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A Technique for Filling the Temples With Highly Diluted Hyaluronic Acid: The “Dilution Solution”

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Abstract

Background: Hollow temples are a common sign of aging, contributing to the upper face appearing “pinched” and the brows appearing short and ptotic. Many treatments have been described for this area, including fat injections and implants. However, traditional injection techniques have not proven entirely satisfactory in correcting the problem without resulting irregularities.

Objectives: The author describes a technical refinement wherein diluted hyaluronic acid (HA) fillers are injected into the temple.

Methods: Thus far, a series of 40 patients has been treated over 18 months with the author’s technique, which involves diluting the HA filler by a ratio of approximately two to one (diluent to filler) and injecting the temple as evenly as possible. As the saline component absorbs, the filling material is distributed more evenly in the temple than with undiluted filler.

Results: Patients experienced improved results, with a smoother appearance to the brow. There were no instances of complications requiring dissolution of the product with hyaluronidase. Irregularities proved minor and easily correctable; no intravascular complications were noted in this series of patients. Clinical photographs demonstrate improvement in the “pinched” upper face and an apparent elongation of the brows. The author estimates, based on prior experience, that duration of effect will be approximately two to three years.

Conclusions: Dilution of the HA fillers administered for brow treatment results in a more even distribution of the product and a lower morbidity than previously described techniques, making temple treatment far easier than in the past.

Keywords

Hyaluronic acid, temple, fill, correction, volume replacement

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This technique, in both dilution of the product and site of injection, represents an off-label use of hyaluronic acid products.

Many of the changes of aging can be understood by observing changes in facial weight. Some faces gain weight, albeit unevenly from top to bottom. Other faces thin as they age. In the latter, the architecture of age includes hollow cheeks, orbits, and temples. As the temples subside, the effect is a conspicuous narrowing of the upper part of the face, along with an apparent shortening and descending of the brow, as the tails fall into the temple area. Temple wasting, like the prejowl sulcus, can be an early sign of aging; some younger people who otherwise look reasonable for their age can exhibit this phenomenon.

These telltale signs of aging in the upper face and brow are by now familiar not only to plastic surgeons but also to the public. Many treatments for hollow temples have been suggested, from implants and fat injections to, more recently,

off-the-shelf fillers. Although each method has its advocates, treatment of temples remains difficult because the tissue in that area is thin and has a propensity toward showing irregularity after injection. As a solution, the author presents an alternative technique in which highly diluted hyaluronic acid (HA) is substituted for the traditional mixture and injected into the temple area to fill and level any hollowed areas. The physical properties of the highly-diluted injectate distribute the filler in a way that has not been possible with traditional injection practices; as a result, the outcome with this modified technique is more predictably smooth and, in skilled hands, has a low incidence of complications.

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Figure 1. (A, C) This 54-year-old woman presented with temple depressions, after having undergone a facelift and browlift with resultant subcutaneous scarring. (B, D) Nine months after treatment with 1 mL of diluted Restylane on the right and 2 mL on the left. This procedure was performed prior to further refinements in the author's technique and could have benefitted more from injection of 2 mL on both sides, with a more highly cross-linked filler. Note that the patient's filler result is smooth, even in thin and operated skin, and the vessels are not more prominent. With the perifascial injection technique described, the filler did not naturally spread to the lateral orbital rim, which demonstrates the importance of placing some filler into the subcutaneous space at the lateral orbit and tail of the brow (see the black arrow in part D).

METHODS

Technique

Pretreatment, the patient's temples were marked, one side of which was almost always deeper than the other. The apex of the temple hollow at the temporal fusion line was also marked on each side. It is worth noting that the temple hollows are oblong and are frequently deepest immediately lateral to the orbit and above the arch. The injection site was planned just inferior to this area; selecting this site automatically places more fill here without having to make a conscious accommodation. The length of the needle (usually a 1.5" 22-gauge) or cannula *must* reach from the injection site to the upper border of the defect. The temple deformity will not be fully corrected otherwise (Figure 1).

