

INJECTABLE TREATMENTS FOR AESTHETIC FACIAL ENHANCEMENT



Injectable treatments for aesthetic facial enhancement described in this chapter include botulinum toxin (Botox, or BTX) and soft tissue fillers. These nonsurgical techniques are an effective bridge for younger patients who may have begun to show some early signs of aging but don't yet need full surgical procedures.

They may be appropriate for patients of almost any age who can benefit from additional facial volume (soft tissue fillers), or for patients undergoing facial surgery whose results can be further enhanced by adjunctive treatments. Surgeons frequently recommend some of these procedures as maintenance or touch-up for patients who have already undergone facial surgery or as an alternative for individuals who cannot undergo surgical procedures because of medical conditions or other reasons.

"There has been a paradigm shift in cosmetic surgery over the last 10 years," maintains **Fanny dela Cruz, MD**, of West Bloomfield, Michigan. "More and more, we are focusing on maintenance therapy rather than major cosmetic procedures. There is a whole new clientele for cosmetic enhancements: fit, healthy, young men and women who are starting to see early signs of aging and unwelcome changes in their appearance. At this point, they want only minimal procedures. A good example is correcting wrinkles in the lip area or enlarging the lips using fillers such as Restylane and Radiesse."

Unlike surgery, most injectable treatments provide only temporary results and must be repeated periodically.

"Increasing the volume of the external tissues of the face by the injection of fat or another type of filling material is not a permanent solution for long-lasting rejuvenation," says **Jack A. Friedland, MD**, of Phoenix, Arizona. "Initial improvement is temporary at best, and the procedure has to be repeated for maintenance of results. Therefore, I feel this type of procedure should be considered ancillary rather than primary — meaning that it can complement surgical procedures but certainly cannot replace them."

This fact has not detracted from the popularity of injectable procedures. However, some patients do approach them with the expectation that they are a substitute for surgical procedures such as a face lift, brow lift or eyelid surgery. While some nonsurgical procedures can soften facial wrinkles and even alter brow shape, it is important to understand that the results of nonsurgical procedures are not the same as the results of surgery. Yet there are unique benefits to many nonsurgical procedures. One of the primary benefits is that treatments such as Botox and various injectable fillers require virtually no downtime or very little recovery. In addition, the risks associated with these procedures are generally less than those associated with surgery. Cost may be initially less than a surgical procedure, but patients must keep in mind that repeat treatments will add more expense over time.

"A single 10-minute Botox procedure can, for a fraction of the cost and none of the surgical risks, rebalance facial expression by weakening specific muscles if used correctly," says **Dean Kane, MD**, of

Baltimore, Maryland. "I am able to raise brows, reduce scowl lines, and reduce forehead furrows, crow's-feet, and most lipstick lines with Botox. I can lift the corners of the mouth, get a gentle lift of the jowl, and reduce the neck lines and bands. Previously, most of these procedures needed surgery or could not be performed. There are limits though. When the skin sags beyond the ability of the underlying muscle to lift it, a surgical procedure will be necessary."

Gary R. Culbertson, MD, of Sumter, South Carolina, adds that the temporary nature of injectable treatments can sometimes be a benefit. "To get rid of frown lines, consider Botox injections first and possibly to see what you might look like after a brow lift. The results of Botox can last up to six months. If you like the results, then you may wish to consider a more permanent surgical solution such as a brow lift."

Whatever type of injectable treatment you are interested in, keep in mind that "nonsurgical" does not mean "nonmedical." This area of aesthetic medicine has attracted many unlicensed and unqualified practitioners, and there have been well-publicized instances in which patients were seriously harmed by injections of tainted or nonmedical grade substances used by these individuals. Just as it is important to select an experienced board-certified plastic surgeon for your aesthetic surgery, it is also vital to select a trained and qualified physician to administer or supervise your nonsurgical treatments.

You also need to know that some injectable treatments you may have read about are either not FDA approved for use in the United States, or they may have FDA approval for certain uses and not others. When a product is FDA-approved for a specific purpose and physicians use the product for additional types of treatments beyond those that are officially approved, this is called an "off-label" use. Off-label use of injectable products is not uncommon — in fact, many of the popular cosmetic uses of Botox are technically "off-label." Nevertheless, you should be made aware of any off-label use as part of your informed consent to undergo a procedure.

