

Treatment of Acne Scars With Hyaluronic Acid: An Improved Approach

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ABSTRACT

Background: Acne scarring is a prevalent and challenging cosmetic issue, which is often addressed by multiple modalities. A low-viscosity non-animal stabilized hyaluronic acid (NASHA) dermal filler, injected in microdoses into the mid-to-superficial dermis, may provide a useful new approach to improving the appearance of depressed acne scars.

Materials and Methods: Twelve consecutive patients with moderate to severe acne scarring, who had completed a series of fractional laser resurfacing, underwent microinjections of 20 mg/mL hyaluronic acid (HA) gel into discrete depressed acne scars on the face.

Results: Immediate visual improvement was observed in all lesions. The procedure was well tolerated. Adverse events were limited to transient pinpoint bleeding at the injection site.

Conclusion: Microinjection of low viscosity HA offers a valuable technique for the treatment of discrete depressed acne scars.

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INTRODUCTION

Hyaluronic acid (HA) is a glycosaminoglycan composed of alternating D-glucuronic acid and N-acetyl-D-glucosamine monosaccharide residue. These are cross-linked to form long unbranched chains, which form an anionic biopolymer. The 3-dimensional structure forms a space-occupying molecule, and the chemical makeup draws a large volume of water to the compound. Due to its combination of properties, endogenous HA contributes turgor and elasticity to the dermis.

Hyaluronic acid has become the leading dermal filler due its combination of low allergenicity, high biocompatibility as demonstrated in ocular and intra-articular uses, and longevity. It is suitable for injection into facial skin, where, in addition to providing immediate and short-term augmentation, it appears to induce longer-term effects by stimulating collagenesis by native fibroblasts.^{1,2} Improvements in its in vivo longevity by cross-linking have further boosted its popularity. To maximize its utility and range of applications, HA has been prepared in a variety of forms, which vary in viscosity and formulation. Hyaluronic acid's viscoelastic properties are a function of the length of the molecular chains of the polymer, cross-linking, concentration, and particle size.³ Medium viscosity HA is best for moderate lines and wrinkles, such as glabellar lines and nasolabial folds. It is injected into the mid-to-deep dermis. Finer HA formulations are available for correction of fine facial lines, such as perioral and periorbital rhytids, and are injected in the superficial dermis. Specialized formulations are designed to be

injected into the lip, while others indicated for restoring volume lost due to natural aging or HIV-related lipoatrophy are injected into the subcutaneous or supraosteal regions.

Restylane[®] Vital is a low-viscosity HA gel, available in 12 mg/mL or 20 mg/mL. It is injected with a metered dose injector that deposits 10 μ L per injection site (Figure 1).

Given the properties, superficial injection, and microdosing delivery technique, Restylane Vital is an excellent candidate product for the treatment of ice pick acne scars. Twelve patients, whose moderate to severe ice pick acne scars had responded well overall to fractional laser resurfacing but who exhibited residual deep focal ice pick scars, were treated with Restylane Vital. The improvement was immediate, as expected, and the treatment was well tolerated by all patients. Restylane Vital therefore appears to offer an improved treatment modality for the treatment of acne scarring.

MATERIALS AND METHODS

Twelve patients (7 men and 5 women) aged 19 to 54 years were treated. All had completed 2 to 5 (mean 3.2) treatments with fractional laser resurfacing for depressed facial acne scars using either erbium (Pixel 2940nm Er:YAG Module; Alma Lasers[™] Ltd, Israel) or CO₂ (UltraPulse[®] Fractional CO₂; Lumenis[®] Ltd, Israel). They exhibited good overall improvement, with no adverse events, but retained scattered deep ice pick scars. At 1 to 2 months after the final laser treatment, they were

FIGURE 1. Microinjector.**FIGURE 2.** Technique for injection into acne scars. The microdroplets are placed in the superficial dermis. Each click on the meter dose injector deposits 10 mL.