There are two main commercially-available HA filler lines in the United States at present. Restylane and Perlane (Medicis Corp., Scottsdale, Arizona) are more particulate, whereas the Juvéderm line of products (Allergan, Inc., Irvine, California) is more highly cross-linked. Restylane is easier for the beginner injector, but either product may be selected for injection according to

the technique described in this article. Juvéderm Ultra Plus has a slight advantage in smoothness of the final result, but is considerably more difficult to inject because of its high viscosity when hydrated.

Prior to treatment, the patient's temples were marked, including the apex of the temple hollow at the temporal fusion line on each side. The injection site was planned immediately inferior to this area; selecting this site automatically places more fill here without having to make a conscious accommodation. It is worth noting that one temple hollow is almost always deeper than the other. Also, the hollow is oblong and is frequently deepest immediately lateral to the orbit and above the arch. The length of the needle (usually a 1.5-inch, 22-gauge needle) or cannula *must* reach from the injection site to the upper border of the defect, or the temple deformity will not be fully corrected otherwise (Figure 1).

The injection site was blocked with a small amount of 1% lidocaine with epinephrine. The product was diluted with a Luer-Lok (BD Corp., Franklin Lakes, New Jersey) transfer hub, in a ratio of two to one (saline to filler). This dilution ratio was the minimum; more dilution equated with increased safety and smoothness in the result. One mL or less of an HA filler per side was not likely to produce a visual change in the

volume of the temples. The author found that 2 mL per side was the right amount in the majority of female cosmetic patients. Therefore, the most common dilution in this series of patients was 2 mL (or syringes) of HA, 1 mL 1% lidocaine with epinephrine, and 3 mL normal saline, for a total of 6 mL. When 1% plain lidocaine was included in the diluent, the incidence of lower lid bruising was higher.

The key to this technique, aside from the dilution ratio, was the depth of injection. After the needle was introduced into the chosen site of injection, it was guided into the deep subcutaneous portion of the temple. Ideally, the plane of injection was immediately adjacent to the superficial temporal fascia, deep to the visible vessels, which are easy to avoid. The author elected to inject while advancing the needle. The first pass was placed at the anterior extent of the hollow, up the lateral orbit and tail of the brow to the apex. Injecting slowly, flow was continued on withdrawal, and the pass was then repeated more posteriorly. The goal was to expand the temple hollow as evenly as possible with approximately three to four radial passes.

The most visually important part of the temple hollow is adjacent to the lateral orbit and the tail of the brow. Patients with broad temples and posteriorly placed hairlines generally have a deeper hollow than can be adequately filled with 2 mL, so most of the filler should be placed anteriorly. A small amount of additional fill was frequently needed for these patients in the tail of the brow and the lateral orbit in the subcutaneous plane (Figure 1C,D). Some patients do not understand the effect of filling the temple unless they see it. In terms of patient expectation, injection of a small amount of local anesthetic and saline can assist both the patient and physician in previewing the anticipated result.¹ Prior to beginning the treatment, nerve block is applied at the point of injection, significantly minimizing discomfort. With the needle in the correct perifascial plane, some patients felt a measure of pressure from the expansion but indicated no pain. If the needle wandered deep or superficial, more pain was reported. It is important to note that if the skin does not rise with the injection, the needle has probably reached the temporalis muscle and should be repositioned.

Since about 6 mL of volume is initially placed into the temple, the area can look alarmingly overfilled. The product can also jet into unintended areas away from the body of the injection, especially in patients who exhibit scarring from prior surgery, thereby adding to the impression of irregularity. Novice injectors may find themselves unduly concerned and begin to massage the area forcefully, but this temptation must be resisted. Forceful massage only results in bruising and discomfort rather than actually dispersing the product. In fact, this "overfill" is what makes the procedure so effective, in this author's experience. More saline leads to more even distribution of product, but since only so much volume can be placed into the temple, the dilution described is a reasonable compromise. The injector cannot apply the product in one spot and hope to later massage it into position. This will lead to a major lump at the site of injection since the HA apparently does not diffuse as far as the saline.

