of 10 AACS members offer botulinum toxin and hyaluronic acid (Table 2).[2] When compared to cosmetic surgery procedures offered by AACS members, the semipermanent fillers are offered more often than almost all 23 surgical procedures (Table 3).

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A PERSONAL ALGORITHM FOR NONSURGICAL FACIAL REJUVENATION

Offering patients only one or two filler options falls short of providing optimal management of the changes that accompany the aging face. Clinicians must identify the products that perform best for them and their patients. The following observations are based on my experience as Director of the Cosmetic Dermatology & Skin Enhancement Center at Penn Medicine at Radnor in Pennsylvania.

MIDFACE CORRECTION

The aging patient typically exhibits symmetrical mid- to lower-face depression, most notably with sunken cheeks. There is a loss of the youthful lifting projection and roundness of the zygoma with submalar depression. Treatment objectives include volumizing the cheeks, lifting of the nasolabial and mesolabial folds, and reversing the deepening of the nasolabial and nasojugal (tear trough) creases.

Volumizing the Cheeks

Poly-L-lactic acid is used as a nonsurgical cheek implant. It is important that this product be injected in the deep dermis or subcutaneous layer and that superficial injections are avoided.[3] Volume restoration occurs over time, with subsequent treatments providing gradual and incremental volume to the injected area. Typically, 3 to 6 sessions are required in order to produce results that will last up to 2 years. Poly-L-lactic acid comes as a freeze-dried powder with 2 vials per box.[3] I reconstitute the product using 5 mL sterile water for injection plus 1 mL lidocaine. During each session, typical treatment requires 6 mL for each side of the face using a 26-gauge needle.

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Table 1

Growth in the Use of Soft Tissue Fillers: 2005 to 2006[1]

Soft Tissue Filler	Procedures, n		
	2005	2006	Change, %
Hyaluronic acid	489,554	778,285	59
Collagen	220,632	267,339	21
Calcium hydroxylapatite	66,182	78,849	19
Poly-L-lactic acid	46,732	54,912	18
Fat	48,960	52,904	8
Total	872,060	1,232,289	41

The use of poly-L-lactic acid can be accompanied by the delayed occurrence of subcutaneous papules at the injection site. These are typically palpable, asymptomatic, and nonvisible. Other treatment-related adverse events include bruising, edema, hematoma, inflammation, and erythema.[3]

Nasolabial and Mesolabial Folds

For grade 3 or 4 (mild to moderate) nasolabial folds, calcium hydroxylapatite is used. As opposed to poly-L-lactic acid, in which the full response requires time for collagen deposition, the clinical response to calcium hydroxylapatite is related to injection volume.

Table 2

The 9 Most Commonly Offered Noninvasive Procedures by the American Academy of Cosmetic Surgery Member Practices in 2006*[2]

Procedure	Member Practices Offering Procedure, %
Botulinum toxin type A	94
Hyaluronic acid	92
Chemical peels	80
Laser resurfacing	69
Microdermabrasion	65
Fat injections	62
Collagen injections	59
Laser hair removal	59
Calcium hydroxylapatite/poly-L-lactic acid†	50

*Based on 206 completed surveys.

†The American Academy of Cosmetic Surgery confirms that calcium hydroxylapatite/poly-L-lactic acid data are combined.

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TABLE 3

The 5 Surgical Procedures Offered More Commonly Than Calcium Hydroxylapatite/Poly-L-lactic Acid by American Academy of Cosmetic Surgery Member Practices in 2006[2]

Procedure	Member Practices Offering Procedure, %
Liposuction	76.2
Blepharoplasty	68.4
Face-lift	59.7
Forehead-lift	58.3
Lip implant	51.9

Over time, the manufacturer claims that calcium hydroxylapatite also stimulates new collagen growth. Clinical results last for 9 to 12 months.[4]

The treatment of more severe nasolabial and mesolabial folds may require injections of hyaluronic acid, with additional filling accomplished using underlying poly-L-lactic acid injections.

Tear Troughs

Individuals in their early 30s begin to experience some descent of the malar fat pad. This can result in the formation of dark circles beneath the eyes and deepening of the nasolabial and nasojugal creases.[5]

The hyaluronic acid formulation in Juvéderm differs from that of Restylane in that there is less resistance to injecting the product through the syringe. However, based on early experience with Juvéderm, it is important to secure the needle firmly to the syringe in order to avoid separation during injection.

The most common side effects from hyaluronic acid include temporary injection site reactions such as redness, pain and tenderness, firmness, swelling, lumps and bumps, and bruising.

