Section 4

Complications

Transient postinjection erythema, swelling, tenderness, and bruising are expected with dermal filler treatments, and are considered part of routine follow-up rather than complications. These issues and suggestions for management are reviewed in Follow-ups and Management of the Introduction and Foundation Concepts section.

Each dermal filler product has specific side effects and complications associated with their use. The following section focuses on complications seen with hyaluronic acid (HA) and calcium hydroxylapatite (CaHA) which, relative to other dermal filler products, have comparatively good safety profiles. Severe product-related complications such as granulomatous reactions are extremely rare with temporary dermal fillers such as these, and are more commonly reported with permanent dermal fillers such as silicone, polymethylmethacrylate (ArteFill®), and certain semipermanent fillers such as poly-L-lactic acid (Sculptra®).

Complications

- Extensive bruising or rarely, hematoma
- Visible or palpable filler bumpiness
- Asymmetry, overcorrection, or undercorrection
- Unpredictable persistence of filler, either shorter or longer than anticipated
- Tyndall effect (bluish discoloration)
- Migration or extrusion of filler
- Prolonged or severe swelling
- Prolonged erythema
- Hyperpigmentation and rare possibility of hypopigmentation
- Infection (e.g., reactivation of herpes simplex or herpes zoster, bacterial infection)
- Erythematous, tender bumps, and nodules
- Granulomas
- Keratoacanthomas
- Tissue ischemia and skin necrosis
- Blindness
- Allergic hypersensitivity reactions (e.g., urticaria, angioedema, and a remote possibility of anaphylaxis)
- Scarring

Extensive bruising (Fig. 1) can occur when dermal filler is injected in a large region, when extensive fanning or cross-hatching is performed, or if a large blood vessel is nicked. It occurs most often in patients taking anti-inflammatory medications such as acetylsalicylic acid (Aspirin). Extravasated blood can migrate to dependent areas, which is seen several days after the initial bruise. The use of small gauge needles with gentle injection technique, and avoidance of anti-inflammatory medications and other supplements with anticoagulant effects prior to procedures, can help reduce bruising. Bruises may be camouflaged with makeup. See Follow-ups and Management in the Introduction and Foundation Concepts section for more information about bruising and management.

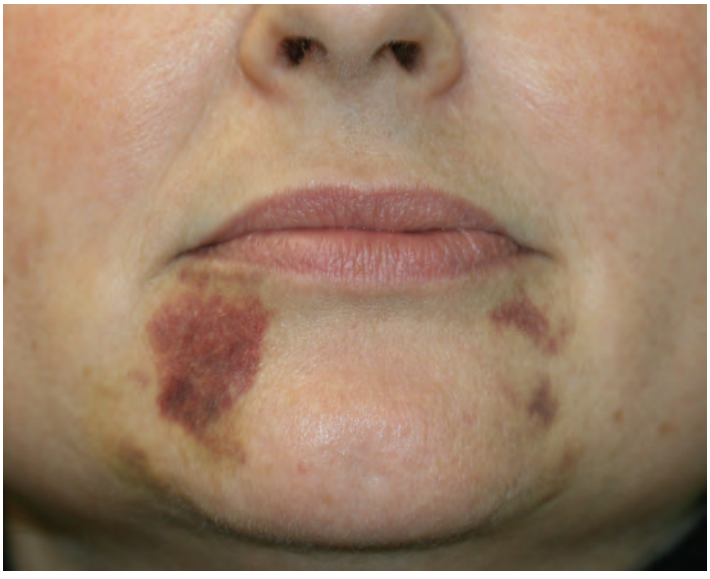

FIGURE 1 ● Extensive bruising, 2 days after dermal filler treatment (Radiesse®, a semipermanent calcium hydroxylapatite product).

Filler bumpiness evident at the time of, or shortly after treatment, is a complication related to injection technique and volumes. It is usually caused by placement of filler too superficially or unevenly. Dermal fillers with more structural support, such as CaHA, are more likely to cause bumpiness than thinner, more malleable fillers such as HAs. **Bumpiness** and areas of **overcorrection** resolve as filler volume diminishes. If patients are distressed, these filler collections can often be corrected with vigorous compression by the provider (see General Injection Principles in the Introduction and Foundation Concepts section). Compression may result in bruising, and local anesthesia may be required at the time of filler compression for patient comfort. Lancing of large filler collections with a scalpel and expressing the product has also been reported. Increasingly, providers are using hyaluronidase (5–20 units initially) for correction of HA collections as well as treatment of other HA complications such as vascular compromise (see Hyaluronidase section later).

