Filler Complications: Focus On Vascular Compromise

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4 Hylans and Soft Tissue Augmentation
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Systematic Review of Clinical Trials of Small- and Large-Gel-Particle Hyaluronic Acid Injectable Fillers for Aesthetic Soft Tissue Augmentation

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BACKGROUND Hyaluronic acid (HA) is the most frequently injected filler for soft tissue augmentation in the United States.

OBJECTIVE To systematically review published evidence for aesthetic use of small- and large-gel-particle HA.

METHODS AND MATERIALS Clinical data on anatomic area, level of evidence, patient population, trial design, endpoints, efficacy, and safety were extracted from PubMed.

RESULTS Fifty-three primary clinical reports were analyzed. The highest-quality efficacy evidence was for the nasolabial folds (NLFs), with 10 randomized, blind, split-face, comparative trials. Several randomized, blind trials supported treatment of the glabella, lips, and hands. Lower-level evidence (from studies with nonrandomized, open-label, or retrospective designs) was recorded for the nasolabial folds (lip-crease), upper eyelids, nose, infraorbital hollows, oral commissures, marionette lines, perioral rhytides, temples, and cheeks. Common adverse events (AEs) across anatomic areas were pain, bruising, swelling, and redness. Serious AEs were uncommon (8 events in 8 patients of 4,000 total patients) and were considered to be unrelated (7 events) or probably unrelated (1 event) to treatment.

CONCLUSION The efficacy and safety of small- and large-gel-particle HA are well established for NLFs; evidence for the glabella, lips, and hands is more limited. Preliminary reports in other anatomic regions suggest efficacy without major complications.

This review was funded by Medicis Aesthetics Inc., Scottsdale, Arizona. Complete Healthcare Communications Inc., Chadds Ford, Pennsylvania, provided editorial support for the development of this manuscript. Drs. Cohen, Dayan, Brandt, and Namkung have served as consultants or clinical trial investigators for Medicis Aesthetics; Ms. Nelson is an employee of Medicis Aesthetics; Drs. Axford-Gatley and Theisen are employees of Complete Healthcare Communications, whose services are funded by Medicis Aesthetics.

Volumizing Hyaluronic Acid Filler for Midface Volume Deficit: 2-Year Results from a Pivotal Single-Blind Randomized Controlled Study

Derek Jones, MD,*‡ and Diane K. Murphy, MBA‡

BACKGROUND Hyaluronic acid (HA) gels are commonly used to correct age-related midface volume deficit (MVD), yet the Food and Drug Administration has not specifically approved them for this purpose.

OBJECTIVE To study the safety and effectiveness of a new 20-mg/mL HA gel (VYC-20L) specifically formulated and optimized for mid-face volumizing.

METHODS AND MATERIALS A multicenter, single-blind, controlled study randomized 235 subjects aged 15 to 65 with MVD to a treatment group and 47 to a no-treatment control group. Responders were defined as subjects who achieved improvement of 1 point or more on the validated 6-point Mid-Face Volume Deficit Scale (MFVDS) at 6 months as rated live by two blinded independent evaluators. The primary endpoint required a 70% or greater treatment group response and a statistically significant difference (p < .001) between the treatment and control group responder rates.

RESULTS The primary endpoint was met, with 86.6% of the treatment group improving by 1 point or more on the MFVDS at month 6 and a statistically significant difference (p < .001) between the treatment and control group responder rates. Subjects tolerated VYC-20L well, with no unanticipated adverse device effects. Nearly half of subjects maintained correction for 24 months.

CONCLUSION VYC-20L is safe and effective for age-related MVD, with correction lasting up to 2 years. Allergan designed and funded this study. Dr. Jones is a consultant for Allergan and received research support for conducting this study. Ms. Murphy is an Allergan Employee and stockholder.
Understanding, Avoiding, and Managing Dermal Filler Complications

JOEL L. COHEN, MD

BACKGROUND Dermal fillers are increasingly being utilized for multiple cosmetic dermatology indications. The appeal of these products can be partly attributed to their strong safety profiles. Nevertheless, complications can sometimes occur.

OBJECTIVE To summarize the complications associated with each available dermal filling agent, strategies to avoid them, and management options if they do arise.