LOWER FACE

Most patients want to add volume to their lips but wish to avoid looking overdone. In addition, a common complaint among women older than 50 years is lipstick "bleeding" around the mouth along the perioral rhytides.[6]

Lips

My preference is to use Perlane, a formulation of hyaluronic acid. The objective is to provide a more youthful and relaxed appearance with an uplifting hint of a smile. This is accomplished using injections at the corners of the mouth (oral commissure) at the level of the modiolus. Additionally, injections along the philtral columns enhance and redefine the Cupid's bow area. Successful treatment in this anatomical area requires attention to facial characteristics and ethnicity.[7,8]

Perlane is supplied in a 1-mL disposable glass syringe. The most commonly observed side effects are swelling, redness, pain, bruising, and tenderness at the injection site, which typically resolve in fewer than 7 days.[9]

Upper- and Lower-Lip Rhytides

A human-based collagen product, CosmoDerm, can be used to correct upper- and lower-lip rhytides. Unlike hyaluronic acid, calcium hydroxylapatite, and poly-L-lactic acid, human-based collagen implants are sterile injectable liquids made of highly purified human collagen. These products (ie, CosmoDerm, CosmoPlast) also contain lidocaine to provide local anesthesia at the site of injection.[10]

Human-based collagen implants can be injected without a skin test prior to treatment. However, they should not be used in patients with severe or multiple allergies that have led to anaphylactic shock or an acute reaction that requires immediate emergency medical assistance. Human-based collagen implants should also not be used in patients who are allergic to lidocaine or in patients with an inflamed or infected skin condition.[10]

SUMMARY

As the availability of new products for nonsurgical facial rejuvenation continues to grow, we can expect

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that more clinicians will utilize these new products in order to meet their patients' expectations for a youthful appearance. The recommendations in this article should not be interpreted as rigid rules. Rather, they should stimulate personal consideration of the options available to enhance the practice of dermatologists and plastic surgeons. Ultimately, becoming skilled in the use of several categories of fillers will provide the best outcomes.

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Dermal Fillers for Facial Rejuvenation and Restoration: Integrating New Therapies Into Clinical Practice

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For each question listed below, select the one best answer.

1. What are the applications for facial-shaping agents?
   a. Enhance natural features
   b. Restore aged facial features
   c. Rejuvenate fading youth
   d. All of the above

2. Select the volumetric lifting procedure that serves as an alternative and a complement to traditional surgical tension lifting.
   a. Regional aesthetic volume enhancement
   b. Nonsurgical total facial rejuvenation and restoration
   c. Both a and b
   d. None of the above

3. Which answer best describes regional aesthetic volume enhancement?
   a. A method of assessing, planning, and performing volume enhancement to replace (augment) biometric volume loss/alteration
   b. A surgical technique to provide long-term lifting of aging facial features
   c. A product-dependent procedure that provides volumetric lifting of facial features
   d. All of the above

4. Select the term that best describes hyaluronic acid.
   a. Stimulatory filler
   b. Chemical denervation
   c. Replacement filler
   d. Both a and c

5. Select the characteristic finding(s) associated with intrinsic aging.
   a. Slowed skin and collagen production
   b. Changes in elastin resulting in a loss of tone
   c. Sun exposure
   d. Both a and b

6. Identify the products composed of human-derived collagen.
   a. Captique, Hylaform, Juvéderm, and Restylane
   b. CosmoDerm and CosmoPlast
   c. Radiesse and Sculptra
   d. Both a and b

7. Silicone and polymethylmethacrylate are synthetic products that are not readily metabolized and removed by the body.
   a. True
   b. False

8. According to the American Society of Plastic Surgeons survey, what was the growth in the use of all fillers from 2005 to 2006?
   a. 14%
   b. 24%
   c. 41%
   d. 91%

9. According to the American Academy of Cosmetic Surgery, how many of its members offer semipermanent fillers to their patients?
   a Less than 10%
   b. Approximately one quarter
   c. Approximately one half
   d. More than 9 of 10

10. Select the correct statement regarding the hyaluronic acid products Juvéderm and Restylane.
    a. Greater resistance injecting Juvéderm through the syringe
    b. Less resistance injecting Juvéderm through the syringe
    c. Severe nasolabial folds might require additional filling with poly-L-lactic acid
    d. Both a and c

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Dermal Fillers for Facial Rejuvenation and Restoration: Integrating New Therapies Into Clinical Practice

Project ID: 4991ES22 Released: February 2008

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Please answer the following questions by circling the appropriate rating:

1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

Extent to Which Program Activities Met the Identified Objectives

After completing this activity, I am now better able to:

- Define the techniques of assessment for the aging face **1 2 3 4 5**
- Identify a personal plan for diagnosing and prescribing therapy for the aging face **1 2 3 4 5**
- Describe the use of collagen stimulators for nonsurgical treatment of facial rejuvenation and restoration **1 2 3 4 5**
- Identify treatment options based on location and stage of lipoatrophy **1 2 3 4 5**
- Describe safety considerations and injection techniques for dermal fillers **1 2 3 4 5**

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The content presented:

- Was timely and will influence how I practice **1 2 3 4 5**
- Enhanced my current knowledge base **1 2 3 4 5**
- Addressed my most pressing questions **1 2 3 4 5**
- Provided new ideas or information I expect to use **1 2 3 4 5**
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