Special Topic

Soft Tissue Fillers in the Nose

Clinton D. Humphrey, MD; John P. Arkins, BS; and Steven H. Dayan, MD

Using soft tissue fillers to correct postrhinoplasty deformities in the nose is appealing. Fillers are minimally invasive and can potentially help patients who are concerned with the financial expense, anesthetic risk, or downtime generally associated with a surgical intervention. A variety of filler materials are currently available and have been used for facial soft tissue augmentation. Of these, hyaluronic acid (HA) derivatives, calcium hydroxylapatite gel (CaHA), and silicone have most frequently been used for treating nasal deformities. While effective, silicone is known to cause severe granulomatous reactions in some patients and should be avoided. HA and CaHA are likely safer, but still may occasionally lead to complications such as infection, thinning of the skin envelope, and necrosis. Nasal injection technique must include sub-SMAS placement to eliminate visible or palpable nodularity. Restricting the use of fillers to the nasal dorsum and sidewalls minimizes complications because more adverse events occur after injections to the nasal tip and alae. We believe that HA and CaHA are acceptable for the treatment of postrhinoplasty deformities in carefully selected patients; however, patients who are treated must be followed closely for complications. The use of any soft tissue filler in the nose should always be approached with great caution and with a thorough consideration of a patient's individual circumstances. (*Aesthet Surg J; 29:477-484.*)

Several rhinoplasty surgeons have used fillers in the nose for many years, seeing the value of an injectable agent that is capable of precisely smoothing out irregularities and asymmetries in the nose following cosmetic rhinoplasty.[1] With the relatively recent availability of a variety of filler materials, the popularity of these injectables has grown exponentially throughout this decade. While the primary indication for fillers continues to be facial aging and the correction of moderate rhytides, as physicians continually look for new filler applications, injecting the nose has grown fashionable in some circles. Some practitioners have even suggested that injectable agents can serve as a substitute for surgical rhinoplasty in a select population.[2-4]

Certainly, the ability to smooth out irregularities and asymmetries in the nose with an injectable material still holds great appeal because imperfections after rhinoplasty are common. The primary advantage to using fillers in the nose is the ability to fix a deformity without the financial expense, anesthetic risk, or downtime generally associated with surgical intervention. Disadvantages include potential damage to the nasal skin envelope, the need for serial treatments to maintain correction, and a decrease in the surgeon's drive to achieve the perfect result intraoperatively. Some benefits and risks are unique to specific agents; we will discuss the merits of several popular injectable materials individually.

Dr. Humphrey is a Fellow in the Department of Otolaryngology, Division of Facial Plastic and Reconstructive Surgery, University of Illinois Medical Center, Chicago, IL. Mr. Arkins is Clinical Research Data Manager and Research Coordinator at DeNova Research, Divison of Aesthetic Medicine, in the offices of Dr. Steven H. Dayan. Dr. Dayan is in private practice and is Clinical Assistant Professor in the Department of Otolaryngology, Division of Facial Plastic and Reconstructive Surgery, University of Illinois Medical Center, Chicago, IL.

INJECTABLE FILLER MATERIALS

Human-Based Collagen

Human-based collagens are most often obtained from human fibroblastic cell cultures.[5] They are grown in a laboratory and have much lower immunogenicity than bovine collagen. Therefore, no allergy testing is required before administration. Unfortunately, the longevity of human collagen is limited, rarely persisting beyond three months. In this respect, it is inferior to many other currently available products. There are no reports in the literature of using human-based collagen in the nose.

Hyaluronic Acid Derivatives

Hyaluronic acid (HA) is a naturally occurring component of human connective tissue. The chemical structure is identical across species and this minimizes the likelihood of immunogenicity. Cross-linking and other tech-

Table. Patients treated with either hyaluronic acid or calcium hydroxylapatite gels

Type of treatment and area	No. of patients	Volume injected
HA, dorsum and radix	19	0.1–0.3 mL, dorsum; 0.3–0.4 mL, radix
CaHA, dorsum and radix	18	0.3–1.6 mL of mix (1.3 mL CaHA, 0.3 mL lidocaine)
HA, sidewall	3	0.2–0.4 mL

CaHA, calcium hydroxylapatite; HA, hyaluronic acid.

niques have been used to render HA more stable, producing its superior longevity.[5] Although typically reported to last four to six months, the senior author (SHD) has previously published his experience with an HA longevity of eighteen months in some patients.[6] HA was approved by the US Food and Drug Administration (FDA) for filling moderate to severe wrinkles around the nose and mouth in 2003, but is used off-label for other indications. Redaelli[2] described using HA at the nasofrontal angle, the radix, and the tip defining points in the nose with good results. Beer[3] used HA to augment the nasal dorsum. Neither author has reported complications when using HA derivatives for these applications. There are reports of embolization of the dorsal nasal artery after injection of the glabella; the same complication has been witnessed after injecting collagen in this area.[7,8] Augmenting the radix region with HA could potentially have similar risks, but midline injections should be relatively safe.