METHODS AND MATERIALS Complications with dermal fillers reported in peer-reviewed publications, prescribing information, and recent presentations at professional meetings were reviewed. Recommendations for avoiding and managing complications are provided, based on the literature review and the author’s experience.

RESULTS Inappropriate placement or superficial placement is one of the most frequent reasons for patient dissatisfaction. Due to the reversibility of hyaluronic acid, complications from these fillers can be easily corrected. Sensitivity to any of the currently approved FDA products is quite rare and can usually be managed with anti-inflammatory agents. Infection is quite uncommon as well and can usually be managed with either antibiotics or antivirals depending on the clinical features. The most concerning complication is cutaneous necrosis, and a protocol to treat the full spectrum of this process is reviewed.

CONCLUSIONS Complications with dermal fillers are infrequent, and strategies to minimize their incidence and impact are easily deployed. Familiarity with each family of soft-tissue augmentation products, potential complications, and their management will optimize the use of these agents.

Dr. Cohen is a Consultant and Clinical Trial Participant for Allergan, Inc., BioForm Medical, Inc., ColBar LifeScience Ltd., Medicis Pharmaceutical Corporation.

Over the past several years, a major shift in the use of dermal fillers has occurred in the cosmetic dermatology arena. The use of these products is growing rapidly, due in large part to their effectiveness and versatility, increased public interest, the availability of multiple new options, and a diminishment of the social stigma surrounding their use. Their favorable safety profiles also contribute to the popularity of these products. However, despite the impressive safety demonstrated with these agents, complications and adverse events can occur. To ensure the best possible outcomes and greatest patient satisfaction, the dermatologist who injects dermal fillers must have proper training in their use and be aware of the types of unwanted effects that can occur and how to treat them. Dermal fillers are commonly categorized by duration of effect: temporary, semipermanent (duration is often longer than 18 months but the exact time frame is unknown), and permanent options (Table 1).

Injection Site Reactions

The most common adverse events associated with fillers are local injection site reactions. In a randomized, double-blind, multicenter comparison of hyaluronic acid (Restylane, Medicis Aesthetics Inc., Scottsdale, AZ) versus collagen (Zyplast, Allergan Inc., Santa Barbara, CA) for the treatment of nasolabial folds in contralateral sides in each patient (n = 138), injection site reactions occurred at 93.5%
CAUTION IN HIGHER RISK AREAS
Blindness Caused by Cosmetic Filler Injection: A Review of Cause and Therapy

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Summary: Vascular occlusion causing blindness is a rare yet greatly feared complication of the use of facial aesthetic fillers. The authors performed a review of the aesthetic literature to ascertain the reported cases of blindness and the literature reporting variations in the vascular anatomy of the human face. The authors suggest a small but potentially helpful addition to the accepted management of the acute case. Cases of blindness, mostly irreversible, from aesthetic filler injections have been reported from Asia, Europe, and North America. Autologous fat appears to be the most frequent filler causing blindness. Some cases of partial visual recovery have been reported with hyaluronic acid and calcium hydroxylapatite fillers. The sudden profusion of new medical and nonmedical aesthetic filler injectors raises a new cause for alarm about patient safety. The published reports in the medical literature are made by experienced aesthetic surgeons and thus the actual incidence may be even higher. Also, newer injectors may not be aware of the variations in the pattern of facial vascular arborization. The authors present a summary of the relevant literature to date and a suggested helpful addition to the protocols for urgent management. (Plast. Reconstr. Surg. 134: 1197, 2014.)
Fig. 1. Vascular anatomy of the periocular region. (Copyright Jean D. Carruthers, M.D., 2014.)
Anatomic Considerations for Soft Tissue Augmentation of the Face

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ANATOMY CAN VARY . . .
New Anatomical Insights on the Course and Branching Patterns of the Facial Artery: Clinical Implications of Injectable Treatments to the Nasolabial Fold and Nasojugal Groove

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Background: Improper manipulation of injectable treatments to the face can result in disastrous vascular complications. The aim of the present study was to elucidate the detoured course of the facial artery and to provide detailed metric data regarding facial artery location with a view to helping physicians avoid iatrogenic vascular accidents during injectable treatments.

Methods: Sixty specimens from 35 embalmed cadavers (24 male and 11 female cadavers; mean age, 70.0 years) and one fresh male cadaver (age, 62 years) were used for this study.