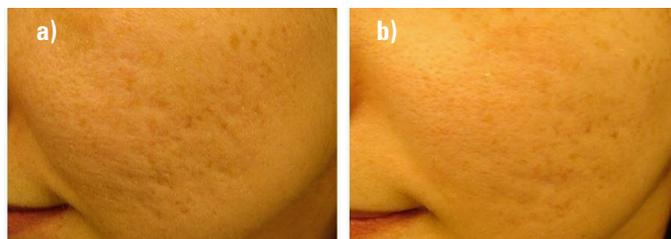
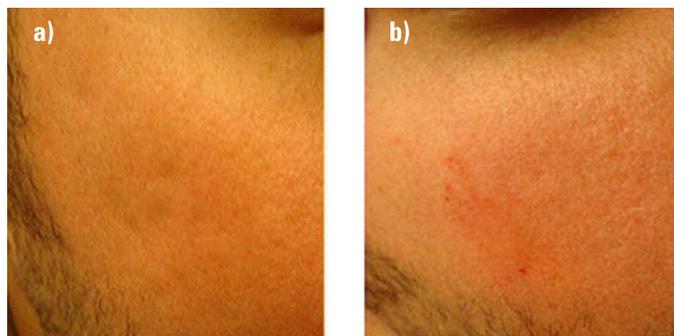
treated with 20 mg/mL Restylane Vital using the premeasured 10 microliter/dose injector supplied by the manufacturer. The filler was placed in the superficial dermis (Figure 2). Injections were repeated until the defect was visibly corrected.

RESULTS

All the patients with ice pick acne scars of the face underwent Restylane Vital microinjections at the conclusion of a series of fractional resurfacing treatments. All participants tolerated the procedure well, and all were extremely satisfied with the immediate improvement. Adverse events were limited to pinpoint bleeding at the injection site. Figures 3 and 4 show representative results before and immediately after injection.

DISCUSSION

Acne scarring is a substantial aesthetic problem as it is widely prevalent, affects the face prominently, is poorly masked by cosmetics, and begins at an early age. Despite the advent of aggressive and effective treatments for acne, the problem remains widespread even among young adults. The inflammatory component of acne causes follicular necrosis and periappendageal fibrosis. Since the pilosebaceous unit extends to the deep dermis and subcutaneous fat, the fibrosis frequently extends to the deep tissue, resulting in depressed scars.⁴ In fact, since the inflammation in inflammatory acne is predominantly beneath the epidermis, dermal scarring and pitting is frequently observed under epidermis that is visually intact after the acne has resolved.⁵ As the scars mature, they contract, drawing in the surface and forming the characteristic pitting of acne scars. Furthermore, age-related lipoatrophy results in concavities of the cheeks and

FIGURE 3. Facial acne scars **a)** before and **b)** after treatment.**FIGURE 4.** Facial acne scars **a)** before and **b)** after treatment.

temples, which reduces the stretch on the scars and exaggerates the appearance of acne scarring as the face matures.

The approach to treating acne scarring is dictated by the type of scar as well as the patient's skin and expectations. Superficial macular acne scars, which may be erythematous or hyperpigmented, typically improve over 3 to 18 months and do not require treatment.⁶ At the other end of the spectrum, hypopigmented acne scars are relatively common on the trunk and are very difficult to treat.⁷ The depressed scars of acne have been classified by Jacob et al into 3 basic categories:⁶

1. Ice pick scars: deep and narrow (<2 mm) sharply marginated tracts that extend to the deep dermis or subcutis. Their significant depth makes them inaccessible to conventional skin resurfacing options.
2. Rolling scars: usually wider (4-5 mm or more). Abnormal fibrous dermal tethering to the subcutis causes a rolling appearance. Since the anchor of the tethers is deep, corrective measures must reach the deep dermis and subcutis.
3. Boxcar scars: crisp, varicella-like superficial depressions.

This classification was designed to guide the approach to treatment. Ice pick scars have historically been treated by punch excision or punch grafts, as their small size allows for the use of a small punch biopsy.⁸ Rolling scars, whose deep tethering must be addressed, are well-addressed by subcision, to release the downward vectors.⁹⁻¹¹ Boxcar scars, which are more superficial, are well-treated with resurfacing techniques – chemical peels (trichloroacetic acid, glycolic acid, or, less commonly, phenol), dermabrasion, or laser

resurfacing.¹² Larger and deeper acne scars, of any class, may require a combination of surgical intervention (punch excision or punch elevation) and resurfacing.¹³⁻¹⁵ In more recent years, the approach to acne scars has been focused on non-invasive or minimally invasive approaches. Primary treatment is often provided by ablative or non-ablative laser resurfacing or fractional resurfacing, which have provided good results.¹⁶⁻²⁰ Radiofrequency has also demonstrated efficacy in a number of studies, presumably by causing a mild degree of dermal contraction and by stimulating fibroblasts activity.^{21,22}

An additional approach to treating discrete acne scars is the injection of dermal fillers. Prior reports have described the treatment of acne scars with injections, and showed good levels of efficacy and reasonable tolerability.²³⁻²⁷ A recently published study examined the treatment of acne scars with HA using a needle-less pneumatic device, which distributes a dilute solution of HA over 1 cm² per injection site.²⁸ While this approach has merits, particularly in the treatment of large surfaces and in its induction of collagen by focal controlled dermal injury, the treatment of discrete scars is very easily amenable to standard injection without devices, and the use of a more concentrated HA gel provides immediate results.