THE CONSULTATION

The consultation is a time for you and the surgeon to get to know and feel comfortable with each other. You should feel completely confident that the surgeon is fully qualified. If you haven't read sections in the beginning of this book about choosing a surgeon who is certified by the American Board of Plastic Surgery, you should do so now.

Your surgeon may evaluate several factors, including your skin quality, facial structure and volume, the type and location of facial wrinkling, contraction of your facial muscles, position of your brows, and any other aspects of your facial appearance that may bother you. All these factors

fast FACTS

LENGTH OF INJECTABLE PROCEDURES

Generally 10 to 45 minutes.

ANESTHESIA

Usually local anesthetic or topical numbing agent.

LENGTH OF STAY

Usually performed as a routine appointment in doctor's office.

RECOVERY

Although there may be temporary bruising, swelling or redness, patient can generally return to normal activities immediately or within a few hours following treatment.

RISKS/POSSIBLE COMPLICATIONS

When performed by a qualified and experienced plastic surgeon, the risks associated with injectable treatments are relatively minor. However, as with any medical procedure, there can be unanticipated outcomes.

Some of the risks and complications associated with injectables include:

- Infection or abscess.
- Scarring, lumps, or nodules.
- Asymmetry.
- Peeling and open sores.
- Allergic reaction.

The above-listed risks may be only some of those that your surgeon will discuss with you in greater detail during your consultation.

will help your surgeon determine if you are a suitable candidate for one or more injectable therapies. He or she will also review your entire medical history, including any medications you may currently be taking and conditions that could cause problems. These might include (depending on the type of injectable treatment being considered) active infections or sores that have not healed; allergies to beef, bird or bovine products; autoimmune diseases; or the rare allergy to lidocaine.

You and your surgeon will work together to determine the best treatment plan for you. Depending on the type and depth of your wrinkles, the condition of your skin and the extent of overall facial aging, your surgeon may discuss other procedures that might better achieve your goals, such as face lift, brow lift, eyelid surgery or skin resurfacing. These procedures, in appropriately selected patients, are often performed in conjunction with the use of Botox and soft tissue fillers.

"I've been using soft tissue fillers for the past few years and have found that they provide a tremendous enhancement to some of the aesthetic surgical procedures we do," says **Larry Sargent, MD**, of Chattanooga, Tennessee. "A good example is lip augmentation. In the past, there were few good options for significant lip enhancement with a natural appearance. Today, soft tissue fillers such as hyaluronic acid can make a big difference in shaping and enlarging the lips with relatively little risk and overall good results."

BOTOX

Botox is a product name for botulinum toxin (BTX) Type A. Botox injection is a popular nonsurgical method to temporarily reduce or eliminate frown lines, forehead creases, crow's-feet around the eyes, and in some instances, bands or cords in the neck. It can also be used to decrease nostril flaring and improve downturned corners of the mouth.

Wrinkles such as crow's-feet, frown lines, and horizontal forehead creases are usually caused by repeated muscle contraction associated with facial expressions. The cosmetic form of botulinum toxin, used as a therapeutic agent, blocks certain nerve impulses and temporarily inactivates the muscles that cause these wrinkles. The action of Botox is well targeted to the specific muscles that control facial expressions, and surrounding muscles are not impacted. Your surgeon's

understanding of facial anatomy is paramount in achieving a natural-looking result.

"I think Botox is best used in the upper third of the face for frown lines, forehead furrows, and crow's-feet," says **Gustavo Galante, MD**, of Munster, Indiana, who adds, "It can be used for lines around the mouth, but there is more room for error in those areas. The muscles in the upper face are used largely for expression, whereas those around the mouth are more functional — for eating, talking, and kissing. It's critical that the surgeon knows the anatomy of the area being injected."

Botox injections will not only smooth certain types of facial wrinkles, but the treatment will also slow the process of further wrinkle formation.

"In addition to its temporary qualities in reducing furrows, Botox helps to prevent fine lines from becoming deeper, because it weakens the muscles that cause deep wrinkle formation," says **Alexander C. Digenis, MD**, of Louisville, Kentucky.