Following treatment of the first side, patients in this series were asked to place some pressure on their temple with the flat part of the hand while the injector prepared the dilution for the opposite side. Since saline is absorbed remarkably quickly, that short duration of pressure was usually enough to render normalcy to the first side, reassuring both patient and injector. Once enough experience is gained, treatment should take approximately one minute per side, and the patient should appear only slightly swollen when he or she leaves the office. In this way, no true downtime is experienced by the patient.

Patients were instructed to apply ice and pressure (again, with the flat part of their hand) on the temples for a few minutes several times during the first posttreatment evening. When bruising was observed, it occurred not in the temple, but in the lower eyelid. Most patients' temples continued to change subtly for approximately one week before stabilizing. Some patients complained of headache and localized tenderness for a few days, as often seen with HA fillers elsewhere in the face. In some patients, the superficial vessels also appeared more prominent for the first few days, but receded to normal projection soon after in nearly all cases.

This technique has been applied to 40 patients in the author's private clinic over approximately 18 months.

RESULTS

Patients have reported a high degree of satisfaction with the results of this technique. The author has also found the results to be satisfactory in terms of smoothness. No patients in this series required dissolution or reversal of the product. No patient has complained of irregularity, although the author noticed a few minor cases under direct tangential light and adjusted his technique to utilize more cross-linked fillers.

The most common side effect was bruising of the lower lid (again, not of the temple), seen in about 30% of patients before epinephrine was included in the dilution. Since the addition of epinephrine to the technique protocol, bruising has occurred only very rarely. The most common early issue was undercorrection, for which the author also adjusted his technique. Initially, the protocol included 0.5 mL of HA per side; the amount was then increased to 1 mL and subsequently increased again to 2 mL. On the basis of the results, the author now administers 2 mL per temple in most female patients.

No intravascular incidents have been noted with the sharp 1.5-inch, 22-gauge needle. Except for the sentinel vein, the needle remains deep to the major vessels in the area and the movement protects against intravascular injections. The viscosity of the cross-linked mixture is much greater than the viscosity of the undiluted product, perhaps making flow into a small vessel potentially less likely than with a more fluid injectate. Equal results have been demonstrated in the author's own experience with a blunt 18-gauge cannula.

Clinical results can be seen in Figures 1 to 7.

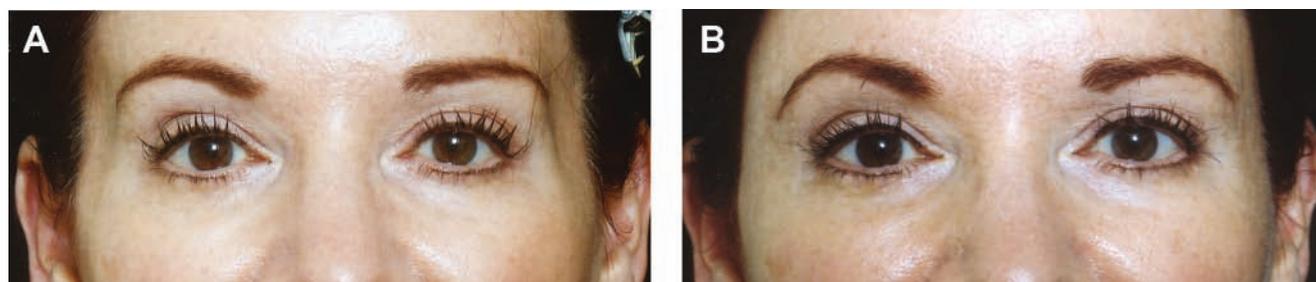


Figure 2. (A) This 58-year-old woman presented for treatment of temporal hollowing. (B) Ten months after injection of 2 mL of Juvéderm Ultra Plus per side. Note that the tail of the brow seems to elongate slightly as it rotates anteriorly in the posttreatment photograph. This patient also had 0.5 mL of Restylane injected into her brow 18 months prior to the posttreatment photo.



