

Rejuvenation of the Upper Face and Periorcular Region: Combining Neuromodulator, Facial Filler, Laser, Light, and Energy-Based Therapies for Optimal Results

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BACKGROUND The upper face and periorcular region is a complex and dynamic part of the face. Successful rejuvenation requires a combination of minimally invasive modalities to fill dents and hollows, resurface rhytides, improve pigmentation, and smooth the mimetic muscles of the face without masking facial expression.

METHODS Using review of the literature and clinical experience, the authors discuss our strategy for combining botulinum toxin, facial filler, ablative laser, intense pulsed light, microfocused ultrasound, and micro-needle fractional radiofrequency to treat aesthetic problems of the upper face including brow ptosis, temple volume loss, A-frame deformity of the superior sulcus, and superficial and deep rhytides.

RESULTS With attention to safety recommendations, injectable, light, laser, and energy-based treatments can be safely combined in experienced hands to provide enhanced outcomes in the rejuvenation of the upper face.

CONCLUSION Providing multiple treatments in 1 session improves patient satisfaction by producing greater improvements in a shorter amount of time and with less overall downtime than would be necessary with multiple office visits.

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The upper face and periorcular region is a complex and dynamic part of the face. This area is particularly important in conveying facial expression and emotion, and the delicate periorcular tissues and forehead show some of the earliest signs of aging. Successful rejuvenation requires a combination of minimally invasive modalities to fill dents and hollows, resurface rhytides, improve pigmentation, and smooth the mimetic muscles of the face without masking facial expression. The authors will discuss how a single treatment session combining botulinum toxin (BoNT-A), facial filler, laser, intense pulsed light (IPL), and energy-based therapies such as microfocused ultrasound (MFUS) and microneedle fractional radiofrequency (MFR) can treat specific aesthetic problems and provide

optimal outcomes in the rejuvenation of the upper face.

There are few studies discussing treatment order when combining treatments for rejuvenation of the upper face and periorcular area. In this study, the authors will extrapolate from available research and discuss the rationale for the approach to combination therapy. It is important to state that this order is not based on a large body of evidence, and the approach will change based on the devices used and other individual factors.

General Approach

As a general approach, the authors commonly treat with IPL, vascular, or pigment lasers first, followed by

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skin-tightening devices, then ablative lasers, and then injectables for a number of reasons. The authors often perform the IPL, vascular, or pigment laser first because they provide good results at a modest investment of time and money and help the practitioner gain the confidence of the entry-level patient. In addition, the laser and energy devices are often performed before the injectables to avoid any blood contamination of the devices. It is also important to perform IPL and vascular lasers before treatments that may lead to erythema (i.e., energy-based devices and injections) because the erythema may result in greater energy absorption by the IPL/vascular laser increasing the risk of adverse outcomes from overtreatment such as hyperpigmentation, hypopigmentation, or scarring.

The decision to administer facial filler before or after laser-based, light-based, and energy-based therapies depends on the type of filler being used, the depth of the filler placement, the type of device being used, and the depth of the device treatment. Clinical studies have shown hyaluronic acid (HA) filler in the nasolabial folds to be unaffected by nonablative laser, monopolar radiofrequency, and IPL treatment.¹ A porcine model revealed that HA-based fillers are unaffected by nonablative and superficial ablative treatments, but more aggressive deeper laser treatments can produce some filler–laser interactions.² In addition, hyaluronidase is often added to injectable anesthetics for ablative resurfacing as a spreading agent, which can result in the unintentional dissolving of HA-based facial fillers. With these considerations in mind, it is possible to administer facial filler before nonablative laser, light, and MFUS treatments. However, from a practical standpoint, the authors often find it worthwhile to administer facial filler at a follow-up visit after swelling has resolved to allow for detailed injectable placement and avoid laser–filler interaction from deep ablative laser treatments. Finally, there may be substantial reduction in rhytides after treatment, which may change the quantity and location of filler placement.