Asymmetry and **undercorrection** result from unbalanced injection volumes or injecting too little dermal filler. These complications can occur with patients who exhibit rapid swelling during dermal filler treatment; however, they are more often related to injectors' skill and experience. Additional filler may be necessary for correction and it is important to discuss this possibility with patients prior to initial dermal filler treatment due to the cost associated with this unanticipated procedure.

Filler persistence can be unpredictable, either shorter or longer than anticipated, and can vary from the dermal filler product's FDA approved duration. Product persistence in tissue tends to decrease with small injection volumes, highly mobile treatment areas, and in patients with a high metabolism.

Tyndall effect, seen as a bluish discoloration of the skin, may occur with superficial placement of HA in thin-skinned areas, such as the tear trough area. Areas with the Tyndall effect can be managed with compression, hyaluronidase injection, or treatment with a Q-switched 1064-nm laser.

Migration of dermal filler may occur with aggressive post-procedure massaging. It is therefore, advisable to instruct patients to avoid palpating the treatment area. **Extrusion** could possibly occur shortly after treatment from a needle insertion site.

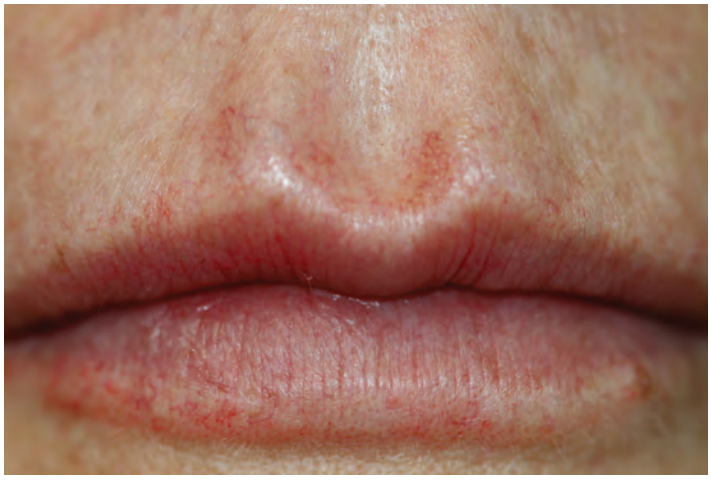

FIGURE 2 ● Prolonged erythema, several years after dermal filler treatment (Restylane®, a long acting product).

Prolonged swelling may be seen for up to 4 weeks after treatment in some patients, without associated tenderness, pain, or bumps. The swelling is typically small but clinically evident. Prolonged swelling is more common if extensive bruising has occurred with treatment. Ice and oral antihistamines (e.g., cetirizine 10 mg, one tablet daily) may be used until swelling resolves (see Aftercare in the Introduction and Foundation Concepts section). In rare cases of **severe swelling** and **allergic hypersensitivity** reactions, such as **urticaria** and **angioedema**, intramuscular steroids (dexamethasone 8 mg) followed by oral steroids (prednisone 60 mg per day tapered over 1–2 weeks) may be necessary.

Prolonged erythema without other associated signs of tenderness, pain, bumps, or swelling, can be seen as hypervascularity overlying the dermal filler treatment area (Figs. 2 and 3). Lasers or intense pulsed light devices specific for reduction of vascularities