That's why people as young as their 30s and even 20s, who want to prevent wrinkles before they happen, as well as older women and men can be appropriate candidates for Botox injections.

But wrinkle reduction and prevention are not the only uses of Botox. Today, plastic surgeons frequently use BTX, often in combination with soft tissue fillers such as collagen or hyaluronic acid (Restylane, Hylaform or Captique), for facial shaping.

"Botox is best used in the upper part of the face for brow shaping rather than wrinkle reduction, and in the lower part of the face to dramatically reduce the gravitational effects that pull down the corners of the mouth and create a marionette line," says **Laurie Casas, MD**, of Glenview, Illinois.

First used in the late 1960s to treat neurological disorders and since 1997 to treat facial wrinkles, BTX has proven to be safe; there have been no documented systemic complications associated with BTX injections to date. Side effects can include a burning sensation during injection, local numbness, slight swelling and bruising, but most are not long lasting. Some patients report minor headache pain or mild flu-like symptoms for several days. Allergic reaction is very rare.

The procedure

Your plastic surgeon can inject Botox in his or her office, exam room, or other ambulatory setting. While



Preoperative appearance. Aging causes descent of soft tissues, resulting in volume loss in the cheek areas and deep facial lines and folds.



Postoperative appearance. Following injection with a soft tissue filler, the nasolabial fold is less pronounced, creating a smoother facial contour.

you contract the muscles that correspond to the area to be treated, the surgeon locates the best injection site and administers the Botox into the muscle using a very small needle.

It would seem that Botox injections are easy to administer, but the success of your Botox therapy is extremely technique-dependent. Injections must be placed precisely to provide effective treatment, minimize the side effects mentioned above, and avoid complications.

"Although Botox has been around for years, there is still no standard 'formula' for its proper administration," says **Eric Mariotti, MD**, of Concord, California. "I still believe there is just as much art as there is science for the best aesthetic results. No two patients are alike and each must be evaluated critically to determine the dosage and placement of injections. In inexperienced hands, a little too much here or not enough there can lead to an unnatural appearance."

For example, if Botox is injected improperly, the eyelids can droop, brows may be asymmetrical, or facial expressions may look unnatural. Although temporary, these problems can take a few months to resolve. Difficulty in swallowing associated with treatment of neck bands is a serious, although rare, complication. A qualified and experienced plastic surgeon has the skill and knowledge of facial anatomy to lessen the risk of unexpected side effects and complications. He or she understands how the various facial muscles interact and can administer the toxin in strategically placed locations to achieve exactly the desired effect, whether it is smoothing frown lines and neck cords or modifying brow shape.

"When patients come in who just want Botox to reduce their horizontal forehead lines, I always tell them it is also a good idea to inject some into the vertical frown line area and crow's-feet," says **Vicente J. Poblete, MD**, of Avon Lake, Ohio. "In the course of trying to alter facial aesthetics, if we only treat the elevator muscles to remove the forehead lines and do nothing to the other muscles, the eyebrows may droop. That's because another set of muscles, called the depressors, will overpower the weakened elevator muscles."

Post-treatment

Following treatment, your surgeon will advise you to avoid lying down or massaging the injection areas for a few hours so that the toxin does not spread to nearby muscles. You should begin to see the effects within a few days, and improvement may continue for about 10 to 12 days. Results can last anywhere from two to 12 months, though the average seems to be about four to six months. Patients who continue with long-term Botox therapy may find that the effects of injections seem to last longer than in earlier stages of treatment. Occasionally, patients may experience no effects from Botox injection; in such cases, touch-up injections typically produce the desired results.

INJECTABLE SOFT TISSUE FILLERS

A vibrant smile is full and rich. Likewise, a youthful, vibrant face is characterized by fullness and smooth contours rather than a "gaunt" or hollowed-out appearance. But over time, the wear and tear on muscles and tissues from normal, everyday facial expressions and

movements combine with the effects of gravity and exposure to the elements to break down the underlying tissues that support your skin. Laugh lines, crow's-feet, and other facial wrinkles, as well as soft tissue depletion, can cause you to look older and less vibrant than you feel.