Although HA filler to the nose has been reported as an augmenting or nasal reshaping option for the virgin (or unoperated) nose,[2,3,9,10] it has been found to be more valuable by the senior author as a postrhinoplasty adjunct for treating minor defects of the dorsum. The virgin nose treated with large amounts of HA (greater than 0.5 mL) may be placed at risk for vascular compromise, particularly if injected with a larger particle or more robust HA such as Perlane (Medicis Aesthetics, Scottsdale, AZ) or Juvéderm Ultra Plus (Allergan, Irvine, CA.) The larger particle size of these HA products can apply pressure onto nasal vasculature, leading to the possibility of vascular compromise. In addition, the hydrophilic properties of HA may expand the skin soft tissue beyond the product's original deposited borders, resulting in a distorting augmentation. Juvéderm is noted to be more hydrophilic than Restylane (Medicis Aesthetics, Scottsdale, AZ) and therefore more likely to expand the nasal tissues.[11] Therefore, Restylane (and not Juvéderm) has been a favored choice by the authors for nasal injections of HA.

Regardless of which HA is used, slight undercorrection is recommended to help compensate for the posttreatment expansion. Additional caution is recommended to ensure that the placement of the HA is not superficial (at the dermis or just below the dermis), where it may result in irregularly lumpy nasal skin with a blue discoloration (Tyndall effect). The authors have used HA in the virgin nose in very few scenarios, recommending surgical rhinoplasty as a definitive and ideal approach for those requesting nasal reshaping. The postrhinoplasty patient with a minor dorsal defect is the ideal candidate for HA augmentation. However, the operated nose is intuitively at greater risk for vascular compromise because rhinoplasty surgery will likely have altered the native vasculature of the nose. Placement of the product laterally near the lateral nasal artery blood supply or at the base of the nose near the columellar artery entry may place the nose at particular risk for vascular compromise.[12]

HA is not used by the authors in the soft tissues of the tip or the nasal base. While many have reported using HA in these regions, it has been our experience that the clinical side effects and the complication rates increase when it is injected into or near the tip region. Fortunately, HA's filling effects (whether with Juvéderm or Restylane) can be reversed rapidly with the injection of hyaluronidase.

The irregular, postsurgical nasal dorsum in the region of the rhinion or keystone is the area most effectively treated with HA. Following dorsal hump reduction, thinning skin and callous formation may cause deformities in this area that are recognizable six months to several years after the edema has resolved and skin contracture has occurred. HA, specifically Restylane, has been found to be very effective in smoothing and camouflaging this area; therefore, it is the favored choice over the other products. Although not statistically proven, it has been our anecdotal experience that a small aliquot of product (0.1 to 0.2 mL) only needs to be placed once directly over a dorsal irregularity. The correction seems to persist. Perhaps the native tissue responds by stimulating collagen formation, resulting in a thickening of the tissue.[13] Rarely is a second injection necessary, making this product a wonderful option for the rhinoplasty surgeon. Restylane may also be used for small defects or concavities on the nasal sidewall, but it is placed conservatively, judiciously, and deep below the SMAS so as to not impede vascularity. Over the last three years, we have treated 22 postrhinoplasty patients with HA filler (Table). The dorsum was injected 16 times with volumes between 0.1 and 0.3 mL. The nasal sidewall was treated on three occasions with volumes of 0.2 to 0.4 mL and the radix was treated three times with volumes of 0.3 to 0.4 mL.

Calcium Hydroxylapatite Gels

Calcium hydroxylapatite (CaHA) is a mineral constituent of bone and has been used in various medical applications for more than a decade. Like HA, this naturally-

occurring substance is nonimmunogenic. It can be suspended in a gel of glycerin, carboxymethylcellulose, and water, making it injectable through a 27-gauge needle.[5] CaHA gel's greatest perceived advantage is superior longevity, although it is more readily palpable than HA derivatives, especially if injected too superficially. To prevent palpability, injection is always performed subdermally. CaHA was approved by the FDA for soft tissue augmentation in HIV patients with lipoatrophy in 2006. The senior author has published his experience using CaHA in the nasal dorsum and radix with results persisting over one year.[14] Stupak et al[15] have used CaHA for postrhinoplasty deformities of the dorsum, supratip, sidewall, and ala. Becker[16] reports correcting saddle nose and retracted columella deformities. None of these authors has reported any serious complications when using CaHA in the nose.

CaHA has been the product favored by the senior author for masking large nasal convexities. The product is placed deeply onto the nasal bones at the radix and feathered into the dorsal hump. This effectively makes the nose appear longer and reduces the disproportionate influence the dorsal hump has on the profile appearance.

On two occasions, CaHA has also been used to treat saddle nose deformities. The product is premixed immediately before injection with 0.3 mL of lidocaine with epinephrine, creating a less viscous (and therefore more moldable) product. The CaHA is then placed deeply onto the bony cartilaginous skeleton and shaped into the dorsum, much like a sculptor working with terra cotta clay. A Denver nasal splint or tape may be placed on the nose afterward for a duration of two to three days in order to maintain the new nasal shape.