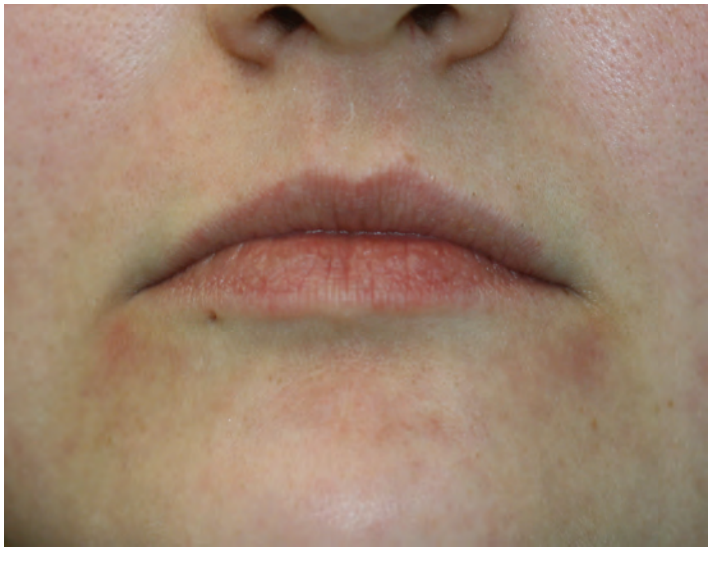

FIGURE 3 ● Prolonged erythema, 3 months after dermal filler treatment (Evolence™, a semipermanent collagen filler).

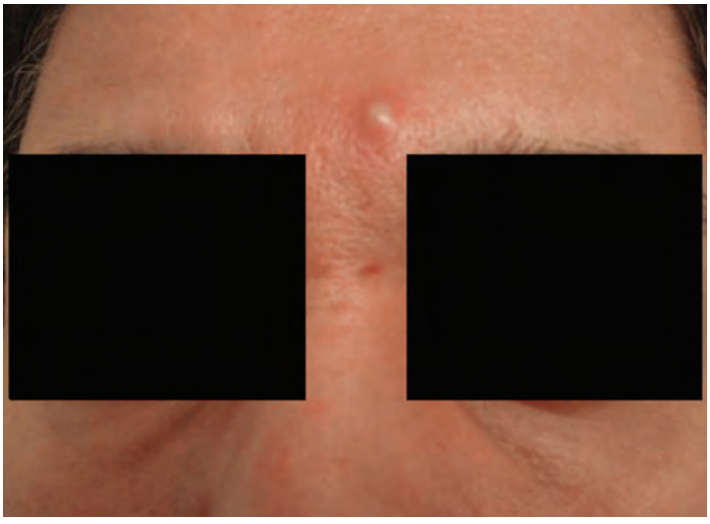

FIGURE 4 ● Infectious nodule, 2 weeks after dermal filler treatment (Aquamid®, a permanent polyacrylamide filler) (Courtesy of L. H. Christensen, M.D.).

can be effective in reducing erythema. Prolonged erythema may stimulate **postinflammatory hyperpigmentation**, which can be treated with topical lightening products such as hydroquinone.

Infection, such as reactivation of herpes simplex or herpes zoster can occur, and may be prevented with prophylactic antiviral medications (valacyclovir 500 mg, one tablet twice daily, taken 2 days prior to treatment and 3 days posttreatment). Anytime the skin barrier is breached bacterial or fungal infection is possible. Preparing the injection area adequately can reduce the risk of inoculating the skin with pathogens. The mouth harbors numerous bacteria and ensuring that needles are changed between lip injections and other dermal injections may also aid in reducing the risk of infection.

Erythematous, tender bumps, and nodules are treated as bacterial infections (Fig. 4). These can occur immediately after treatment or can be delayed up to a year or more. Management typically consists of a 6-week course of empiric antibiotics with a macrolide (e.g., clarithromycin 500 mg, one tablet twice daily) or a tetracycline (e.g., minocycline 100 mg, one tablet twice daily). Fluctuant nodules are incised, drained, and cultured before initiating antibiotics. Hyaluronidase can be injected into the nodular area if HA dermal fillers were used. There is new evidence suggesting that late-onset erythematous tender nodules may be due to biofilms, which are aggregates of microorganisms within adhesive protective coverings that can adhere to foreign bodies. Biofilms can be elusive to standard culture methods and highly resistant to antibiotics. They are presumed to resolve once the dermal filler foreign body is gone. Late-onset erythematous tender nodules are treated as above, and referral to a plastic surgeon may be necessary for excision if nodules do not resolve.

