# Management of Complications and Sequelae with Temporary Injectable Fillers

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**Background:** Injectable nonpermanent soft-tissue augmentation materials are extremely well-tolerated products that can be used safely in virtually all patients who are candidates for facial augmentation. In this article, the authors review the management of the few common and minor undesirable effects that may be associated with temporary fillers; in addition, the authors mention the rare incidence of serious complications.

**Methods:** The authors conducted a MEDLINE-based (1990 to 2005) review of complications and side effects of nonpermanent injectable filler materials. This review was supplemented with evidence presented at recent plastic surgery and dermatology scientific meetings and unpublished information made available to the authors.

**Results:** Nonpermanent injectable soft-tissue augmentation materials are extremely safe substances that are unlikely to cause more than mild injection discomfort, transient redness and swelling, and occasional short-term bruising when used for facial augmentation. Symmetry can usually be maintained with judicious bilateral use of injectant, and injection-site necrosis is rare and treatable. Proper technique minimizes the already very low risk of visible implants, nodule formation, and hypersensitivity reactions. Other serious effects are exceedingly rare, and retinal artery thrombosis, previously associated with injectable collagen, has not been seen with newer fillers.

**Conclusions:** Injectable nonpermanent fillers are extremely safe substances. Attention to injection technique further minimizes the low risk of adverse events, which are usually minor, spontaneously resolving, and easily treated. (*Plast. Reconstr. Surg.* 120 (Suppl.): 98S, 2007.)

Prepackaged injectable soft-tissue augmentation materials are extremely safe substances.[1] In vivo, they are associated with benign and remitting short-term effects. Medium-term effects are infrequent, and given the nonpermanent nature of the injectables, long-term effects are virtually absent. Interestingly, despite the differences in composition among the various common soft-tissue augmentation materials, they are remarkably similar in the type and frequency of their undesired effects.

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Although injectable augmentation materials are extremely well tolerated, their use runs up against the law of rising expectations. That is, patients expect these procedures to be so pain-

**FDA Status and Approved Uses:** Restylane (Perlane, Juvéderm/hyaluronic acid derivative), CosmoPlast (CosmoDerm/human collagen), Zyderm (Zyplast/bovine collagen), Sculptra (poly-L-lactic acid), and Radiesse (calcium hydroxylapatite) are FDA approved for soft-tissue augmentation. Radiesse (calcium hydroxylapatite) is FDA approved for use in the urinary bladder and larynx/vocal cords and as a radiopaque marker but not for facial soft-tissue augmentation. Bioform, Inc., the manufacturer of Radiesse, has submitted a FDA application for facial soft-tissue augmentation and may receive approval for this indication before publication of this supplement.

less, quick, uncomplicated, and unnoticeable that they can find even the most minor unanticipated outcomes to be disconcerting and upsetting. For this reason, it is desirable to discuss before treatment some of the most common potential sequelae (e.g., bruising and swelling) that have now been well described in the literature[2–4] and that can be temporarily socially embarrassing. In addition, it behooves the injector to take steps to minimize these minor outcomes.

## SHORT-TERM UNDESIRED EFFECTS

### Injection-Associated Discomfort

Short-term effects of injectables include discomfort on injection and postinjection skin redness, swelling, and bruising. With regard to injection-associated discomfort, some amount is experienced with all fillers. One factor associated with greater discomfort is the viscosity and consequent injection pressure associated with the injectant. Thicker hyaluronic acid preparations (e.g., Restylane; Medicis, Scottsdale, Ariz.)[5] and calcium hydroxylapatite preparations (e.g., Radiesse; BioForm Medical, San Mateo, Calif.) are among the more viscous fillers. On injection, these firmly displace surrounding tissue, thus inducing pain. Another relevant factor is the caliber of the needle. Calcium hydroxylapatite requires at least a 27-gauge needle, and poly-L-lactic acid requires at least a 25- to 27-gauge needle; in the latter case, the thicker needle is necessary not because of a uniformly elevated viscosity but rather because of the tendency of the reconstituted solution to contain thick, focal inclusions that tend to clog thinner needles. Obviously, thicker needles tend to injure more tissue on injection and thus to elicit greater injection discomfort. The anatomical site of injection also modifies pain. Perioral injections, injections of the lip, and injections of the periocular skin, especially lower eyelids, are among the most painful because of the increased sensory innervation at these sites.