CaHA, in our experience, is a much more predictable product than HA. Persistence of correction is approximately 10 to 12 months and rarely longer. Repeat injections at one year are necessary to maintain correction. The product's lack of hydrophilic properties also prevents skin and soft tissue expansion beyond the original placement. This ensures that the patient can be treated to complete correction per the discretion of the injector. We have previously reported on using CaHA in the nose and the senior author has performed rhinoplasty on posttreatment CaHA patients without difficulty.[13]

Silicone

Silicone is a synthetic, inert substance composed of polymerized dimethylsiloxane. It is available in varying degrees of viscosity, ranging from water thin to solid blocks or sheets.[5] Liquid silicone is typically injected into the subdermis to provide permanent soft tissue augmentation. Webster described correction of postrhinoplasty asymmetries and irregularities with injectable silicone more than 20 years ago.[1] Before that time and since, the use of silicone as a soft tissue filler in the face and nose has been a source of considerable controversy.[17] Current commercially available liquid silicone preparations are approved by the FDA only for the treatment of retinal detachment, although they are frequently used off-label for cosmetic purposes. Advocates of silicone claim that administering uncontaminated medical grade silicone with the proper "microdroplet" technique will ensure satisfactory results and eliminate complications. However, even when injected by a practitioner who follows these guidelines, some patients may still develop serious granulomatous reactions. Such reactions are unpredictable, sometimes occurring many years posttreatment. Resulting cellulitis, nodules, or ulcers are difficult to treat and the endpoint may be irreparable local tissue damage.[18,19] Before considering injectable silicone for the nose, strong consideration should be given to these potential long-term risks for morbidity. While many rhinoplasty surgeons have, on occasion, used silicone to treat minor defects, the authors have no experience with this product in the nose.

TECHNIQUE

When using soft tissue fillers in the nose, patient selection is paramount. Good candidates for injectables are resistant to surgery, have thick skin, and have deformities that do not involve the nasal tip or alae. In our experience, postrhinoplasty irregularities along the dorsum and sidewalls can often be treated safely and successfully. Others report using fillers in the supratip area, but we are reluctant to recommend this practice because of the likelihood of complications.[14] Those who advocate "medical rhinoplasty" report more extensive filling of multiple areas, including the nasofrontal angle, the nasal tip, and the nasal spine.[2] The greatest cumulative experience with nasal fillers has been obtained using HA, CaHA, and liquid silicone. For this reason, the discussion will be limited to these materials.

An appropriate needle is first selected to administer the filler. The smallest needle that the product will flow smoothly through is preferable because a thin needle minimizes patient discomfort and maximizes precision. The advantage of HA agents and silicone is that they will flow through a 30-gauge needle. CaHA is more easily delivered through a 27-gauge needle. Discomfort is rather mild and topical anesthetic (23% tetracaine and 7% lidocaine) is adequate. We reconstitute HA and CaHA by mixing 1 mL of filler material with 0.3 mL of 1% lidocaine with epinephrine (1:100,000). The reconstitution decreases the viscosity of the products, making them easier to inject precisely. In addition, it reduces discomfort during injection and seems to result in decreased posttreatment edema and ecchymoses. It is not known whether mixing filler material with local anesthetic affects persistence.

Fillers used elsewhere on the face are targeted at various tissue planes, depending primarily on viscosity. Currently available forms of CaHA and liquid silicone are more viscous and are placed subdermally to prevent direct visibility or palpability. The most popular

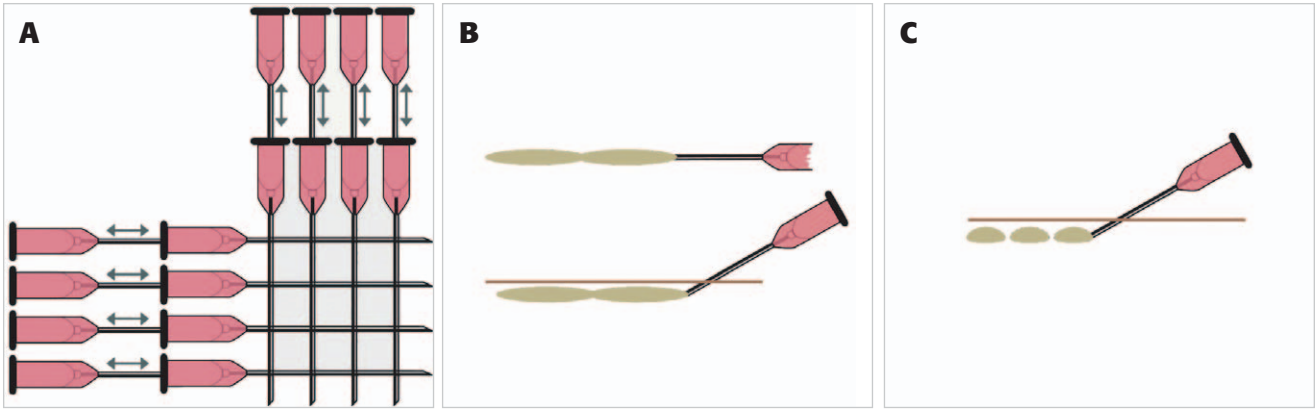

Figure 1. Techniques for injecting soft tissue fillers include fanning, threading, and serial droplet methods. **A**, Multiple passes are made at perpendicular angles for better camouflage when fanning. **B**, An even strip of material is injected as the needle is withdrawn in threading. **C**, A small volume is deposited with each insertion of the needle in the serial droplet method.