Results: In 56 cases (93.3 percent), the branches of the facial artery were observed at the vicinity of the nasolabial fold. The facial artery was located 3.3 cm...
The Anatomical Origin and Course of the Angular Artery Regarding Its Clinical Implications

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Vascular Compromise After Hyaluronic Acid Cheek Augmentation

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Affiliation forthcoming

ABSTRACT

Soft tissue augmentation agents are used for facial rejuvenation millions of times each year throughout the world. Fortunately with the use of approved substances as well as a keen knowledge of the underlying anatomy, vascular compromise is a very rare circumstance. It is imperative, however, to be familiar with potential side effects of filler agents, and specifically the signs and symptoms of vascular compromise.

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TRAIN YOUR STAFF TO HELP SCREEN AND RECOGNIZE POTENTIAL ISSUES
Retraction of the Plunger on a Syringe of Hyaluronic Acid Before Injection: Are We Safe?

WAYNE CAREY, MD, FRCP(c), FAAD,* AND SUSAN WEINKLE, MD, FAAD†

BACKGROUND  Controversy exists concerning the need for aspiration before injection with hyaluronic acid (HA) fillers.

OBJECTIVE  The authors undertook a study of HA products to determine if blood could be aspirated back into a syringe of HA when the needle has been primed or filled with HA.

METHODS AND MATERIALS  Two studies were set up to determine if or when blood could be withdrawn from a heparinized fresh tube of blood into the HA syringe. Two different techniques were tested; one using a slow-pull retraction of the plunger and up to a 5-second waiting time before release versus a rapid pullback and quick release.

RESULTS  Review of these data demonstrates that the usual clinical method, which involves quick withdrawal and instant release of the syringe plunger does not allow for sufficient removal of the filler found intraluminal in the needle and may give rise to false negative results in vitro and likely in vivo with the exception being the Galderma/Medicis products.

CONCLUSION  In summary, withdrawal of the syringe plunger with no visible blood in the syringe does not eliminate the possibility of intravascular placement of the syringe needle.

Dr. W. Carey is a consultant and speaker for Teoxane, Merz and Galderma. Dr S. Weinkle is a consultant and speaker for Merz, Galderma and Allergan.
It is important to differentiate

Bruising  Vascular Compromise
Ask about DISTRIBUTION
Complications in the Cosmetic Dermatology Patient: A Review and Our Experience (Part 1)

Monique Vanaman, MD,* Sabrina Guillen Fabi, MD, FAAD, FAACS,**
and Jean Carruthers, MD, FRCSC, FRC***
Have protocols and supplies on-hand to potentially get ourselves out of trouble expeditiously . . .
Injection Necrosis of the Glabella: Protocol for Prevention and Treatment after Use of Dermal Fillers

Adrienne S. Glaich, MD, Joel L. Cohen, MD, and Leonard H. Goldberg, MD, FRCP

BACKGROUND  Injection of filler materials into the dermis is well tolerated, with few mild and transient side effects. Injection necrosis is a rare but clinically important potential complication caused by interruption of the vascular supply to the area by compression, injury, and/or obstruction of the vessel(s). The glabella is a particular danger zone for injection necrosis regardless of the type of filler used.

OBJECTIVE  We recommend a protocol that may be used to help prevent and treat injection necrosis of the glabella after injection with dermal fillers.

CONCLUSION  Injection necrosis in the glabellar region may be prevented by knowledge of the local anatomy and an understanding of its pathophysiology and treated by a suggested protocol.
TABLE 4. Protocol for Treatment of Glabellar Necrosis