Several mechanisms can be used to diminish injection pain. Immediately before injection, application of ice or a vibratory sensation during injection can decrease discomfort. In the case of vibration, a hand-held vibrating back massager or similar device can be used. The efficacy of this procedure is predicated on the fact that vibratory sensation and sharp pain are transmitted through common neural pathways, with transmission of one type of sensation reducing concurrent experience of the other. If a vibrating device is not available, pinching the skin at the same time as piercing it with a needle can be of benefit. Topical anesthetic preparations, both commercially prepackaged types (e.g., LMX; Ferndale Laboratories, Inc., Ferndale, Mich.) and custom preparations produced by compounding pharmacies, may be of some use in providing relief. If topicals are to be used, they should be applied before injection for at least 30 to 60 minutes and usually under occlusion of transparent dressings [e.g., Tegaderm (3M, St. Paul, Minn.), Saran Wrap (S. C. Johnson & Son, Racine, Wis.)] or repeatedly rubbed into the skin every 10 to 15 minutes. In general, however, injection pain is experienced beneath the level that can be treated by topical anesthetics. Thus, this modality is usually more effective at convincing the patient that the physician is concerned about pain management than at markedly reducing physiologically experienced pain. It should also be noted that topical anesthesia should be used sparingly or not at all on mucosal surfaces, such as the wet part of the lip, as systemic absorption can occur. Nerve blocks, in contrast, can be extremely helpful. The most commonly placed blocks are those of the infraorbital nerve, for treatment of the nasolabial folds and upper lips, and the mental nerve, for treatment of the lower lip and marionette lines. Full blocks can be easily placed intraorally, with a 30-gauge needle attached to a 3-cc syringe containing 0.5 to 2.0% lidocaine with 1:100,000 or 1:200,000 epinephrine. Alternatively, articaine 1% with 1:100,000 epinephrine may be injected. With a pH of 7 and an onset of action of 1 to 2 minutes, it is less painful and faster acting than lidocaine. Usually, 0.5 to 1 cc to each infraorbital foramen and 0.2 to 0.4 cc to each mental area is sufficient. Miniblocks, which consist of placement of as little as 0.1 cc of anesthetic solution into the sulcus superior to the third incisor bilaterally with an additional injection into the mucosa above the frenulum in the midline, can also achieve excellent anesthesia of the fibers of the infraorbital nerve. Some physicians may prefer to place blocks transcutaneously without having patients open their mouths. Although patients will still feel some pain after nerve blocks, they may tolerate this residual discomfort better if they are instructed that complete anesthesia with intradermal injection would be counterproductive. Specifically, they should understand that full infiltration with injected anesthesia would result in undesired filling of the potential spaces and rhytides that are targets for augmentation. Consequently, less filler material would be

placed, and only an incomplete and shorter lasting correction would be possible.

In an off-label use, some augmentation materials may be mixed with small quantities of lidocaine prior to injection to reduce injection discomfort without excessively increasing bolus volume. For instance, a 1.3-cc syringe of calcium hydroxylapatite can be attached, via an appropriate connector, to a syringe containing 0.1 to 0.2 cc of 1% or 2% lidocaine with epinephrine; the back-and-forth motion of the two syringes produces a smooth slurry that is easy to inject and that patients report hurts less upon delivery.

Patients have widely varying pain tolerance for injectable augmentation materials. Some fillers, such as collagen [e.g., CosmoDerm (Inamed Aesthetics, Irvine, Calif), CosmoPlast (Inamed Aesthetics), Zyderm (Inamed Aesthetics), and Zyplast (Inamed Aesthetics)], are minimally viscous, come prepackaged with anesthetic, and are well tolerated by virtually all patients. Nerve blocks are often preferred by patients when injecting hyaluronic acid derivatives, calcium hydroxylapatite, and poly-L-lactic acid. A small subset of extremely sensitive patients paradoxically find nerve blocks more distressing than filler injections without anesthesia; these patients complain of persistent numbness and strange sensations after nerve blocks and, needless to say, should not receive these in the future.

**Redness and Swelling**

Redness and swelling (i.e., erythema and edema) tend to result immediately after injection with many fillers. Both are local effects of puncture trauma and associated inflammation and the hygroscopic properties of the filler being used. Redness will usually persist for a few hours to overnight, but swelling can last longer, up to 1 to 2 days. When the lip is injected, swelling may be more noticeable and usually lasts 1 to 3 days and occasionally longer. Likewise, following multiple injections with poly-L-lactic acid, especially when used for diffuse facial lipoatrophy, edema or fat redistribution manifesting as an elevated contour may persist for several days to 1 week. In general, the more material that is injected, the greater the duration and extent of swelling.