Figure 2. **A**, Pretreatment view of a 43-year-old woman. **B**, Six months after the injection of CaHA to the nasal dorsum.

HA formulation has medium viscosity and deep dermal placement is typically recommended. We have found the dermal placement of HA to be undesirable because it can result in persistent blue lines and the formation of telangiectasia. Alternatively, persistence is unaffected and correction is as good, if not better, when HA is placed subdermally. Subdermal placement is especially critical when administering fillers to the nose. In most cases, sub-SMAS placement is even more ideal. Over the nasal dorsum and sidewalls, especially in patients with thin skin, filler material will be visible, palpable, or both if not placed below the SMAS layer. Although not advocated by the authors, if one plans to inject the supratip, radix, or nasal spine, such injections must also be placed immediately adjacent to the nasal skeleton. Attempts at subperichondrial injections are unnecessary and may damage the nasal framework.

Techniques for injection include fanning, threading, and serial droplet methods (Figure 1). Fanning involves injecting material during multiple passes at perpendicular angles for better camouflage. In thread-

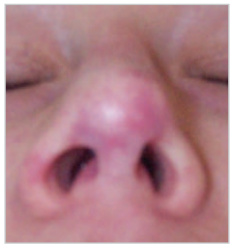

Figure 3. Pallor and mottled appearance of the nose developed within hours of HA injection to correct nasal tip irregularity in a 25-year-old woman on whom the senior author had previously performed secondary rhinoplasty.

ing, the needle is advanced through the skin to the hub; a smooth strip of material is then injected as the needle is withdrawn. Serial droplet deposition involves precisely injecting only a very small volume of material with each insertion of the needle.[20] Serial droplet deposition is the most useful technique in the nose for accurate correction of spot deformities; both HA and CaHA can be effectively placed using this method. The visible correction immediately after injection should persist with these materials. Figure 2 shows the results after injecting CaHA to the nasal bridge. When unsure, one should always err toward undercorrection. This is particularly important with HA, as the HA correction will expand and additional filler can be applied in future sessions.

A modified serial droplet technique is the only technique acceptable for injection of silicone in order to minimize the risks associated with this material. Webster et al described the "microdroplet" technique for silicone, placing a minute volume of 0.01 mL with each injection.[1] Injections of greater than 0.05 mL per droplet are highly prone to granuloma formation.[21] Undercorrection is necessary with silicone because the induced fibroblastic response to the material can be expected to augment the injected area in the weeks after treatment. Treatments should be spaced at least one month apart until the desired result is obtained.

COMPLICATIONS

Various complications have been observed using filler materials in the nose and elsewhere. HA is well known to have resulted in isolated cases of arterial embolization and necrosis when injected in the glabellar region.[7,22] Our own experience with HA has been mixed. We have witnessed no complications when correcting nasal dorsum and sidewall deformities. Postrhinoplasty tip injections, however, have resulted in morbidity for two patients in the senior author's practice.

On one occasion, a patient on whom the senior author had performed a secondary rhinoplasty received, against medical advice, a large-particle HA treatment into her nasal tip by a nurse injector in a medical spa eight months after her revision rhinoplasty. Within 12 hours, the patient developed pallor and mottling of the nasal skin envelope, indicating ischemia (Figure 3). The senior author recommended treatment with 15 U of hyaluronidase (1 mL of solution made by combining 150 U of hyaluronidase and 10 mL of 1% lidocaine) injection, topical nitropaste, and warm compresses. The patient was treated at an outside institution. She applied nitropaste twice a day for one week and underwent three separate injections of 15 U of hyaluronidase, each separated by two days. The ischemia gradually resolved and necrosis was avoided. However, one year later, her nasal skin still has a thinned, mottled, lumpy appearance, making her a poor candidate for any further treatment (Figure 4).

Another patient had a small (0.1-mL) HA injection to the nasal tip by the senior author eight months after rhinoplasty. One week later, the patient returned