The authors recommend administering BoNT-A to glabella in a separate session or as the last step when performing combined treatment with light or energy-based therapies because of concern that tissue

manipulation from the devices could cause BoNT-A to migrate down the supraorbital or supratrochlear nerve sheath and into the orbital tissues to cause ptosis or diplopia.³ In addition, when injections are performed as the last step, any anesthesia that is used early on for the devices will minimize the pain from the injections. The practice pattern of administering BoNT-A 1 week before CO₂ laser resurfacing or 1 month after resurfacing is supported by the literature demonstrating enhanced and more prolonged improvement of rhytides in patients who received BoNT-A up to 3 months after their resurfacing treatment.⁴ The main consideration to administering 1 month after resurfacing is that some patients choose to enjoy their BoNT-A during a time when they are more able to appreciate the product instead of during the healing phase after ablative laser resurfacing (Table 1).

Brow Ptosis

Nonsurgical treatment of mild to moderate brow ptosis can be achieved with a combination of MFUS MFR, BoNT-A, and HA facial filler. Microfocused ultrasound, which has been shown to raise the brows by 1.7 mm,^{5,6} is performed first followed by fractional ablative CO₂ laser if desired for the treatment of dyschromia and fine lines, a treatment combination that has a strong record of safety and efficacy in the face and cheeks.⁷ Traditional ablative laser can also be applied to focal areas of hyperpigmentation on the forehead. It is important to remember that there is no safe shield for MFUS around the eye, and this treatment should not be performed inside the orbital rim.

Botulinum toxin applied to the glabella relaxes corrugator and procerus depressor muscles for a more immediate brow lift but does require retreatment every 3 months with the possibility of a longer retreatment interval as the glabellar muscles atrophy with repeated injections. Botulinum toxin treatment to the lateral aspect of the orbital orbicularis oculi muscle can be used to lift the tail of the brow. The brow lift provided by BoNT-A may also provide a small improvement in the appearance of upper eyelid dermatochalasis. Finally, careful administration of HA facial filler to the retro-orbicularis oculi fat pad can be performed to provide a more youthful contour to brow. Filler

TABLE 1. Suggested Treatment Combinations by Problem Area

<i>Problem</i>	<i>Same Day, Option 1 (Less Involved Treatment)</i>	<i>Same Day, Option 2 (More Involved Treatment)</i>	<i>Multivisit, Treatment (Most Involved, Most Result)</i>
Brow ptosis (mild)	BoNT-A glabella ± HA filler to brow	MFUS Fx ablative ± focal Trad ablative CO ₂ laser	Visit 1 MFUS Fx ablative ± focal Trad ablative CO ₂ laser Visit 2 (after re-epithelialized from ablative laser*) BoNT-A HA filler to brow
Upper eyelid dermatochalasis, mild	BoNT to glabella and crows feet Periocular ablative laser resurfacing	MFUS (to lift brow) Forehead (to lift brow) and periocular Fx ablative ± focal Trad ablative CO ₂ laser	Visit 1 MFUS (to lift brow) Forehead (to lift brow) and periocular Fx ablative ± focal Trad ablative CO ₂ laser Visit 2 (after re-epithelialized from ablative laser*) BoNT-A to glabella and crows feet
Temple volume loss	High G' filler or Poly-L-lactic acid to temporal hollows	Not applicable	Not applicable
Superior sulcus deformity (A-frame hollows)	Low G' HA filler	Nasal fat pad transfer during blepharoplasty	Visit 1 Nasal fat pad transfer during blepharoplasty Visit 2 (1-mo postoperative visit) HA filler if needed
Forehead and alabellar rhytides	BoNT-A Intradermal HA facial filler	IPL BoNT-A Intradermal HA facial filler	Visit 1 IPL Fx ablative ± focal Trad ablative erbium or CO ₂ laser Visit 2 (after re-epithelialized from ablative laser*) BoNT-A Intradermal HA facial filler
Periocular rhytides	IPL BoNT-A Intradermal HA facial filler	IPL Ablative erbium or CO ₂	Visit 1 IPL Fx ablative ± focal Trad ablative erbium or CO ₂ laser Visit 2 (after re-epithelialized from ablative laser*) BoNT-A Intradermal HA facial filler