As with mild injection-associated discomfort, redness and swelling are best managed by apprising patients in advance of these likely outcomes. In addition, careful injection technique can reduce the degree of both redness and associated edema. Whether the filler is placed by means of a serial injection technique or by linear tunneling with threading, minimizing the number of skin punctures limits the associated trauma. Even when poly-L-lactate is injected in multiple small aliquots, the needle may be partially withdrawn and redirected instead of completely removed and reinserted. Of the hyaluronic acid products, Restylane appears to induce more swelling than Hylaform (Inamed Aesthetics) and Hylaform Plus (Inamed Aesthetics).

Postinjection application of ice packs for 5 to 10 minutes definitely reduces the risk of swelling. Concerned patients may be allowed to use ice packs at home every few hours on the day of the injection but warned to avoid excessive use, which may cause cold injury to their skin. If patients are returning to work or social engagements immediately after injection, they should be encouraged to apply concealing makeup until the redness spontaneously remits. Makeup with a greenish tint is most able to camouflage red coloration. It is, however, the swelling that typically limits social activity on the day of treatment.

**Bruising**

Bruising (i.e., ecchymosis) is an inadvertent and occasional effect of soft-tissue augmentation. One cause of bruising is needle-associated perforation of vessels, usually dermal veins, during filler injection. In addition, crushing or rupture of vessels secondary to the pressure of adjacent firm tissue materials can result in localized or widespread ecchymoses. If bruising occurs, it may be evident immediately after injection but, often, notably in patients taking platelet disaggregators, bruising is delayed. Resolution may be gradual, over approximately 5 to 10 days. Even when it does occur, bruising tends to be localized and not markedly disfiguring. It is important for patients to understand that bruising does not interfere with the clinical result.

Needle perforation of vessels can be avoided by understanding the superficial anatomy of the face and also studiously refraining from impinging on visible dermal medium-caliber vessels. Side lighting and cleansing the skin with alcohol pads can illuminate bluish dermal vessels. Ecchymoses caused by firm fillers compressing nearby vessels are more difficult to prevent, especially if large quantities of thicker filler materials are used. One technique entails canalization of the superficial fat with a 1.25-inch needle; this allows injection of viscous materials over a wide area without having to reperforate the dermis repeatedly, thus minimiz-

ing the risk of hematoma or bruising. Injection at the level of the superficial fat is also inherently less likely to cause bruising because of the decreased density of this layer and its relative dearth of vessels per unit volume compared with the dermis.

When bruising does occur, immediate firm pressure over gauze should be applied to the involved area for a few minutes. Ice packs may also be used. Pressure, and to a lesser extent ice, can limit the extent of the bruise. The most common locations for bruises are the perioral rhytides and the lower eyelids, with injections of poly-L-lactate or hyaluronic acid derivatives under the eye reliably inducing bruising; the upper third of the nasolabial fold; the upper lip; and the lateral edge of the lower lip. Patients should be reassured that the effects are transient and will not impair the final correction associated with the filler. At the same time, they should understand that the bruise may darken for a day or so before it slowly resolves over a week to 10 days.

An adverse effect similar to bruising is frank bleeding. This can result when a vessel of moderate caliber is perforated by an injection needle. Almost without exception, firm pressure for 1 to 5 minutes will stop pinpoint bleeding. Cautery and ligation are exceedingly rarely, if ever, required.

### Overcorrection and Undercorrection

Because the goal of fillers is to improve aesthetic appearance, precision regarding the site and quantity of injection is imperative to ensure the most attractive result. Potential problems include overcorrection, undercorrection, and asymmetry.

With the exception of the least viscous forms of collagen (e.g., CosmoDerm, Zyderm), significant overcorrection is not necessary with injectable fillers and should be avoided. Relatively little of these fillers will dissipate immediately after injection. All facial anatomical sites are, however, subject to some immediate swelling on injection, and this should be taken into account when determining the degree of appropriate correction. For instance, the lips will swell on needle trauma even in the absence of any delivered material, and postinjection swelling for 2 to 3 days is not uncommon. Patients should be reassured that their "Angelina Jolie" lips are a transient phenomenon on the way to desired lip size within a day or two. In general, undercorrection is a less serious problem than overcorrection because patients can always be asked to return in 1 to 2 weeks for a touch-up procedure to replete any missed or incompletely treated areas. When injecting patients who are acutely concerned about looking unnaturally injected or receiving fillers for the first time, it may be prudent to deliberately undercorrect at the first visit.

