

Shaping of the Eyebrows with Botulinum Toxin Type A (BoNT-A)

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By rebalancing the forehead and periocular muscles, botulinum exotoxin type A (BoNT-A) injections can improve the shape and position of the eyebrows. In the United States, three individual preparations of BoNT-A are approved for cosmetic use, including onabotulinumtoxin A (Botulinum Toxin Cosmetic; Allergan, Inc.), abobotulinumtoxin A (Dysport; Medicis Cosmetic, Valeant Pharmaceuticals), and incobotulinumtoxin A (Xeomin; Merz Pharmaceuticals). All three BoNT-A preparations are FDA approved for the temporary reduction of moderate to severe glabellar rhytids. Combining this indication with additional “off-label” uses allows for eyebrow shape and position sculpting (Fig. 129.1). It is even possible to induce a modest “chemical brow lift” and help correct intrinsic or iatrogenic asymmetry of the eyebrows. Reports by Carruthers and Carruthers (2005) as well as (Frankel and Kamer 1998) have shown that the majority of patients experience a modest elevation of the brow.

A thorough understanding of the functional anatomy of the upper face is essential to obtain optimal cosmetic outcomes and to avoid undesirable side effects. The muscles involved in modifying the eyebrows may be functionally divided into the elevator (the frontalis), the medial depressors (the medial portion of the orbicularis oculi, the corrugator supercilii, and the procerus), and the lateral depressors (the lateral portion of the orbicularis oculi).

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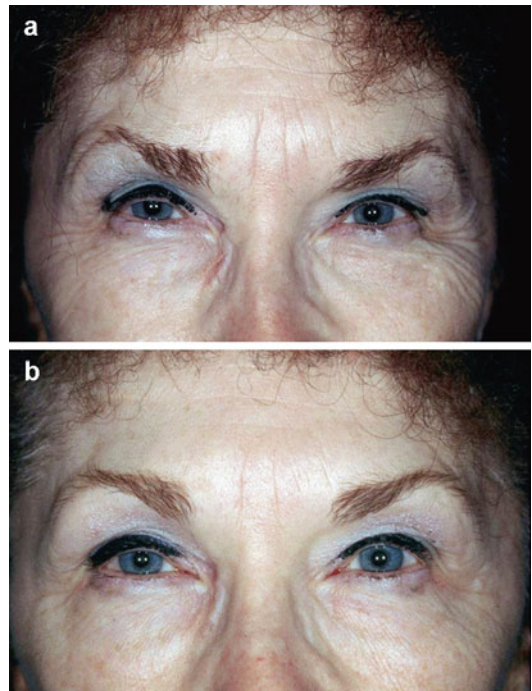


Fig. 129.1 (a) Prebrow and (b) postbrow shaping with botulinum toxin

Modifying the Position of the Medial Eyebrows

Treatment of the medial depressors can result in cosmetic improvement of the glabella by elevating the medial aspect of the eyebrow and diminishing dynamic and static “scowl lines” created by contraction of the corrugator supercilii and the procerus. Many patients contract or maintain resting tone in these muscles, causing the medial eyebrows to move inferomedially. This creates vertical rhytids in the glabella, resulting in a tired or angry expression. Chemical neuromodulation of these muscles results in a decrease in their resting tone, maintenance of the medial eyebrows in a more superolateral position, and an “opening of the glabella” that is cosmetically desirable.

Modifying the Position of the Lateral Eyebrows

The isolated treatment of the medial depressors consistently results in elevation of the lateral eyebrows as well (Carruthers and Carruthers 2007). This may be the result of diffusion of BoNT-A from the medial depressors into the inferomedial portion of the frontalis. Additionally, partial paralysis of the medial frontalis triggers a compensatory increase in the resting tone of the untreated lateral frontalis, resulting in an elevation of the lateral and central eyebrow. This effect was quantitatively measured by elevation of brow height following BoNT-A treatment of the medial depressors with resulting lateral followed by central and medial brow elevation, peaking at 12 weeks post-treatment (Tiryaki and Ciloglu 2007). This effect may be exaggerated in cases where only the medial frontalis is injected with BoNT-A, resulting in marked ptosis of the medial portions of the eyebrows and superolateral movement of the lateral portions. A characteristic and usually undesirable appearance described as a “Jack Nicholson,” “Spock,” or “quizzical” effect may result. This side effect is treated or prevented by