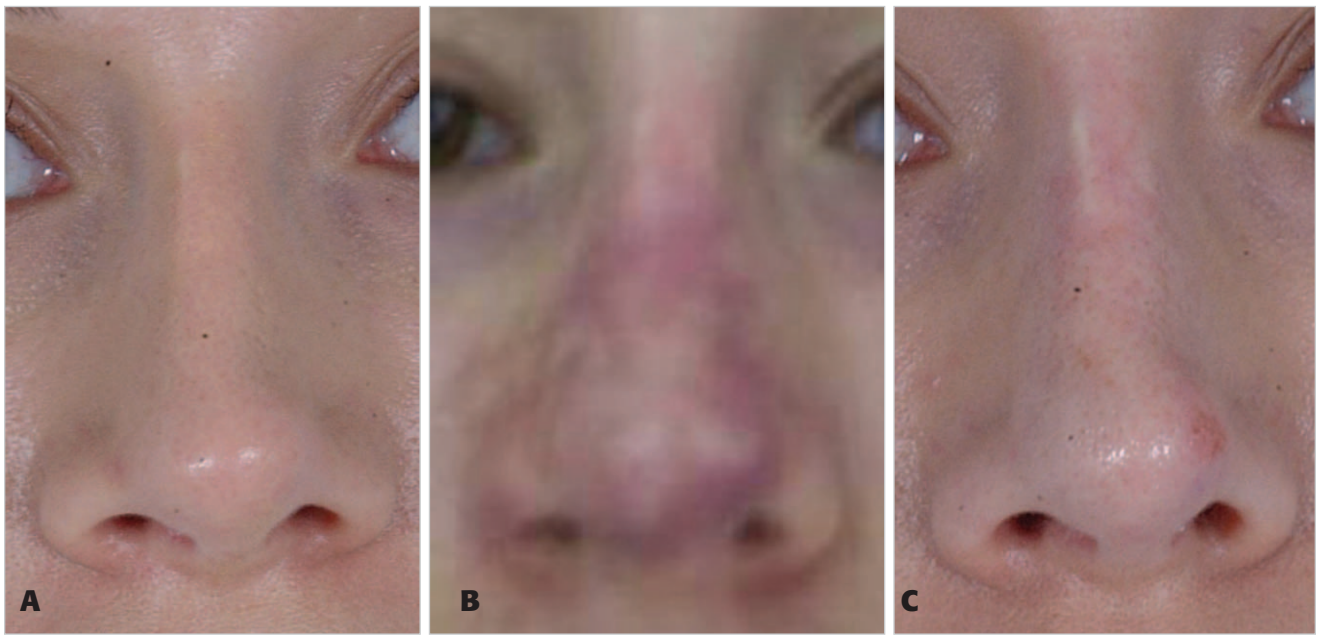

Figure 4. A, Pretreatment view of a 25-year-old woman after rhinoplasty revision. **B**, One week after hyaluronic acid injection at a medical spa. **C**, Three months after hyaluronic acid injection. This is the same patient that was shown in Figure 3.