Maintenance of symmetry is important regardless of how much material is delivered. There are two measurements that are helpful in maintaining right–left symmetry: quantity injected and visible correction. On the one hand, when using the traditional 1-cc syringe of injectable, the injector should ensure that approximately equal amounts are delivered into corresponding structures, such as the lips or nasolabial folds, on each side of the face. On the other hand, given that most faces are slightly asymmetrical to start, visual inspection should be used to verify that both sides look comparably filled. That is, to give the appearance of equality, exactly equal quantities need not be injected into right and left sides. Alternating small aliquot injections on either side may collectively permit achievement of symmetry.

### Injection-Site Necrosis

One uncommon but significant undesired effect that may be causally related to placement of filler materials is injection-site necrosis.[6] Inadvertent injection of the angular artery (nasolabial fold area) or supratrochlear artery (glabellar area) with viscous fillers induces an ischemic response with violaceous bluish gray discoloration, pain, erosion, and ulceration. Resolution without pain is routine except when a large bolus of material is injected, with ensuing full-thickness necrosis. On recognition of this side effect, immediate application of nitroglycerin paste may reduce the size and extent of the area affected by ischemia. Injections at the glabella with newer injectable fillers have not been reported to cause retinal artery thrombosis, an embolic phenomenon reported in the distant past following use of Zyplast collagen.

## MEDIUM-TERM UNDESIRED EFFECTS

### Visible Implants

Implanted material that remains visible near the surface of the skin is an aesthetically problematic undesired outcome. Typically manifesting as a blanched or white papule, or as a palpable lump, visible injectant is invariably a result of injections that are too superficial or excessive in quantity.[7] If medium-term fillers such as thicker collagens (e.g., CosmoPlast and Zyplast), hyaluronic acids, poly-L-lactate, and calcium hydroxylapatite are injected into the high (e.g., papillary) dermis or

epidermis, they may be sequestered in a layer where they are not easily metabolized. Visible blanched or bluish areas can persist for months, even after the remainder of the implant effect has disappeared.

Care must be taken to avoid this problem. When injections are placed using the serial puncture technique, the injector should ensure that at least the mid dermis is reached before the syringe plunger is depressed and that injection ceases as the needle is pulled back out. During injection, it is extremely important to watch the skin near the needle tip to ensure the absence of blanching indicative of superficial placement; rapid ascertainment and needle repositioning can mitigate the problem. Once a blanched area has been created, firm massage may help to break this up. The patient should be asked to open their mouth, and extremely firm pressure should be applied by the physician between the thumb and forefinger to flatten and spread the superficial focus of injectant. At the same time, the patient should be warned that this maneuver may induce a bruise. If hyaluronic acid fillers are placed too high in the papillary dermis, a visible blue papule may become evident, sometimes immediately, occasionally a few days later; this can be very easily corrected by puncturing the site with a 25- or 27-gauge needle and expressing the material. Notably, injections of the thinnest form of collagen (e.g., CosmoDerm, Zyderm) can be placed high in the dermis without problems. Indeed, thin collagens are designed to fill fine skin lines, and injection-related yellow-colored blanching is a good sign, confirmatory of adequately superficial placement.

**Nodule Formation**

An uncommon but troublesome outcome of injectable augmentation is nodule formation. Historically, nodules were believed to be associated with hypersensitivity reactions. For instance, there have been other anecdotal reports of post–hyaluronic acid hypersensitivity and granulomatous reactions, including abscess-like nodules and foreign body reactions on the nasolabial folds and lips.[8–13] A retrospective cohort study of 709 patients treated with Restylane and Hylaform between 1996 and 2000 found that both substances were associated with sporadic cases of injection-site skin reactions (four with Hylaform and two with Restylane), including indurated nodules (three with Hylaform and one with Restylane).[14] Nodules appear to emerge either immediately after treatment, likely a result of superficial injection or excessive injection to a given location, or several weeks later as a result of local inflammatory or granulomatous foreign body reactions, which have been seen in the histopathology of some of these nodules. Nodules have also been noted with use of poly-L-lactate, with rates of nodule formation ranging from 6 to 52 percent in a series of five open-label clinical studies from Europe and the United States.[15–18] The majority of nodules, described as palpable but nonvisible subcutaneous micronodules, occurred within the first year, and most resolved. Palpable but not visible small subcutaneous nodules occurred in as many as half of patients, with onset at an average of 218 days (range, 9 to 748 days). Nodule formation from poly-L-lactic acid can be reduced by diluting the material with 5 to 8 ml rather than the lower volume (4 ml) used in these studies. In one study with calcium hydroxylapatite, 56 percent of patients had no nodules, 36 percent had minimal nodule formation, 8 percent had moderate nodule formation, and 0 percent had severe nodule formation.[19] Submucosal nodules following calcium hydroxylapatite tended to occur at the lips, with all except 8 percent remitting within 4 to 6 weeks of treatment.