injecting a small amount of BoNT-A into the lateral frontalis muscle. Caution should be taken not to inject too inferior in this area or a ptotic lateral eyebrow may ensue. Small injections laterally near the temporal fusion lines above the midway point of the eyebrow and hairline will release the compensatory increase in tone of the frontalis muscle and lower the corresponding lateral eyebrow.

Arching and Lifting the Eyebrows

If the inferomedial and lateral aspects of the frontalis are treated as described above, the compensatory increase in tone of the untreated frontalis overlying the midpupillary area can result in an aesthetically desirable arching of the central portion of the eyebrow. This lifting of the brow can be further supplemented by treating the lateral depressors of the eyebrows, the lateral portions of the orbicularis oculi. In properly selected patients, 1–3 mm of elevation of the eyebrows can be obtained with this technique. Cosmetically unacceptable lifting or arching can be corrected by injecting small amounts of BoNT-A into the portion of the frontalis that has increased in tone. It is important to keep these correcting doses small and located relatively superior to avoid overcorrection and brow ptosis. This chemical brow lift is eliminated if the bulk of the frontalis is treated for dynamic forehead rhytids.

Lowering and Flattening the Eyebrows

An eyebrow that is too high or too arched may be lowered by focally weakening the frontalis that lies superior to it. To avoid overcorrection and ptosis, it is prudent to start with small doses relatively superior (>3 cm above the orbital rim). Reassessment after 10–14 days, with supplemental injections as needed, will minimize the risk of brow ptosis.

Treating Eyebrow Asymmetry

The experienced clinician can use the above principles to improve intrinsic or iatrogenic brow asymmetry in a variety of situations. The objective of treating brow asymmetry is to selectively target and reduce relevant depressor activity while harvesting the effects of BoNT-A on increasing resting tone of specific areas of the frontalis, as described earlier. The patient should be warned that while asymmetric treatment may result in improvement of eyebrow symmetry at rest, dynamic rhytids and functional expression with the eyebrows may be uneven.

Pitfalls

As with any cutaneous injection, pain and small areas of bruising are usually minimal but sometimes unavoidable. Injecting superficially into thin periorbital skin, using high-gauge needles, avoiding obvious underlying blood vessels, and applying pressure for several minutes after injection will minimize these complications.

An unanticipated increase in the resting tone of untreated frontalis is relatively easily treated, as discussed. Overtreatment of the frontalis with resulting brow ptosis is much less acceptable and may persist for weeks to months. Particular caution should be used when treating large portions of the frontalis for reduction of horizontal forehead rhytids at the same time as the glabellar or periocular regions. Using small doses in relatively superior locations in the frontalis or

treating the forehead 10–14 days after treating the glabella may avoid this complication.

Inadvertent introduction of BoNT-A into the primary upper lid elevator, the levator palpebrae superioris will result in eyelid ptosis. Ptosis of the brow or eyelid is cosmetically unacceptable and may partially obstruct the visual field. Fortunately, this is extremely rare. Injections should be placed at least 1 cm above the bony rim of the orbit to reduce the likelihood of this complication. Activation of the secondary upper eyelid elevator Muller's muscle, a sympathetically innervated smooth muscle, can be obtained via apraclonidine 0.5 or 1.0 % drops or phenylephrine HCl 2.5 % ophthalmic drops, used three times daily. This will partially correct the eyelid ptosis until the effect of the BoNT has resolved, usually in 2–4 weeks.

Conclusion

With proper technique and understanding of the underlying anatomy, intramuscular botulinum toxin is a safe and effective way to temporarily modify the shape and position of the eyebrows.

References

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