| Discontinue injection immediately |
| Gently massage the affected area |
| Apply hot/warm water on a gauze |
| Apply nitroglycerin paste |
| Nitro-Bid (Fougera, Melville, NY, USA) |
| Apply 1/2 to 1 inch of ointment with applicator to glabella and adjacent forehead (within 3 cm of affected area) and occlude with plastic wrap. Use the applicator to spread the ointment into a thin uniform layer |
| Leave on for 12 hours and then remove for 12 hours; continue the cycle until clinical improvement is noted |
| Continue the treatment until clinical improvement is seen and/or as the patient tolerates; if not, proceed to the next step |
| If using hyaluronic acid gel, inject hyaluronidase (Lee Pharmacy, Inc., Fort Smith, AZ, USA; 50 U/cc) |
| Combine 75 U of hyaluronidase and 1.5 cc of 0.5% lidocaine with epinephrine |
| Inject into hyaluronic acid filler excesses |
| Consider skin prick testing to evaluate risk of allergy |
| Should see improvement in 24 h; may take several days for 100% resolution |
| Use low-molecular-weight heparin |
| Fragmin (Pharmacia, Peapack, NJ, USA); dalteparin sodium 5,000 IU/0.2 mL syringe |
| Inject 5,000 IU daily |
| OR |
| Lovenox (Aventis, Bridgewater, NJ, USA); enoxaparin sodium 100 mg/mL, 150 mg/mL syringes |
| 30 mg SC every 12 h or 40 mg SC once daily until clinical improvement is noted (maximum 14 d) |
| Give deep SC and rotate injection sites |
| Continue treatment until clinical improvement is noted |
| Diligent wound care and observation |
| If an eschar develops, soak well with normal saline |
| Keep the eschar moist with ointment (generic white petrolatum or Aquaphor, Beiersdorf, Wilton, CT, USA) and occlude with plastic wrap |
| OR |
| Occlude with Vigilon (Bard, Covington, GA, USA) daily or Second Skin |
| Treatment of resulting scar |
| Options include silicone pads, Duoderm UltraThin (Convatec, NJ, USA), and intraligeral steroid injection (use with caution as you are injecting into the glabella) |
| We suggest waiting at least 3 mo after the eschar resolves to allow the scar to mature before implementing dermabrasion, surgical excision, pulse dye laser, 1,450 nm diode laser, or carbon dioxide laser resurfacing |

SC = subcutaneously.

Ninety percent of the lumpiness caused by the hyaluronic acid gel resolved in 24 hours, and the remainder took several more days to disappear. An immediate or delayed hypersensitivity reaction to hyaluronidase, such as angioedema, rarely occurs.6-10 For this reason, hyaluronidase is not readily available and can be obtained through compounding pharmacies. Skin prick testing is sometimes done on patients prior to use to avoid this rare but serious complication.

Finally, once necrosis has occurred, it is important to minimize scarring by providing diligent wound care with daily dressings. Keep the wound covered with ointment to prevent crusting and keep out bacteria until healing is complete. These patients should be seen twice weekly to monitor their progress. A resulting scar can be treated with Duoderm Ultra Thin Sheets (Convatec, NJ, USA) or silicone gel sheets and corticosteroid (Kenalog) injections. If a scar remains, it may be treated with light dermabrasion, surgical revision, or injection with filler to restore the contour.1 We suggest waiting at least 3 months prior to any surgical scar revision thera-
– Hyaluronidase multiple injections along and perhaps into the adjacent artery

  • Papers
    – JDD 3/07. R Hirsch, M Lupo, J Cohen, D Duffy (NLF)
In Vitro Resistance to Degradation of Hyaluronic Acid Dermal Fillers by Ovine Testicular Hyaluronidase

Derek Jones, MD,* Ahmet Tezel, PhD,† and Marcos Borrell, PhD†

BACKGROUND Although adverse events are uncommon with hyaluronic acid (HA) fillers, the use of hyaluronidase permits the reversal of treatment complications or overcorrection.

OBJECTIVE This study sought to determine an in vitro dose-response relationship between ovine testicular hyaluronidase (OTH) and three HA dermal fillers (24-mg/mL smooth gel, 20-mg/mL particulate gel, and 5.5-mg/mL particulate gel with 0.3% lidocaine).

METHODS AND MATERIALS The dose response of each was measured after incubation for 30 minutes in concentrations ranging between 5 and 40 U of OTH. Timed responses for the 24-mg/mL and 20-mg/mL HA fillers were obtained after incubation with 20 U of OTH for 15 to 120 minutes.

RESULTS After all dose responses and timed-interval tests, the 24-mg/mL HA smooth gel filler exhibited more resistance against in vitro enzymatic degradation to OTH than the 20- and 5.5-mg/mL HA particulate gels.

CONCLUSION This resistance to degradation in vitro may be attributed to the higher HA content of the 24-mg/mL HA smooth gel, the degree of crosslinking, and the cohesive property of the gel filler.