Treatment of nodules is similar regardless of the causative filler material. Nodules are treated by squeezing aggressively, massaging for several days, injecting corticosteroid, and ultimately considering puncture and aspiration. Dermabrasion has been used to reduce nodules, but even if induration is successfully reduced by this technique, textural abnormalities, pigmentary abnormalities, and scarring may result because the injectant is often localized in the deep dermis, not the epidermis. In some cases, resolution has been attained by treatment with allopurinol[20] or by surgical excision. Either uniformly hard or cystic in composition, nodules may express the contained filler on aspiration. Thus, when a nodule associated with calcium hydroxylapatite injection is incised, a powdery, pasty, white material is often easily extruded, in a manner similar to the expression of an imbedded milium. Poor technique, such as uneven injection pressure and superficial injections, is especially likely to lead to lumps on the lips, including the wet and dry vermilion. Deeper injection, taking care to avoid vasculature and thus bleeding, can prevent this problem. It should be noted that although nodules of the inner wet lip are not visible and thus not disfiguring in the eyes of others, they can be equally troublesome to the affected patients: patients may inadvertently bite down on the overlying, protrud-

ing mucosa or they may obsessively palpate these annoying nodules with their tongues. Intradermal or intraoral nodules of the lips can be resistant to simple corrective treatments such as steroid injections. In general, steroid injections can be useful for diminishing the inflammatory response and possibly rupturing a nodule so as to express its contents and lead to resolution; at the same time, injudicious placement or inadvertent overtreatment with injectable corticosteroids can easily result in an indented, atrophic scar that may be difficult to correct. Most nodules will eventually remit with time. The most conservative management entails gentle at-home massage, reassurance of the patient, and close follow-up. If nodules do not spontaneously involute over some predetermined time interval (usually, the lifetime of the filler involved), more aggressive corrective action may be needed.

When nodules are composed of hyaluronic acid fillers, they can be dissipated by injection of hyaluronidase,[21,22] which is commercially available as a solution in injection-ready vials. Because the surrounding skin has a low concentration of hyaluronate, the enzyme dissolves the unwanted aliquot of injectable material without harming the skin substrate. This technique is particularly helpful when hyaluronic acid derivative injections into so-called tear-trough depressions result in excessive, asymmetric swelling under the eye that would otherwise last months.

The conservative approach to managing nodules presupposes that there is no associated hypersensitivity response, necessitating further evaluation and management. This assumption is now believed to be usually correct. That is, nodule formation is typically a manifestation of superficial or excessive injection and, as such, an error in technique rather than an immune response.

### Hypersensitivity Responses

Nonetheless, there is some evidence that hypersensitivity responses can occasionally be elicited by nonpermanent fillers.[23] Most significantly, injectable bovine collagen can cause cutaneous allergy, and patients must be skin-tested twice, 1 month apart, to reduce the likelihood of this outcome. However, a study in which 428 patients received injection of human-derived collagen (e.g., CosmoDerm) into the forearm and were followed for 2 months found no instances of cutaneous hypersensitivity; this has led to relaxation of the skin-testing recommendation when human collagen is used.[24] Although skin testing before use of human collagen is not deemed necessary by the U.S. Food and Drug Administration, the package inserts for human collagen (CosmoDerm and CosmoPlast) continue to note that use in people with a known allergy to bovine collagen has not been studied.