*The authors may wait up to 1 month after fractional ablative or traditional ablative laser resurfacing to perform BoNT-A injections (to reduce the risk of ptosis and diplopia) and facial filler injections (to allow edema to resolve and provide the best possible technique). We prefer to perform filler injections after fractional ablative laser because there is some evidence that deep ablative treatments may interact with superficial filler.² Most patients prefer to receive all injections in a single visit after the resurfacing healing period is complete as this is a time when they can better enjoy the results of the injectable treatments.

Fx, fractional; Trad, traditional.

injections to this area should be performed cautiously, slowly, in small aliquots, and preferably with a cannula to avoid intravascular injection to the supraorbital artery, which could result in blindness or stroke from retrograde travel.⁸ Generally, the authors recommend that injections be performed 1 week after laser or MFUS.

Temple Volume Loss

Temporal volume loss creates a skeletonized shadowing. Presently, there are no facial fillers approved by the Food and Drug Administration for use in the temples, but long lasting HAs (such as Restylane Lyft [Galderma Laboratories, Fort Worth, TX] or Voluma [Allergan, Irvine, CA]), poly-L-lactic acid (Sculptra [Galderma Laboratories]), and calcium hydroxylapatite (Radiesse [Merz, Raleigh, NC]) are often used off-label to treat this area. There are a number of techniques described for filling this area; however, injecting filler in a supra-periosteal plane deep to the temporalis muscle is considered a relatively safe location to minimize vascular complications. Injectors must understand the facial anatomy as intravascular injection is possible, and blindness, while rare, has been reported and there is no guaranteed safe injection plane or technique.^{8,9} The technique includes pulling back on the plunger before injection to reduce the chance of intravascular injection and slow injection of small aliquots (<0.1 mL) of filler. Subcutaneous injections can also be performed with a cannula and a dilute HA filler or low G' filler to minimize the risk of surface irregularities.

A-Frame Deformity of the Superior Sulcus

A-frame deformity from superior sulcus hollowing is common with age or after upper eyelid blepharoplasty with excessive fat resection. Facial filler can be used to treat this anatomically and aesthetically delicate area, but great caution is advised because the supratrochlear and supraorbital arteries course through this area.⁸ Filler can be placed subcutaneously or below the orbital septum.¹⁰ Low G' HA-based fillers such as Belotero or Restylane Silk are recommended as they are less likely to produce an irregular contour under the thin eyelid skin, and undesirable cosmetic outcome can be reversed with hyaluronidase. Use of permanent fillers is not advised as undesirable aesthetic outcome

would require surgical intervention in a very delicate area. Injectors must be mindful that the weight of the filler can cause mild ptosis and that filler placement is more challenging in patients with scar tissue from previous eyelid surgery. In addition, injection posterior to the orbital septum can result in orbital hemorrhage and blindness; thus, injectors should be comfortable with emergent lateral canthotomy and cantholysis and be ready to refer to an ophthalmologist.