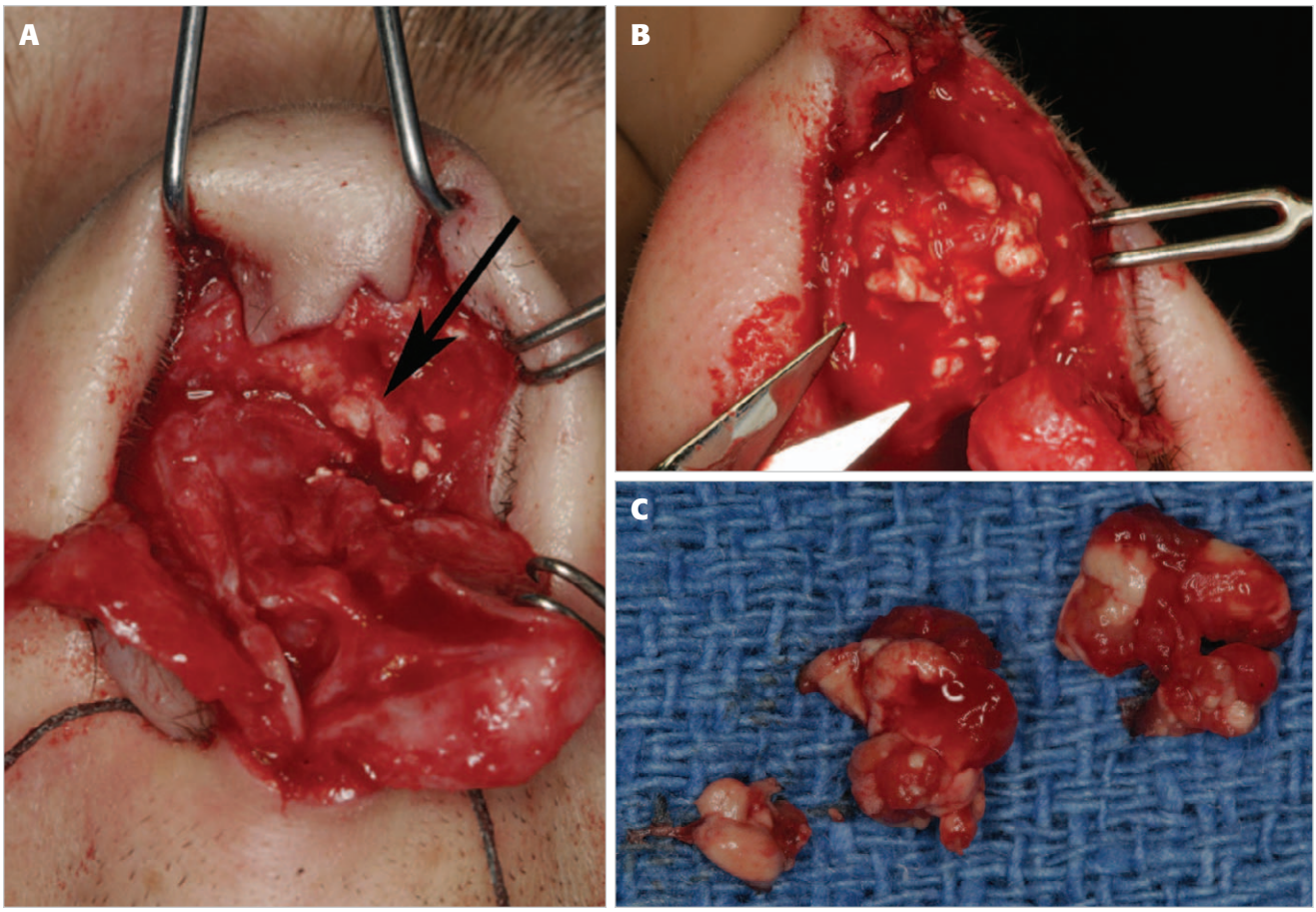

Figure 5. **A**, Intraoperative view of a 23-year-old man who had persistent calcium hydroxylapatite gel (CaHA; *arrow*) in the skin envelope from an injection into the left nasal sidewall six months earlier. **B**, During revision rhinoplasty, CaHA was debrided from the skin and soft tissue envelope. **C**, Multiple individual deposits of CaHA were retrieved, with no sign of degradation. Photographs courtesy of Dean Toriumi, MD, FACS.

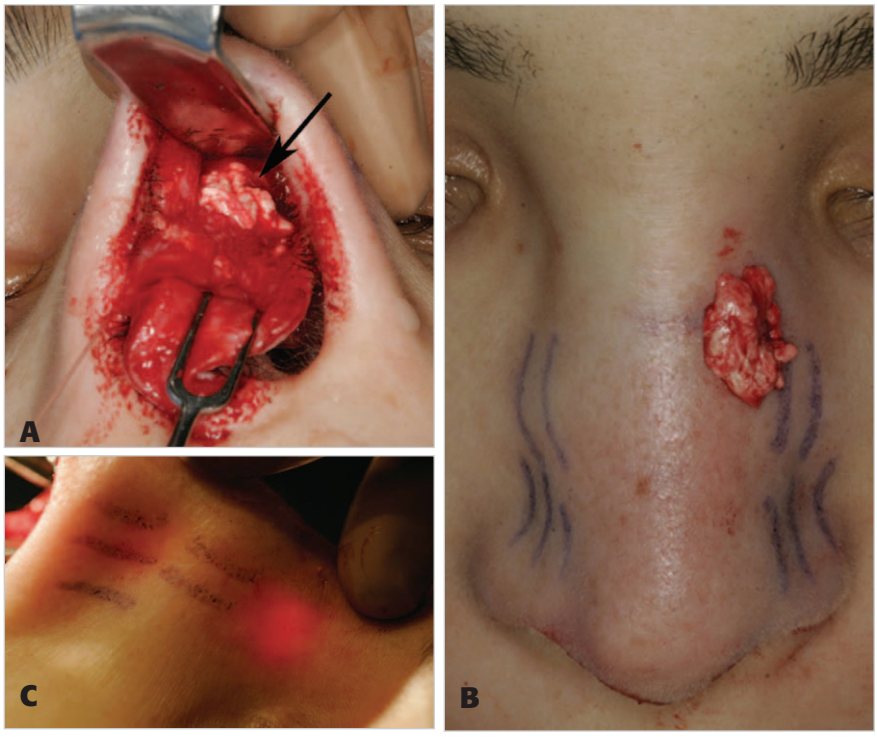

Figure 6. An excessive volume (1.3 mL) of calcium hydroxylapatite gel was injected into the left nasal sidewall of a 29-year-old woman as a single deposit two months before surgery. During revision rhinoplasty, the large deposit (**A**, *arrow*) was identified and removed (**B**). **C**, Transillumination shows substantial thinning of the nasal skin envelope after removal. The patient was producing purulent intranasal drainage on the left side beginning shortly after injection. The drainage resolved following surgery. Photographs courtesy of Dean Toriumi, MD, FACS.