"The addition of volume enhancement, instead of only skin excision and tightening, creates a more natural and rejuvenated result, which is most likely longer-lasting as well," says Michael Parker, MD, of Akron, Ohio. "The 'new-age' cosmetic plastic surgeon does not rely on just one or two procedures to correct problem areas; we are now using multiple modalities, such as skin tightening, laser resurfacing, Botox, and various fillers, in an effort to achieve the maximum enhancement. Of course, this has largely been brought about by technological advancements in the field, and I think that's the wave of the future for cosmetic surgery."

Today, natural or biocompatible substances such as injectable collagen (Zyderm, Zyplast, Cosmoderm, Cosmoplast, Isolagen), hyaluronic acid (Restylane, Hylaform, Captique), calcium hydroxylapatite (Radiesse), poly-L-lactic acid (Sculptra), and fat are helping to restore a more youthful appearance for millions of women and men. Research is ongoing, and new products are constantly being developed that further expand the choices available to physicians and patients.



Preoperative appearance. Frowning causes muscle contraction, which in turn creates skin wrinkles and furrows.

The specific applications and techniques for injectable soft tissue fillers are also expanding as physicians learn how to use these products, alone and in combination, to achieve better and more refined results. In addition to treating facial lines and wrinkles, soft tissue fillers can reduce the appearance of scarring caused by acne, chicken pox or injury; augment lips and cheeks; and even shape noses and chins.

"I would estimate that 99 percent of the fillers used in this country are used to fill lines, wrinkles, and lips. That's probably how I use about 50 percent of my fillers," says Michael Kane, MD, of New York, New York. "The other half I use for facial shaping, which is often essential to creating a youthful appearance. An old advertisement for collagen showed a 'before' picture of a woman with a lot of fine lines in her face, and an 'after' picture without lines. The strange thing was, she didn't look any younger in the 'after' picture. When we age, the fat descends from the cheekbones and accumulates at the jowls. By building up the cheekbones and then using Restylane to fill the indent in front of the jowls, disguising it, I can truly give the face a younger shape."

Fillers can be used in conjunction with skin resurfacing procedures or surgical procedures such as a face lift or brow lift to enhance the facial rejuvenation process and achieve a harmonious effect. Your plastic surgeon can advise you which fillers will work best for your specific needs. Considerations will include the areas for correction, the extent of volume needed, your skin pigmentation (some fillers may not be appropriate for darker-skinned individuals), any allergies that you may have to specific products, and whether a surgical procedure might offer a better or more permanent solution.

There are two main categories of injectable fillers: resorbable (temporary, since they are resorbed by the body over time — effects typically last three to nine months), and nonresorbable (permanent or at least generally longer-lasting than resorbable fillers). It has long been thought that the "ideal" filler would be one that is both biocompatible and permanent. However, many physicians and patients have come to recognize the relative benefits of temporary fillers. As we mature, our faces change in subtle ways; temporary fillers provide us with the opportunity to modify our facial contours in sync with the natural changes that occur with the aging process or in combination with aesthetic surgical modifications.

COLLAGEN

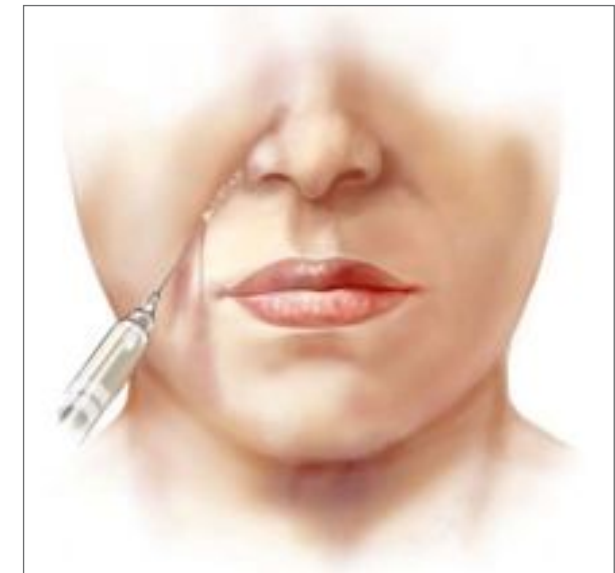
Approved by the FDA in 1981, collagen is a popular soft tissue filler used primarily for the nonsurgical lip augmentation and treatment of nasolabial folds. Although allergy to bovine-based (derived from cows) collagen occurs in less than five percent of the population, it is the primary risk associated with the product, and you will need to undergo allergy testing before your first treatment with bovine-based Zyderm or Zyplast. The test involves the injection of a small amount of collagen beneath the skin of your forearm, which you will be instructed to watch carefully for about a month. If you do not develop a reaction, such as redness or swelling in the area of the injection during this time, it is safe to proceed with treatment.