Granulomas are a delayed complication that typically present as tender nodules with or without fluctuance, appearing up to 2 years after treatment. They are more common with permanent fillers (Fig. 5) and certain semipermanent fillers. Some granulomas spontaneously resolve, whereas others require intralesional steroid injection or excision and consultation for management is advised if this lesion is suspected. Certain dermal filler products have higher reported incidences of granulomas and providers may want

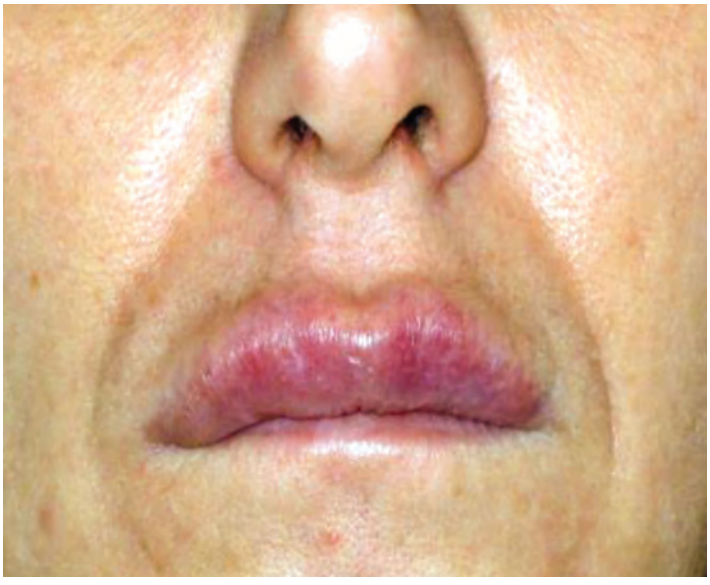

FIGURE 5 Granuloma, 3 years after dermal filler treatment (Dermalive®, a permanent acrylic hydrogel filler) (Courtesy of L. H. Christensen, M.D.).

to carefully weigh the risk to benefit ratio when considering their use. Sculptra, for example, has a reported granuloma incidence as high as 13% (Fig. 6).

Keratoacanthomas, which are benign epithelial tumors, can arise in response to trauma and have been reported following dermal filler treatments (Fig. 7). These lesions can be refractory to treatment and it is advisable to seek consultation for management if these rare lesions arise.

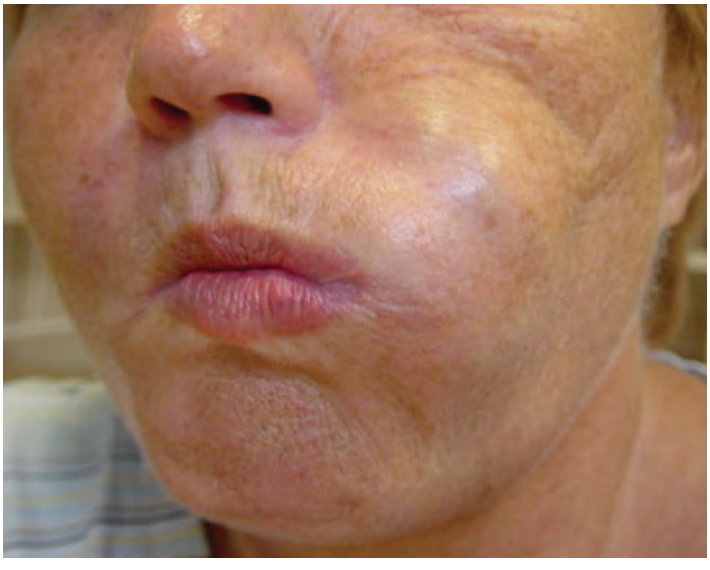

FIGURE 6 Granuloma, 6 weeks after dermal filler treatment (Sculptra®, a semipermanent poly-L-lactic acid filler) (Courtesy of L. H. Christensen, M.D.).