The noncollagen fillers are much less likely to induce immune responses. This derives from the fact that these materials are believed to be highly biocompatible. Specifically, calcium hydroxylapatite granules are biodegraded in a manner analogous to the turnover of bone mineral; hyaluronic acid is a complex sugar that occurs naturally in human skin; and poly-L-lactate is a resorbable polymer similar in composition to commonly used polyglactin 910 (Vicryl; Ethicon, Inc., Somerville, N.J.) suture. A few cases of local hypersensitivity after injections of hyaluronic acid derivatives have been reported; these may have been caused by residual proteins, given that hyaluronic acid is derived either from cocks' combs of domestic fowl or from fermentation using streptococci bacteria. Data presented at the 11th Conference on Retroviruses and Opportunistic Infections in February of 2003 indicated that, in a cohort of 94 patients treated with injectable poly-L-lactate, 1 percent had an anaphylactic reaction.

Overall, cutaneous hypersensitivity reactions associated with nonpermanent filler materials are relatively uncommon. Moreover, it is difficult to ascertain whether such reactions are attributable to a true allergic diathesis or local irritation associated with the quantity and location of a bolus of injectant. Whatever the cause, there are a significant number of reports of red indurated bumps over areas treated with Restylane and Perlane (Medicis) that appear up to 3 months after treatment. Lasting several months, they clear up spontaneously, but topical application of tacrolimus ointment (Protopic; Astellas Pharma US, Deerfield, Ill.) speeds healing, as it does with delayed hypersensitivity after collagen injection. Local reactions may also respond to topical or intralesional steroids, or to incision and drainage.

## RARE, SERIOUS, AND POSSIBLY UNRELATED UNDESIRED EFFECTS

Prepackaged injectable fillers are extremely safe and widely used. As a consequence, it is difficult to know whether the few rare effects reported are truly related to the fillers or incidental, unrelated findings in patients who happen to have received augmentation. In addition, each filler material has specific recommendations for injection technique that can minimize problems with use; for

example, poly-L-lactate is a thick, heterogenous solution that clogs needles and syringes, which consequently need to be frequently changed to avoid inadvertent placement of excessively large aliquots into the skin.

Relatively commonly reported undesired effects that are difficult to ascribe to fillers themselves include headache, sinusitis, and other respiratory symptoms. These may be a sign of concurrent unrelated mild illness or respiratory infections. In some cases, headache may result from the injection process itself: it has been shown by others that needling of the forehead in the absence of injection of any material can occasionally induce headache.

Itch, acne, and herpes simplex virus reactivation (e.g., cold sores) have been reported in a few instances and may be associated with inadvertent skin irritation during the injection process. However, these effects may also be unrelated and reported by patients only because they incorrectly believe them to be related. Cutaneous bacterial infection and resulting scar may rarely be associated with extrusion of superficially placed implants. Management of implant-related infection entails use of topical and oral antibiotics; scarring is best managed by prevention.

Rare, serious effects that have been seen in patients treated with fillers include collagen vascular disease and facial nerve palsy. The infrequency of reports of these makes it impossible to speculate regarding their cause or causal connection to filler materials.

One rare but serious undesired effect that may be causally related to injection of filler materials is injection-site necrosis. Observed rarely after glabellar injections with hyaluronic acid derivatives, this is localized and treatable. This is not associated with embolic phenomena resulting in retinal artery thrombosis, one case of which was reported in the distant past following use of Zyplast collagen.

Another potential adverse event is alteration or degradation of injectable fillers caused by treatment of the overlying skin with lasers, lights, and energy devices. Specifically, it has been suggested that nonsurgical tightening by radiofrequency modalities may result in deeply penetrating heat delivery that may cause liquefaction, migration, or destruction of injectable implants. At least one human study has found this not to be the case, with biopsy specimens of recent hyaluronic acid injections showing that these are unaffected by monopolar radiofrequency treatment; the cosmetic effect of calcium hydroxylapatite injections may actually be augmented by the same treatments.[25]

## CONCLUSIONS

Overall, prepackaged injectable soft-tissue augmentation materials are extremely safe and well-tolerated materials that provide many options for facial rejuvenation. Undesired effects tend to be minor and prone to spontaneous resolution within a few days to 1 week. Rare is the patient who encounters more than mild discomfort, with possible transient redness, swelling, and bruising. Lumps and nodules occur infrequently, are usually easily treated, and are only rarely associated with immune responses or cutaneous hypersensitivity. Discussion of benefits and risks with patients before injection, coupled with a thorough understanding of the specific techniques required for use of particular fillers, should enable surgeons to use these materials with few problems.

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## DISCLOSURES

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