There are other formulations of collagen, Cosmoderm and Cosmoplast, that are made from human-derived sources and do not require you to be allergy-tested prior to injection. Yet another option is Isolagen, a process in which your own collagen-producing cells are cultured from a small skin sample, often easily removed from behind your ear, and then injected in the treatment site. However, this can be a somewhat more expensive alternative. Because today there are other soft tissue fillers with significantly longer-lasting results, collagen is no longer the most widely used soft tissue filler.

The procedure

Collagen contains an anesthetic, lidocaine, which helps diminish any discomfort. Patients may still feel a slight stinging or burning sensation at the beginning of the injections. In patients with a lower pain threshold, an additional topical or local anesthetic can be used.

As with all injectables, selection of the injection points is critical. Your plastic surgeon will mark the sites, often choosing several injection points for each area to be treated. He or she will then inject the collagen with a fine needle at several points along the treatment area. Depending on the length and depth of the wrinkle, several injections may be needed. Your surgeon will slightly overfill each area, since part of the injected solution is saline and local anesthetic that will be absorbed by the body within a few days. Your surgeon may ask you to hold a hand mirror to select and help monitor the sites as well as decide when they



"Fillers" such as hyaluronic acid, collagen, and fat can be injected with a tiny needle beneath the skin wrinkle or indentation, filling or 'volumizing' the area treated.

are sufficiently corrected. The procedure generally takes between 15 to 45 minutes, depending on the areas to be treated.

Post-treatment

Following your collagen treatment, you may experience some stinging or throbbing at the points of injection. This will subside rather quickly; in addition, any redness or swelling that may appear should disappear within 24 to 48 hours. In some cases, notably with fair-skinned patients, redness may last for a week or more. If tiny scabs should form over injection sites, they will heal quickly and without visible marks.

Bandages are not needed, and you can resume normal activities immediately. Your surgeon will advise you to avoid direct exposure of the treated areas to sunlight. You will be able to wear makeup with sunscreen protection the following day. If any of your symptoms or aftereffects persist beyond the periods specified, you should contact your surgeon.

Your results should be fully apparent within one week. Collagen treatments are temporary. Duration varies among individuals and can also be affected by the patient's lifestyle, physical characteristics, and the area

of the face that is treated, with areas most affected by muscle movement having a shorter duration. Typically, the length of time between retreatments is about three to six months.

HYALURONIC ACID

Today, the most popular pharmaceutical fillers are those with hyaluronic acid. Among the best-known hyaluronic acid products available in the U.S. are Restylane, Hylaform and Captique, all of which are FDA approved. Hylaform uses a form of hyaluronic acid obtained from rooster combs. Restylane and Captique are within the category of fillers known as non-animal, stabilized hyaluronic acid (NASHA) products. Manufacturers state that no pre-treatment allergy testing is required for any of these products, but there is some debate about this among physicians. In the case of Hylaform, individuals with known allergies to bird products could be at risk of allergic reaction. Even for NASHA products, some physicians have reported incidents of apparent allergic response, though this appears to be extremely rare.

Dr. Kane says, “If you look at a photo of a 60-year-old patient when she was 20, you will usually see that her brows haven’t fallen appreciably. They’ve deflated a little bit. So, if you build the brow back up with a little Restylane and then use Botox to weaken some of the muscles around the brow that pull it down as well as around the upper bone of the eye socket, the brows look terrific — like they looked at 20 years old, and very natural.”