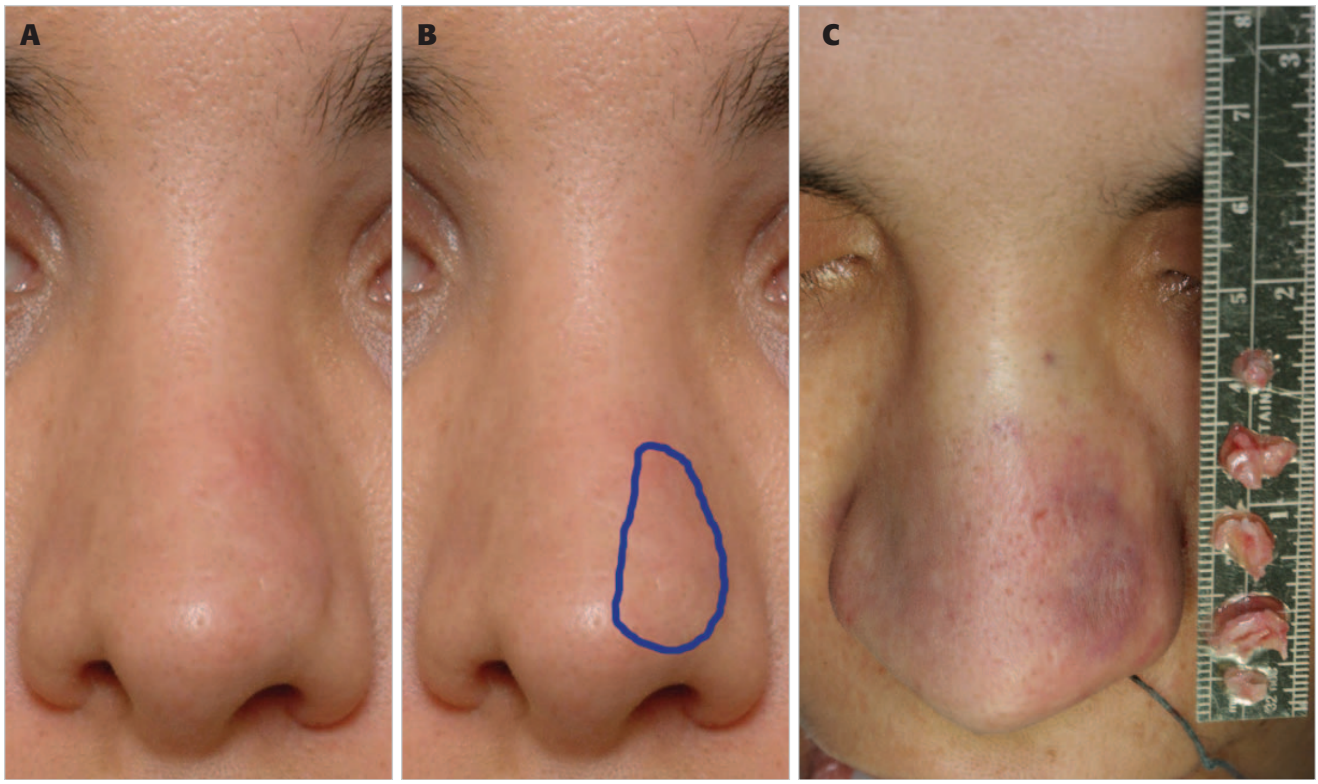

Figure 7. **A**, Silicone injected nine years previously into the left supratip of this 32-year-old woman caused persistent regional inflammation. The area injected was well demarcated by erythema (**B**, blue border) preoperatively. **C**, Each deposit of silicone was encased by a thick fibrous capsule and was removed with difficulty during revision rhinoplasty. Photographs courtesy of Dean Toriumi, MD, FACS.

to the office, complaining that her nose was rapidly becoming blue and numb when exposed to low outdoor temperatures. Treatment with 15 U of hyaluronidase again resolved the symptoms within a few days.

We have concluded that the hydrophilic and expansive properties of HA make it a troublesome choice for placement in the soft tissues of the postrhinoplasty nasal tip, which may already have a tenuous blood supply secondary to scarring. This theoretical risk may be greater for Juvéderm than for Restylane because of Juvéderm's increased hydrophilic properties.

CaHA is more viscous than HA and has a propensity to be nodular or palpable if injected too superficially. This will produce unevenness in the skin envelope that persists for a minimum of six months (Figure 5). We have also witnessed persistent purulent intranasal drainage and thinning of the skin envelope following injection of a large volume (1.3 mL) of CaHA to the nasal sidewall (Figure 6). Our experience has been more positive when using only small deposits of CaHA (0.1 to 0.5 mL) to smooth out dorsal or sidewall irregularities in patients who are uninterested in revision surgery. As with HA, we try to avoid injecting CaHA into the nasal tip because the risk of adverse outcomes is high in this area.

Silicone causes granuloma formation in some patients that can lead to nodularity, cellulitis, and ulceration (Figure 7). Furthermore, if a patient who has been injected with silicone requires revision rhinoplasty surgery, this permanent implant must be removed. Removal is an arduous task because silicone droplets disperse and become individually encapsulated by dense fibrous tissue.[5] Available alternatives and the numerous hazards associated with silicone injections in the nose make it difficult to justify its use.

CONCLUSIONS

Rhinoplasty surgeons must continue to strive for perfection in the operating room because fillers are no substitute for excellent surgical results. Nonetheless, soft tissue fillers are an acceptable treatment for postrhinoplasty deformities in select patients. Patients' individual circumstances must be thoroughly considered before treatment. Primary surgical rhinoplasty candidates or postrhinoplasty patients considering revision surgery should be avoided because persistent material may complicate a future procedure. HA and CaHA are the safest available agents and can be injected with local or no anesthesia. Still, despite the lack of reported problems using HA and CaHA gel in the nose, we have witnessed occasional complications and soft tissue damage. Any insults to the skin envelope could result in suboptimal perfusion and poor healing after a revision rhinoplasty. The only truly good candidates for nasal soft tissue fillers are patients needing minimal dorsal or sidewall correction who are not amenable to surgical intervention. Physicians who choose to inject the nose with soft tissue fillers have a responsibility to follow their patients closely for potential complications like infection, skin

damage, or necrosis. Such issues can be successfully resolved when addressed with prompt and aggressive treatment as indicated. ◗

DISCLOSURES

The authors have no disclosures with respect to the contents of this article.