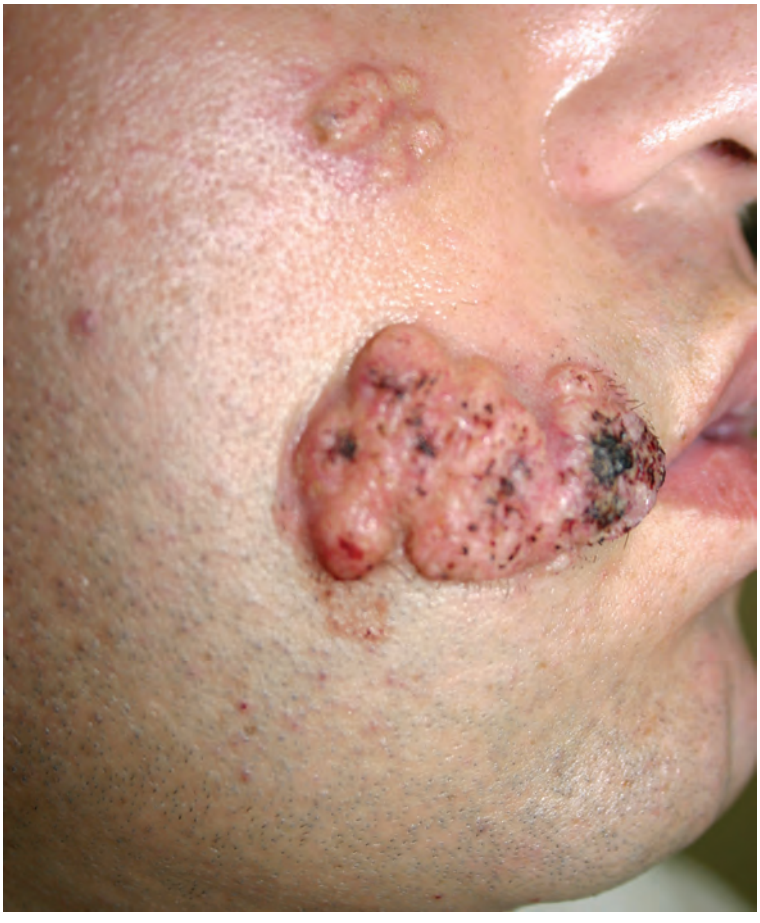

FIGURE 7 ● Keratoacanthoma, 2 months after dermal filler treatment (collagen) (Courtesy of L. Baumann, M.D.).

Tissue ischemia, or reduced blood supply to tissue, is a potentially serious complication that can result in **tissue necrosis** (Fig. 8). Compromised blood flow to the treatment area can result from overfilling tissue with dermal filler or injecting intravascularly. Ischemia typically appears as a violaceous reticular pattern or white blanching of the affected area, with or without associated pain. It may be seen at the time of dermal filler injection, or delayed and has been reported up to 6 hours after treatment. High-risk areas for vascular compromise include, but are not limited to, the following:

- **Glabella.** Vascular occlusion of the supraorbital artery has been reported. In addition, this is a watershed area with limited collateral circulation and is susceptible to vascular compromise due to overfilling tissue with dermal filler. **Blindness** due to retinal artery embolization has been reported with dermal filler treatment in this area.
- **Nasal ala.** The nasal ala and tip are primarily supplied by the lateral nasal artery. Necrosis of the ala has been reported with dermal filler treatments of the nasolabial folds.
- **Superior marionette line.** This area is at risk for ischemia and necrosis due to overfilling the tissue with dermal filler rather than intravascular injection.

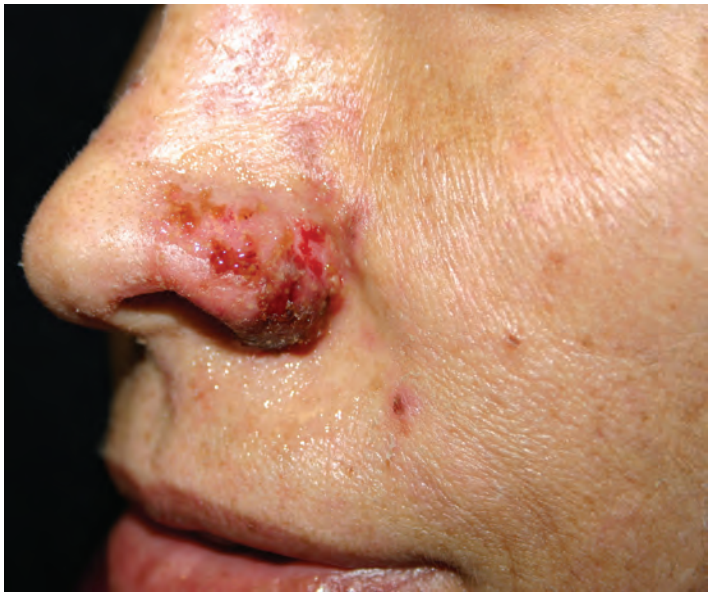

FIGURE 8 Alar necrosis following dermal filler treatment (Courtesy of L. Baumann, M.D.).