Hyaluronic acid (HA) occurs naturally in all living organisms and is a natural component of connective tissues, including the skin. HA’s function in the body is to cushion and lubricate, and it has been used to treat joint pain. HA products come in a variety of formulations that differ in the size of their injectable microspheres (tiny crystals), making some products better suited for treating deeper wrinkles and creases while others are better for thin, superficial lines. In addition, the largest microsphere formulations are more suitable for large-volume augmentations in areas such as the cheeks and chin.

“In facial contouring, my favorite combination of fillers is fat and Restylane,” says Diane Duncan, MD, of Fort Collins, Colorado. “Many people believe that both do similar things. This is not true. I use fat in the super-

ficial subcutaneous plane to achieve a soft, broad fill, while Restylane is used intradermally to fill lines, localized hollows, add definition, and correct asymmetry.”

The procedure

Your surgeon may give you a local anesthetic to help alleviate discomfort, but you might still feel some stinging or burning from the needle. Injection techniques for hyaluronic acid products can vary according to the area being treated. Material may be injected in a series of “threads” or in serial punctures. Plastic surgeons who have received training in the use of injectable HA products are able to use their knowledge of facial anatomy and technical skill to place filler materials in the manner and location that will create the most natural-looking augmentation. Because the injected material is not absorbed into the body as readily as fat, overfilling is not necessary. Depending upon the areas to be treated, the procedure may take from just a few minutes to as much as half an hour.

Post-treatment

Although you can resume normal activities immediately following your HA treatment, you may experience some mild redness and swelling for a few days. More pronounced swelling is possible but unusual. Some patients have experienced side effects including mild headache, nausea, flu-like symptoms or even muscle weakness, which is rare. Most symptoms, if they occur, are not long-lasting.

Your surgeon will advise you to stay out of the sun and to avoid outdoor activities in the cold until any redness and swelling disappear. Of course, any abnormal or progressive pain or symptoms should be reported to your surgeon immediately.

Results of HA injections generally can be expected to last from six months to, in some cases, a year.

CALCIUM HYDROXYLAPATITE (RADIESSE)

Radiesse (formerly called Radiance) is a soft tissue filler made from a form of hydroxylapatite, which is a natural material found in bones and teeth, suspended in gel. It typically is used for the treatment of deeper facial wrinkles or to increase volume in the lips. As a normal constituent of bones and teeth, calcium hydroxylapatite should not elicit a chronic inflammatory or immune response.

“There is a plethora of fillers available, and even more are awaiting approval by the FDA. That attests to the fact that the ideal one has not been found. What works best for me is Radiesse,” says Edward Domanskis, MD, of Newport Beach, California, “which does not need pre-testing and is by far the longest lasting of all fillers presently available.”

The procedure

Radiesse does not include lidocaine, and your surgeon will use a local anesthetic to help reduce any pain or discomfort. As with the other injectables, you may experience some stinging or burning during the injections. Calcium hydroxylapatite is injected in a fashion similar to other injectable fillers, using a fine needle. The procedure usually takes between 15 to 30 minutes to accomplish.

Post-treatment

Although you can return to most normal activities within a few hours following treatment with calcium hydroxylapatite, you should avoid activities that may strain facial muscles and features, such as singing, shouting, strenuous laughing, chewing gum or tough food, and using a straw for 48 hours. Any minor inflammation or swelling will usually disappear within 24 to 48 hours. In addition, the application of ice should help reduce any swelling.

At this time, Radiesse has achieved the longest results of any of the fillers — up to three years. It can, however, cause firm areas (granulomas) to form under the skin, and there have been reports of permanent hardness, especially when this material is used in the lips. As with all aesthetic procedures, your surgeon will explain the balance between risks and benefits and advise what would best meet your needs.

POLY-L-LACTIC ACID

Poly-L-lactic acid, marketed under the name Sculptra, is one of the newest of the pharmaceutical soft tissue fillers and is used for large-volume augmentations. It is a biocompatible material that can be broken down by the body. That is why it has been used for a long time in absorbable sutures and certain types of implants. According to the manufacturer, no skin testing for allergic reaction is required.