REFERENCES

1. Webster RC, Hamdan US, Gaunt JM, Fuleihan JS, Smith RC. Rhinoplastic revisions with injectable silicone. *Arch Otolaryngol Head Neck Surg* 1986;112:269–276.
2. Redaelli A. Medical rhinoplasty with hyaluronic acid and botulinum toxin A: a very simple a quite effective technique. *J Cosmet Dermatol* 2008;7:210–220.
3. Beer KR. Nasal reconstruction using 20 mg/ml cross-linked hyaluronic acid. *J Drugs Dermatol* 2006;5:465–466.
4. Rokhsar C, Ciocon DH. Nonsurgical rhinoplasty: an evaluation of injectable calcium hydroxylapatite filler for nasal contouring. *Dermatol Surg* 2008;34:944–946.
5. Murray CA, Zloty D, Warshawski L. The evolution of soft tissue fillers in clinical practice. *Dermatol Clin* 2005;23:343–363.
6. Narins RS, Dayan SH, Brandt FS, Baldwin EK. Persistence and improvement of nasolabial fold correction with nonanimal-stabilized hyaluronic acid 100,000 gel particles/mL filler on two retreatment schedules: results up to 18 months on two retreatment schedules. *Dermatol Surg* 2008;34(suppl 1):S2–S8.
7. Schanz S, Schippert W, Ulmer A, Rassner G, Fierlbeck G. Arterial embolization caused by injection of hyaluronic acid (Restylane). *Br J Dermatol* 2002;146:928–929.
8. Stegman SJ, Chu S, Armstrong RC. Adverse reactions to bovine collagen implant: clinical and histologic features. *J Dermatol Surg Oncol* 1988;14:39–48.
9. de Lacerda DA, Zancanaro P. Filler rhinoplasty. *Dermatol Surg* 2007;33(suppl 2):S207–S212.
10. Han SK, Shin SH, Kang HJ, Kim WK. Augmentation rhinoplasty using injectable tissue-engineered soft tissue: a pilot study. *Ann Plast Surg* 2006;56:251–255.
11. Kablik J, Monheit GD, Yu L, Chang G, Gershkovich J. Comparative physical properties of hyaluronic acid dermal fillers. *Dermatol Surg* 2009;35(suppl 1):302–312.
12. Toriumi DM, Mueller RA, Grosch T, Bhattacharyya TK, Larrabee Jr WF. Vascular anatomy of the nose and the external rhinoplasty approach. *Arch Otolaryngol Head Neck Surg* 1996;122:24–34.
13. Rittié L, Kang S, Voorhees JJ, Fisher GJ. Induction of collagen by estradiol: difference between sunprotected and photodamaged human skin in vivo. *Arch Dermatol* 2008;144:1129–1140.
14. Dayan SH, Greene RM, Chambers AA. Long-lasting injectable implant for correcting cosmetic nasal deformities. *Ear Nose Throat J* 2007;86:25–26.
15. Stupak HD, Moulthrop TH, Wheatley P, Tauman AV, Johnson Jr CM. Calcium hydroxylapatite gel (Radiesse) injection for the correction of postrhinoplasty contour deficiencies and asymmetries. *Arch Facial Plast Surg* 2007;9:130–136.
16. Becker H. Nasal augmentation with calcium hydroxylapatite in a carrier-based gel. *Plast Reconstr Surg* 2008;121:2142–2147.
17. Rohrich RJ, Potter JK. Liquid injectable silicone: is there a role as a cosmetic soft-tissue filler? *Plast Reconstr Surg* 2004;113:1239–1241.
18. Pearl RM, Laub DR, Kaplan EN. Complications following silicone injections for augmentation of the contours of the face. *Plast Reconstr Surg* 1978;61:888–891.
19. Rapaport MJ, Vinnik C, Zarem H. Injectable silicone: cause of facial nodules, cellulitis, ulceration, and migration. *Aesthetic Plast Surg* 1996;20:267–276.
20. Dayan SH, Bassichis BA. The keys to aesthetic medicine: hyaluronic fillers, neurotoxins & beyond. Chicago: College of Cosmetic Medicine, 2007:44–48.
21. Naoum C, Dasiou-Plakida D, Pantelidaki K, Dara C, Chrisanthakis D, Perissios A. A histological and immunohistochemical study of medical-grade fluid silicone. *Dermatol Surg* 1998;24:867–870.
22. Cohen JL. Understanding, avoiding, and managing dermal filler complications. *Dermatol Surg* 2008;34(suppl 1):S92–S99.

Accepted for publication April 10, 2009.

Reprint requests: Steven H. Dayan, MD, Advanced Facial Plastic and Laser Surgery, 845 N Michigan Ave., Ste. 923 E., Chicago, IL 60611. E-mail: sdayan@drdayan.com.

1090-820X/$36.00

doi:10.1016/j.asj.2009.09.002