- **Body of the lips.** The labial arteries lie deep to the labial mucosa and are at risk for intravascular dermal filler injection.

Ischemia is managed urgently as it can rapidly progress to **tissue necrosis.** If ischemia occurs the following are recommended as part of management:

1. Discontinue injection immediately.
2. Attempt to revascularize the area by firmly and vigorously massaging the ischemic tissue.
3. Apply heat packs.
4. Administer 2 chewable 325 mg aspirin.
5. Apply a vasodilator, such as nitroglycerine ointment (Nitro-Bid® 2% approximately 1 inch) under occlusion with plastic wrap to the affected area. Nitroglycerine can decrease blood pressure and vital signs may need to be monitored.
6. If a HA dermal filler was used, perform a hyaluronidase skin test and if negative after 5 minutes, inject 30–50 units of hyaluronidase in the treatment area and along the course of the blood vessels in the treatment area (see Hyaluronidase section later).
7. It may be advisable to contact the local emergency room and/or a local plastic surgeon if ischemia does not rapidly resolve.

It can be helpful to have supplies assembled for treatment of ischemia in an emergency vascular occlusion kit (see Introduction and Foundation Concepts section, Fig. 16). All steps listed earlier may not be required for every ischemic event. For example, tissue ischemia in the marionette line area, which is usually due to overfilling tissue, typically resolves with discontinuing injection and massaging. However, tissue ischemia of the nasal ala, which is more likely an intravascular occlusion, may require all of the above steps to achieve revascularization. Monitoring of the ischemic area and close follow-up is advised. If an ischemic event occurs, modify the patient's dermal filler

home care instructions to avoid icing the area that had vascular compromise. Necrosis may be seen a few days to weeks after an ischemic event. Nonintact skin is treated with moist wound care using an antibiotic ointment until healed.

Prevention of intravascular injection can be challenging with dermal fillers. Because of the viscous nature of dermal fillers and small gauge needles used for injection, aspiration prior to injection to ensure a vessel has not been cannulated is not feasible with dermal filler procedures. In addition, a blood "flashback" in the needle hub is also not seen if a vessel is inadvertently cannulated with dermal fillers. Gentle plunger pressure, keeping the needle moving during filler injection and using conservative dermal filler volumes for treatment may reduce the risk of ischemia because of intravascular injection or overfilling of tissues.

Scarring is rare with dermal filler treatments, but may occur with any injection, particularly if the treatment is complicated by infection. Patients with a history of overhealing responses such as hypertrophic and keloidal scarring are at increased risk. Injections performed with very large gauge needles, such as those used with autologous fat dermal filler injections, can be associated with scarring (Fig. 9).