Sculptra is formulated with a suspension of microspheres that, when injected into tissue, stimulate collagen



Postoperative appearance. Following Botox injection, the muscles that cause frown lines are temporarily inactivated so that even when the patient tries to frown (as shown here), the area between the eyebrows in the lower forehead remains smooth. Results can last from two to 12 months, but four to six months is average.

formation and increase the thickness of the dermis (the lower layer of the skin). Over time, this process increases volume in the injected facial areas. Sculptra has been approved by the FDA for use in treating facial wasting, a common side effect of HIV infection. Because of its unique ability to volumize and enhance facial contours, it is being used “off-label” for cosmetic purposes such as cheek augmentation and treatment of mild laxity of the midface and jowls. It may be used as a pretreatment for patients undergoing a face lift. When used in this manner, it helps to provide a fuller soft tissue foundation for skin redraping during the surgical procedure.

The procedure

Sculptra is implanted deeply through multiple injection sites, either in a crisscross pattern or through small tunnels created with a thin needle. Injections may be painful, but resuspension of the material in sterile water and lidocaine prior to injection helps to minimize discomfort. A topical or local anesthetic or a nerve block may also be used to further numb the areas to be treated. A common technique for augmenting the cheek area is to inject the material from inside the mouth.

Patients usually will have from three to five treatments, administered a few weeks apart.

Post-treatment

An icepack may be used to help reduce swelling and bruising. These side effects, as well as redness and some discomfort, should diminish or disappear in a few hours or a few days; however, symptoms sometimes may persist more than two weeks. Still, most patients find that they can return to their home or work immediately following treatment, and can re-apply makeup within a few hours. You will be instructed to massage the treated areas periodically over the next several days.

The patient's own collagen formation occurs over a period of four to six months. During that time, the implant is slowly resorbed, but the soft tissue augmentation increases as this new collagen is formed. Repeat treatments may be necessary to achieve or maintain desired results. Initial results have been reported to last as long as two years.

It is possible that small nodules may form at the injection sites within the first six to 12 months following treatment, but these can generally be dispersed through firm massage or, if necessary, by your surgeon inserting a needle directly into the nodule to break it up.

FAT

Fat has long been used as a soft tissue filler to add volume to the face or lips. Many patients like the idea of using their own fat, rather than a pharmaceutical filler, to restore volume that has been lost through the aging process or to "plump up" areas that lack dramatic contours. One of the benefits of fat injection is that, because the fat is removed from your own body, there is no possibility of an allergic reaction.

Fat can be safely injected into the face by a skilled plastic surgeon. It can also be injected in other areas of the body to fill in dents or depressions. However, to date, fat injection into the breasts has been condemned because of the concern that it could impair future mammographic diagnosis of breast cancer.

The procedure

If your own fat is used, it must be harvested from another part of your body. Usual donor sites include the buttocks, abdomen, or thighs. Fat may be extracted during a liposuction procedure or harvested only for

the purpose of reinjection. In the latter case, once the site is selected and cleansed, a local anesthetic, sometimes in combination with oral sedation, is applied. The surgeon makes a tiny incision and uses a syringe or cannula, which is the same instrument used in liposuction, to withdraw a small amount of fat. The fat is then processed and re-injected into the area to be enhanced. The body will absorb some of the injected fat. For this reason, the surgeon will often overfill the area to be enhanced. In addition, the procedure may need to be repeated in the future to compensate for volume loss.

"Fat is an excellent filler, but you have to be very careful, extracting it with low suction to not break up the cells and preparing it very gently, removing the serum so that you inject fat rather than fluid," says **George Marosan, MD**, of Belleville, Washington. "You then have to inject it under low pressure, in small amounts into multiple layers of the tissues under the skin and muscles, so it can get thoroughly vascularized. The transplanted fat only has about 48 hours for blood vessels to find it before it dies. If you put in a large clump, or overfill, the edge will get vascularized, but the blood supply won't penetrate the mass of fat and it will die. By treating it properly, fat can be very long-lasting. I have patients whose results are still excellent after three years."

Archibald S. Miller, MD, of Tulsa, Oklahoma, adds, "It is very important to inject enough fat. The surgeon must overfill the areas being treated. Thirty to 50 percent of the fat cells will be lost, so overfilling is the only way to get the final result that the patient wants. Initially, this overfilling causes a somewhat distorted appearance but once this resolves, patients will find that they are very happy with the results, which can be virtually permanent."