*This study was funded by a grant from Allergan, Inc., Santa Barbara, CA. Derek Jones, MD, is a consultant, investigator, advisory board member, and speaker for Allergan, Inc. He received no compensation for this study. Drs. Tezel and Borrell are employed by Allergan, Inc., Santa Barbara, CA. Editorial assistance was provided by Health Learning Systems, a part of CommonHealth, Parsippany, NJ.
Reversing Facial Fillers: Interactions Between Hyaluronidase and Commercially Available Hyaluronic-Acid Based Fillers

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ABSTRACT

Introduction: Hyaluronidase (HA) degrades hyaluronic acid, allowing flexibility in the use of hyaluronic acid-based fillers commonly used in facial correction. Potentially differing properties of available hyaluronidases and fillers may influence their interaction, leading to important differences in ultimate cosmetic results. This study examines the physical properties of various fillers after exposure to commonly available hyaluronidases in vitro to better inform their in vivo clinical use.

Methods: Four commonly used HA fillers were exposed to varying concentrations of Vitrase (ovine testicular hyaluronidase) and Hylentix (human recombinant hyaluronidase) in vitro. The gross properties of these fillers were then observed to evaluate time- and dose-response; photographs were obtained to allow visual comparison at 1 minute and 5 minutes post-exposure.

Results: At a concentration of 0.1 mL Vitrase to 0.2 mL filler, Restylane dissipated most followed by Juvederm; Belotero most retained its form. Hylentix at the same concentration showed similar results, again affecting Restylane most and Belotero least. Response to treatment with both hyaluronidases increased substantially over time, increasing progressively from exposure to 5 minutes post-exposure. When exposed to Hylentix at 15 U and 30 U to 0.2 mL filler, Belotero retained its form most, followed by Juvederm, Juvederm Voluma, and then Restylane. The effects on filler structure increased with 30 U concentration vs 15 U concentration of Hylentix.

Discussion: Available hyaluronidases and HA fillers appear to have differing physical properties that influence their interaction in a time and dose-dependent manner. Knowledge of the ways in which specific fillers interact with different hyaluronidases may help achieve desired cosmesis when aiming to adjust delicate facial fillers.

Management of Impending Necrosis Associated With Soft Tissue Filler Injections

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Transarterial Degradation of Hyaluronic Acid Filler by Hyaluronidase

Claudio DeLorenzi, BA, MD, FRCS

BACKGROUND  Hyaluronidase (HYAL) has been recommended in the emergency treatment of ischemia caused by accidental intra-arterial injection of hyaluronic acid (HA) dermal fillers. To date, there have been no published studies showing that HYAL can pass through intact arterial wall to hydrolyze HA emboli.

OBJECTIVE  The goal of this study was to study whether or not HYAL could cross intact human facial arterial wall to hydrolyze HA filler.

MATERIALS AND METHODS  Short tied-off segments of fresh human cadaver–sourced facial artery specimens, overfilled with a monophasic dermal filler (dermal filler “sausages”), were immersed in either HYAL or normal saline as controls. At 4 and 24 hours, the vessels were removed from the preparations, and one end of each vessel was cut open.

RESULTS  Only the HYAL-immersed specimens showed degradation of filler gel.

CONCLUSION  In conclusion, cross-linked HA is susceptible to hydrolysis by HYAL when contained within the intact facial artery in a cadaver model, indicating that direct intra-arterial injection of HYAL is likely not necessary to help restore the circulation of ischemic tissues. This bench study provides support for the current recommended treatment of accidental intra-arterial injection with HYAL injection diffusely into ischemic tissues.

The product used in this study was supplied by Allergan Inc. C. DeLorenzi is a paid medical consultant for Allergan Inc., and Merz Pharmaceuticals GmbH, Canada.
Treatment of Hyaluronic Acid Filler–Induced Impending Necrosis With Hyaluronidase: Consensus Recommendations

Joel L. Cohen, MD; Brian S. Biesman, MD; Steven H. Dayan, MD; Claudio DeLorenzi, MD, FRCS; Val S. Lambros, MD; Mark S. Nestor, MD, PhD, PA; Neil Sadick, MD; and Jonathan Sykes, MD