Figure 3. (A, B) This 53-year-old woman presented for treatment of temporal hollowing. She had a very thin, athletic frame and a thinning face. (C, D) Eight months after treatment with diluted Restylane, 2 mL per side.

DISCUSSION

The author has long noted the importance of the brow in treating volume changes to the face. Many other practitioners have noticed the effect of hollow temples and have tried to fill them with custom-carved implants² and injections of fat or off-the-shelf fillers. In the author's hands and in the hands of others,^{3,4} these efforts have not always been successful. Injected fat has proven satisfactory in some patients, but has been associated with difficult irregularities in others. As in other areas of the face, patients with thick skin experience the best results with fat injection; unfortunately, thick skin is not a typical quality in

older patients. Furthermore, traditional injection of HA products with small needles very commonly results in similar irregularities. Diluting fillers for ease of injection and for the addition of local anesthesia is not new; the author first heard it discussed in relation to diluting calcium-based fillers for the dorsum of the hand (R. Rohrich, personal communication, 2007).⁵ The technique is quite common now.

With the author's modified technique, the filler is evenly dispersed in a large amount of saline, amplifying the target area. As the saline absorbs, the filler concentrates and distributes more evenly than with traditional injection techniques. Not only is the temple hollow leveled, but the tail of the brow rotates anteriorly, giving the

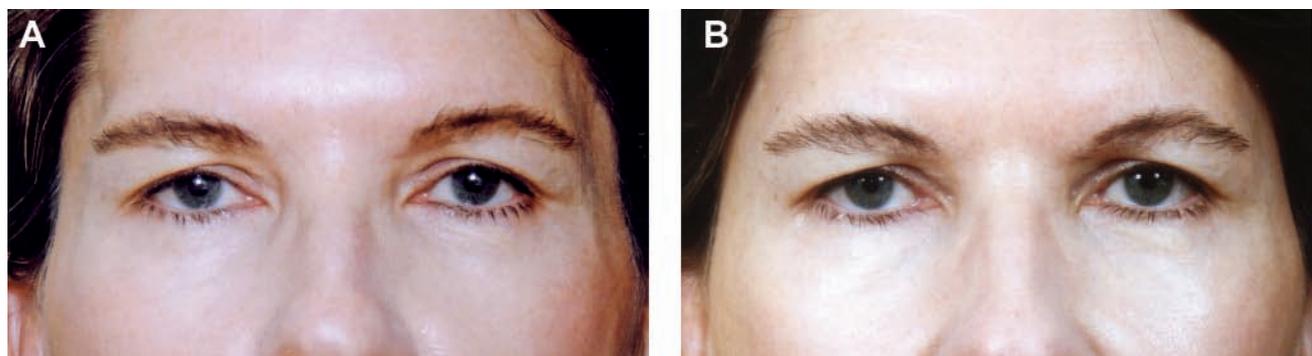


Figure 4. (A) This 58-year-old woman presented for treatment of temporal hollowing. She had undergone a subcutaneous lateral browlift one year before, for which the dissection was performed bluntly. This was perhaps the cause of the considerable fat atrophy in her temples. (B) One year after treatment with Restylane, 2 mL per side.



Figure 5. (A) This 60-year-old woman presented for treatment of temporal hollowing. (B) One year after the last treatment. This patient received 1 mL of Restylane into her brows, followed by an additional 1 mL placed one month later, with 4 mL dilution each time. Note how the tails of the patient's brows seem to straighten and rise slightly after the temple hollow is filled. This is not elevation, but the unrolling of a curved shape.

impression of rising and lengthening (Figures 2, 6, and 7). As young faces do not typically have temporal hollows, leveling the hollows alters the gestalt of the face in a very powerful way. The “pinched” upper face subsequently appears more vertical.