In some instances, fat may be transplanted rather than injected. Fat, dermis or fascia (a layer of tissue that covers muscles) can be grafted from one area of the body to another to improve contour and create more fullness. Usually grafting is done in conjunction with facial surgery rather than as an isolated procedure.

"There has been an evolution in facial rejuvenation over the past 25 years," says **Michael Epstein, MD**, of Chicago, Illinois. "For a long time, lifts were the main method until about 15 years ago, when skin rejuvenation came to the fore and techniques such as chemical peels and laser resurfacing became more popular. Although

these adjuncts improved facial rejuvenation, it was still incomplete. But in the last several years, aided by the use of digital photography and comparisons of old photos with the patient's present appearance, the key role that volume loss plays in facial aging became more apparent. Fat grafting, an excellent method of restoring volume, has also undergone an evolution. Originally it was just harvested and re-injected; however with today's more modern techniques, which preserve the cells, we can achieve essentially permanent results."

Post-treatment

Recovery from fat injection is much longer than recovery following injection of most pharmaceutical soft tissue fillers. Following fat injection, there will be significant bruising and swelling that may last several days to several weeks. The size and location of treated

areas will determine the severity of post-treatment symptoms and the time needed for complete recovery.

Your surgeon will advise you to stay out of the sun until all redness has cleared. Until then, you can wear makeup with sunscreen protection to help conceal any redness or bruising.

There are differing reports concerning how long injected or implanted fat can be expected to last. Most surgeons agree that a significant percentage of the fat will be long-lasting or even permanent, especially if the treated area is one that has limited muscle movement. However, because of fat's resorbable nature, results of fat injections can be somewhat unpredictable in terms of symmetry and longevity. As mentioned earlier, overfilling helps compensate for expected resorption but also may make your initial results significantly "fuller" than desired.

Editor's Viewpoint

Over the last few years, there has been a meteoric rise in the use of chemical denervation (Botox) and soft tissue fillers for facial rejuvenation and cosmetic enhancement of facial shape. A commonly used approach today is the combination of Botox injections for the upper face and fillers for the lower. These injectable treatments are also popular as adjuncts to facial aesthetic surgery, complementing and sometimes prolonging surgical results. Careful analysis of each patient's physiognomy and aesthetic goals guides the surgeon in designing the best treatment strategy.

Botox injections also have been used very successfully to control migraine headaches and diminish excessive sweating of the armpits and palms, an embarrassing problem for some patients.

Injectable treatments are a wonderful tool in treating cosmetic patients, but, like any tool, they can be misused. The physician must practice meticulous technique with careful control of the location and depth of injections based on an intimate knowledge of the anatomy coupled with full understanding of the unique characteristics of the injected material. Inadequately trained practitioners from varied backgrounds are often responsible for the substandard results that all of us have seen, many times on well-known celebrities who appear virtually expressionless from Botox, sporting "over-plumped" lips and mask-like faces from overzealous use of fillers. These kinds of results are entirely avoidable.

For all the reasons mentioned by our contributing experts, absorbable and semi-permanent injectables are "the way to go" and will probably remain so for the foreseeable future. Meanwhile, the search for the ideal filler material continues with several promising ones, yet to be FDA-approved, on the horizon.

My personal preference for facial volume restoration has almost completely shifted away from injections of autologous fat (harvested from the patient's own body) to hyaluronic acid and other filler materials. Not so for the body, however, where fat remains the best filling material for post-liposuction defects.

There are, however, some exciting developments with regard to autologous fat. At the University of California, Los Angeles (UCLA), we are in the process of research that could greatly enhance the performance of fat as a soft tissue filler. Our research shows that stem cells are abundantly present in the fat removed by liposuction. These stem cells can be isolated and preserved (like blood in a blood bank) for later use. Enriching fat with stem cells prior to injection should significantly improve its survival in the face and body and eliminate the need for unsightly over-correction to compensate for fat resorption. These findings may even lead us to reconsider the use of fat for breast augmentation, a practice that has been widely condemned on the grounds that it causes calcifications within the breast tissue, resulting in false positive mammograms. More research needs to be done, but it is entirely possible that our own fat may yet become the ideal universal filler.

— **Peter B. Fodor**