Abstract
Injection-induced necrosis is a rare but dreaded consequence of soft tissue augmentation with filler agents. It usually occurs as a result of injection of filler directly into an artery, but can also result from compression or injury. We provide recommendations on the use of hyaluronidase when vascular compromise is suspected. Consensus recommendations were developed by thorough discussion and debate amongst the authors at a roundtable meeting on Wednesday June 18, 2014 in Las Vegas, NV as well as significant ongoing written and verbal communications amongst the authors in the months prior to journal submission. All authors are experienced tertiary care providers. A prompt diagnosis and immediate treatment with high doses of hyaluronidase (at least 200 U) are critically important. It is not felt necessary to do a skin test in cases of impending necrosis. Some experts recommend dilution with saline to increase dispersion or lidocaine to aid vasodilation. Additional hyaluronidase should be injected if improvement is not seen within 60 minutes. A warm compress also aids vasodilation, and massage has been shown to help. Some experts advocate the use of nitroglycerin paste, although this area is controversial. Introducing an oral aspirin regimen should help prevent further clot
### Table 1. Management of Impending Necrosis: Treatment Protocol and Expert Recommendations

| Upon first recognition of vascular compromise | (1) Use a significant amount of a hyaluronidase enzyme in the area of necrosis (i.e., Vitrase at minimum 200 U).  
(2) Apply a warm compress and massage vigorously.  
(3) Massage topical nitroglycerin (NTG) paste into the area.  
(4) Introduce an oral aspirin regimen. |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Daily follow-up                             | (1) Look for signs of improvement or any further signs of occlusion or necrosis.  
(2) With improvement, stop the NTG paste.  
(3) Without improvement, repeat hyaluronidase, NTG paste, and aspirin regimen. |
Today, 2% nitroglycerin paste (NitroBid, Fougera, Melville, NY) is used increasingly for management of vascular compromise after filler injection. Schonberger and colleagues used laser Doppler flowmetry (LDF) to assess the true nature of the local vasodilatory effects of nitroglycerin on the downstream low-caliber, “resistance” arterioles (Figure 2). Mean blood flow readings of forehead perfusion were 365% higher at sites of transdermal nitroglycerin patch application than with placebo ($p = .005$) (Figure 3).$^{12,13}$ This ability of topical nitroglycerin to induce a local vasodilatory response in small- or medium-caliber dermal vessels supports its use by physicians in the setting of filler-induced ischemia.

Figure 3. Boxplots of percentage change in blood flow at sites of nitroglycerin and placebo patches. Reprinted with permission from ref. 13.
Hyaluronidase Caveats in Treating Filler Complications

Marina Landau, MD

BACKGROUND  Most of the complications associated with hyaluronic acid (HA) fillers can be addressed by hyaluronidase. Extensive experience with this enzyme was accumulated in ophthalmology and anesthesia. In dermatologic use multiple aspects still remain controversial.

OBJECTIVE  To elucidate questions with regard to hyaluronidase use in HA-induced complications, including appropriate dosage, timing, and technique of delivery, differences in the activity of hyaluronidases of different origins, interaction between the enzymes and different HA gels, and safety issues.

MATERIALS AND METHODS  Extensive review of the relevant literature was conducted. The conclusions are based on this review and personal author’s experience.

RESULTS  FDA-approved hyaluronidases provide predictable results and can be used interchangeably. A physician has to be closely familiar with specific characteristics of other hyaluronidases. Different brands of HA fillers have different sensitivity to degradation by hyaluronidase. For filler overcorrection or misplacement, low dose of the enzyme has to be injected directly into the palpable HA mass. In case of vascular accident, flushing of the ischemic area with high doses of hyaluronidase is required. Hypersensitivity reactions to hyaluronidase are so far not reported in dermatologic literature.

CONCLUSION  With increased popularity of HA fillers, hyaluronidase had become an indispensable tool in dermatology office. It is safe and reliable for treatment of HA-induced complications.

The author has indicated no significant interest with commercial supporters.
Retro or PeriBulbar Injection Techniques to Reverse Visual Loss After Filler Injections

Jean Carruthers, MD,* Steven Fagien, MD,† and Peter Dolman, MD*

Figure 1. Complex vascular anatomy of the orbit and facial vessels.

Figure 3. (A, B) Lateral view of the right orbit showing gentle change in angulation of the 25-G needle as it passes the posterior aspect of the globe and enters the retrobulbar space.