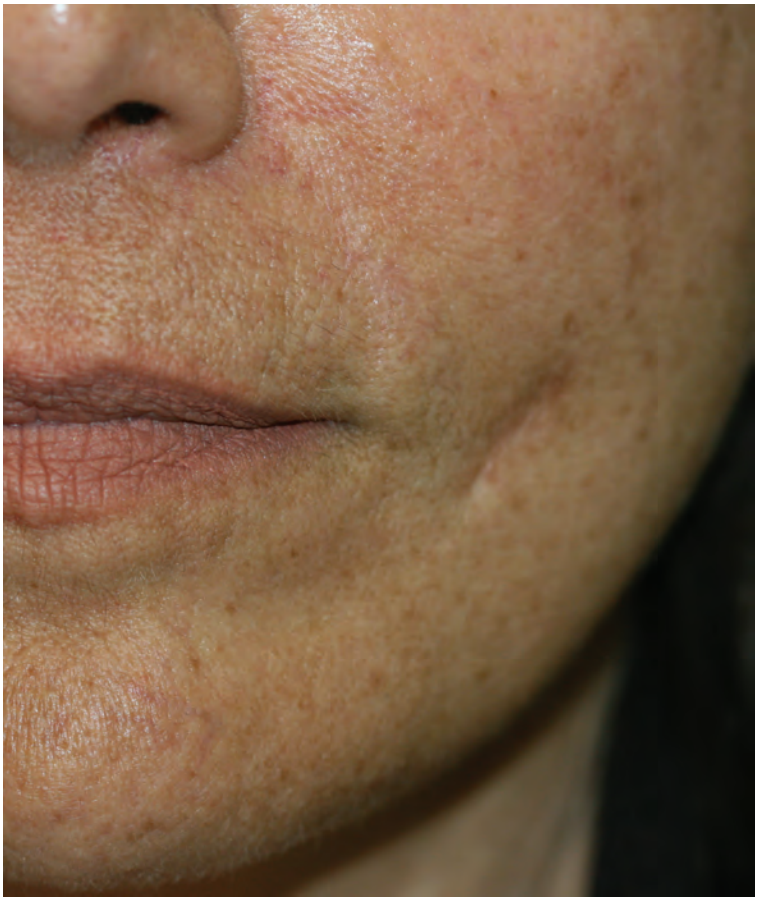

FIGURE 9 ● Scar, 1 year after dermal filler treatment (autologous fat).

Hyaluronidase

Hyaluronidase is an enzyme that breaks down HA and it is an emerging therapy used for correction of HA dermal filler complications such as filler bumpiness and vascular compromise. Hyaluronidase is not currently FDA approved for these indications.

Hyaluronidase Off-label Indications

- Bumpiness and overcorrection due to HA injection
- Tyndall effect due to HA injection
- Tissue ischemia due to HA injection
- Nodules and granulomatous reactions due to HA injection

Hyaluronidase Contraindications

- Allergy to bee stings (bee venom has hyaluronidase)
- Known hypersensitivity to hyaluronidase or its components
- Current use of furosemide, epinephrine, benzodiazepines, heparin or phenytoin
- Pregnancy

Hyaluronidase Products

Hyaluronidase is available as a powder or solution. Powdered hyaluronidase is reconstituted with sterile normal saline and is used within 12 hours of reconstitution. Hyaluronidase solutions must be refrigerated. Commercially available hyaluronidase is either bovine (cow) or ovine (sheep) derived (see Table 1). Hylenex, a human recombinant hyaluronidase, has been recalled by the manufacturer but may be available in the future. Product dosing is equivalent for the different hyaluronidases listed below.

Hyaluronidase Complications

Use of hyaluronidase for management of HA complications has not been widely studied and there are sparse data on complication rates. Most adverse reactions are local. Rarely, allergic reactions such as urticaria, angioedema, and anaphylaxis have been reported.

TABLE 1

Hyaluronidase Products

Agent	Source	Other Ingredients	Concentration
Amphadase®	Bovine	Thimerosal (preservative)	150 units/mL
Vitrase®	Ovine	Albumin	200 units/mL

Hyaluronidase Skin Testing

Skin testing is recommended for all hyaluronidase products to ensure there is no allergic reaction to the product or its components. If a positive reaction is observed, hyaluronidase is contraindicated.

1. Draw up 3 units of hyaluronidase (0.2 mL of 150 unit/mL solution).
2. Inject subdermally on the dorsum of the forearm.
3. Evaluate in 5 minutes. A positive reaction includes any of the following: palpable wheal, induration, local puritis, or systemic allergic signs (urticaria, angioedema, and anaphylaxis).

Hyaluronidase Dosing

- Hyaluronic acid dermal filler bumpiness, overcorrection, Tyndall effect nodules, or granulomas: 5–20 units initially, injected intradermally in the HA collection.
- Vascular occlusion: 30–50 units initially, injected intradermally and subcutaneously along the course of the artery.

There is a concern that high hyaluronidase doses may degrade native dermal HA resulting in soft tissue depressions. However, this has not yet been rigorously studied. Some providers report use of doses as high as 375 units without adverse changes in facial volume.

Timing of Hyaluronidase Effects

Data are sparse regarding hyaluronidase pharmacokinetics, but evidence suggests that the time for onset of effects may be dose dependent. With conservative hyaluronidase doses of 5–20 units used to treat HA collections, smoothing effects may be fully evident 1–2 weeks after injection. With high hyaluronidase doses of 150–200 units, effects may be evident within hours of injection.

Conclusion

All dermal filler treatments have associated risks of complications. These reactions vary from erythema and edema to more serious complications of necrosis and even blindness. Whereas severe adverse reactions are rare, appraising patients of all possible complications is essential prior to dermal filler treatment.