Care must be taken not to overfill; the goal is to level the temple hollows, not to make them convex. With that said, overcorrection is not likely with the amounts recommended here. Although not presented here, the technique is also very useful around the lateral orbit, as well as other difficult and thinner areas of the face.⁶

The effects of HA fillers around the lower lids and brows have been shown to persist up to two or three years.^{1,7} Previously, the author also experienced a significant amount of local bruising and evident lumps up to three years with traditional injection techniques. The duration of the effects of this technique, along with its superior outcomes, are expected to be similar in duration. Although the author has not utilized calcium-based fillers because they lack reversibility and the preferable persistence of results with HA products,

calcium-based fillers can in fact be diluted with this same technique.

As the results show, the outcomes with this technique have been very satisfactory, even in patients with significant temple and skin atrophy, in whom irregularities would easily be visible (such as the patient in Figure 2). In patients who have undergone previous facelifts or browlifts with temple dissection (such as the one in Figure 1), the injection has proven harder to control because of the scarring. Nonetheless, the final result is smoother than with alternative techniques. This approach allows filling of the temples as well as other parts of the face,⁸ to improve the appearance of thin, operated faces.

The main disadvantage of this technique is cost. Since almost all cosmetic patients require approximately 4 mL of product to make a visible difference, the financial burden can be substantial. In the author's own practice, the price of individual syringes is discounted for temple treatment. The procedure is so powerful, gratifying, and simple that the aesthetic rewards outweigh the relatively small difference in financial return.



Figure 6. (A) This 50-year-old woman presented for treatment of temporal hollowing. (B) One month after treatment with 2 mL of diluted Juvéderm Ultra Plus per side. Note that the tail of the brow is positioned laterally. This is the only patient in the series whose vessel seemed to become more prominent after injection; it was probably hidden in the hollow and emerged with the increased projection.

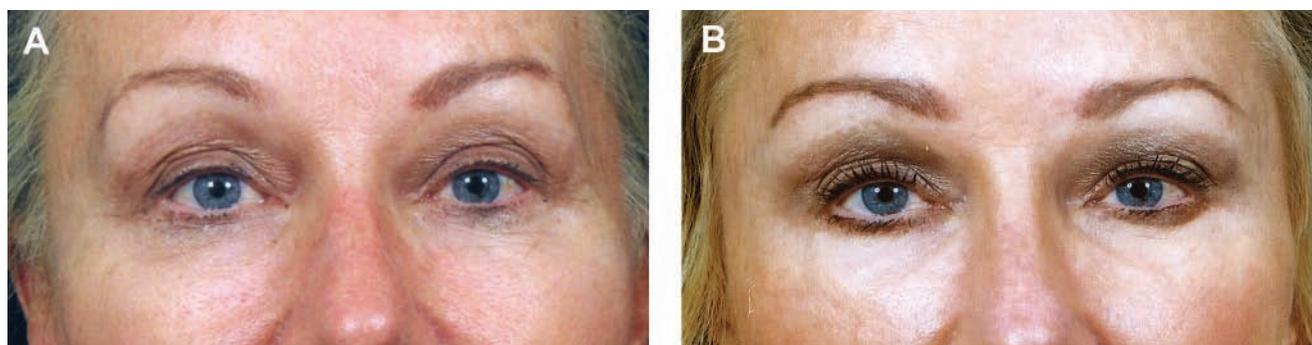


Figure 7. (A) This 63-year-old woman presented for treatment of temporal hollowing. (B) Eight months after treatment with 2 mL Juvéderm Ultra Plus per side.

CONCLUSIONS

This modified dilution and injection technique for filling the temple area with hyaluronic acid is a powerful tool for treating patients whose faces have hollowed as a result of aging. The procedure has a short learning curve and will likely prove accessible for less experienced injectors, although there are subtleties that must be taken into account. The procedure is reliable, forgiving, and reversible. Once the clinician learns to recognize temple defects and is aware of the remarkable changes that can be accomplished with accurate filling, patients with aging faces will benefit greatly.

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