Forehead Rhytides

While an off-label use, BoNT-A provides excellent improvement in forehead rhytides. Intradermal HA filler can be used to smooth the remaining rhytides. Ideally, this would be performed after the neuro-modulator takes effect, but owing to convenience, it is often done concurrently. However, many patients with forehead rhytides demonstrate frontalis contraction "at rest" to keep the brows elevated. These patients may experience undesirable brow ptosis and the appearance of increased upper eyelid dermatochalasis if the entire forehead is treated with BoNT-A. In these patients, the authors recommend BoNT-A treatment of the glabella and superior frontalis only to prevent dropping the brow. Intradermal HA facial filler can be administered same day or after the onset of action of the BoNT-A to smooth the residual rhytides. Newer trends of rejuvenation involve placement of dilute filler along the entire atrophic forehead through a cannula in the preperiosteal plane, which can then be massaged across the entire forehead.¹⁰ Patients who have nondynamic superficial rhytides may also benefit from fractional ablative laser resurfacing with the efficacy and longevity of the resurfacing treatment augmented by BoNT-A.⁴ In this case, the fractional ablative laser is performed first followed by BoNT-A and facial filler approximately 1 month later when the most significant edema has resolved. The authors' filler technique for these nondynamic superficial forehead rhytides includes the use of a 30-gauge needle, HA filler, and injection of the superficial dermal plane using very small aliquots. The supratrochlear and supraorbital arteries are typically located in the subcutaneous plane in the forehead region. As such, injection within the dermis or in the preperiosteal

plane is considered safest in this area to avoid vascular complications including blindness.⁸

Glabellar Rhytides

Botulinum toxin is a very effective treatment of glabellar rhytides but requires retreatment every 3 months. A botulinum treatment, RT002, is in development by Revance Therapeutics and has demonstrated reduction of glabellar rhytides for up to 6 months.¹¹ The authors also advocate for combined therapy with BoNT-A and HA facial filler for treatment of glabellar rhytides. Carruthers and Carruthers found that combining BoNT-A and HA resulted in greater improvement in glabellar rhytides at rest and maximum frown, with a median time to return to preinjection furrow status of 32 weeks in the combined group versus 18 weeks for those receiving filler alone.¹² When approaching treatment in this area with filler, it is critical to be aware of the location and depth of the supratrochlear, supraorbital, dorsal nasal, and angular arteries as necrosis or blindness may occur.^{8,13} To treat this area, the authors use a technique similar to that described for superficial forehead rhytides; a 30-gauge needle is used to inject small aliquots of HA filler to fill the rhytid at the intradermal level. The authors do not proceed deeper than the dermis, and the authors specifically use HA fillers as hyaluronidase can be used to dissolve the filler in the cases of vascular compromise, which may, but is not guaranteed, to prevent permanent complications such as local necrosis or blindness from retrograde travel.^{8,13}

Periocular Rhytides (Crows Feet)

Therapy for periocular rhytides ranges from BoNT-A injections alone, to a combination of IPL followed by ablative CO₂ laser and delayed BoNT-A. Skillful injection of BoNT-A smoothes the deep rhytides created by the mimetic muscles of the face and reduces a “squinty-eyed” appearance. A new topical formulation of botulinum in Phase 3 development by Revance Therapeutics has been shown to reduce crows feet lines and may appealing to patients who prefer to avoid injections.¹⁴ Use of BoNT-A with IPL has been shown to augment the improvement in crows feet rhytides, lentiginos, telangiectasia, pore size, and skin texture compared with IPL alone.¹⁵ Botulinum toxin has also

been shown to provide enhanced and more prolonged improvement of rhytides in patients treated with CO₂ laser.⁴ When treating crows feet, injections inside the orbital rim should be avoided in patients with steatoblepharon as this can cause worsening of lower eyelid fat prolapse. When using ablative lasers in the periocular area, the use of a metal shield to protect the eyes is mandatory. Although CO₂ laser provides more dramatic results than nonablative technologies, ablative laser does carry the rare but real risks of scarring, ectropion, and infection, with complications occurring more often in inexperienced hands.

Conclusion

Clinicians increasingly are using combined interventions that target multiple aspects of the aging process. Basic strategies include sun protection and use of skin care products such as antioxidants and retinoids. Lasers and light-based therapies, injectables such as fillers and BoNT-A, and skin-tightening devices can all work synergistically to enhance in-office treatment. In addition, providing multiple treatments in 1 session improves patient satisfaction by producing greater improvements in a shorter amount of time and with less overall downtime than would be necessary with multiple office visits.

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