Most of the side effects of non-animal stabilized hyaluronic acid (NASHA) are transient and mild and include pain and intermittent swelling, edema, and erythema at the injection site. Pain is more prominent with higher viscosity and larger-bore needles, and as such Restylane Vital is a relatively less painful injection. The erythema is transient, and swelling can be reduced by application of ice for 5 to 10 minutes post-injection.

"Microinjection of low viscosity hyaluronic acid offers a valuable technique for the treatment of discrete depressed acne scars."

CONCLUSION

Given the high degree of tolerability, the proven safety record, the effectiveness in clinical improvement, and the known durability of NASHA, it is a highly preferred dermal filler for the correction of acne scars. When combined with the Restylane Vital formulation and the microdosage delivery technique, the approach is an excellent option for the treatment of discrete depressed acne scars. It is recommended that Restylane Vital injections be performed after a course of laser resurfacing procedures has been completed, both to avoid heating effects on the injected material (a topic that remains subject to debate) and to reduce the overall "burden" of acne scarring prior to initiating point-by-point injections.

DISCLOSURE

The authors have no conflicts of interest to report.

REFERENCES

1. Fisher GJ, Varani J, Voorhees JJ. Looking older: fibroblast collapse and therapeutic implications. *Arch Dermatol*. 2008;144(5):666-672.
2. Wang F, Garza LA, Kang S, et al. In vivo stimulation of de novo collagen production caused by cross-linked hyaluronic acid dermal filler injections in photodamaged human skin. *Arch Dermatol*. 2007;143(2):155-163.
3. Carruthers A, Carruthers J. Non-animal-based hyaluronic acid fillers: scientific and technical considerations. *Plast Reconstr Surg*. 2007;120(suppl 6):s33-s40.
4. Layton AM, Henderson CA, Cunliffe WJ. A clinical evaluation of acne scarring and its incidence. *Clin Exp Dermatol*. 1994;19(4):303-308.
5. Knutson DD. Ultrastructural observations in acne vulgaris: the normal sebaceous follicle and acne lesions. *J Invest Dermatol*. 1974;62(3):288-307.
6. Jacob CI, Dover JS, Kaminer MS. Acne scarring: a classification system and review of treatment options. *J Am Acad Dermatol*. 2001;45(1):109-117.
7. Wilson BB, Dent CH, Cooper PH. Papular acne scars. A common cutaneous finding. *Arch Dermatol*. 1990;126(6):797-800.
8. Solotoff SA. Treatment for pitted acne scarring—postauricular punch grafts followed by dermabrasion. *J Dermatol Surg Oncol*. 1986;12(10):1079-1084.
9. Aalami Harandi S, Balighi K, Lajevardi V, Akbari E. Subcision-suction method: a new successful combination therapy in treatment of atrophic acne scars and other depressed scars. *J Eur Acad Dermatol Venereol*. 2011;25(1):92-99.
10. Vaishnani JB. Subcision in rolling acne scars with 24G needle. *Indian J Dermatol Venereol Leprol*. 2008;74(6):677-679.
11. Alam M, Omura N, Kaminer MS. Subcision for acne scarring: technique and outcomes in 40 patients. *Dermatol Surg*. 2005;31(3):310-317.
12. Basta-Juzbašić A. Current therapeutic approach to acne scars. *Acta Dermatovenerol Croat*. 2010;18(3):171-175.
13. Khunger N; IADVL Task Force. Standard guidelines of care for acne surgery. *Indian J Dermatol Venereol Leprol*. 2008;(suppl 74):s28-s36.
14. Grevelink JM, White VR. Concurrent use of laser skin resurfacing and punch excision in the treatment of facial acne scarring. *Dermatol Surg*. 1998;24(5):527-530.
15. Dzubow LM. Scar revision by punch-graft transplants. *J Dermatol Surg Oncol*. 1985;11(12):1200-1202.
16. Hedelund L, Moreau KE, Beyer DM, Nymann P, Haedersdal M. Fractional nonablative 1,540-nm laser resurfacing of atrophic acne scars. A randomized controlled trial with blinded response evaluation. *Lasers Med Sci*. 2010;25(5):749-754.
17. Kim S, Cho KH. Clinical trial of dual treatment with an ablative fractional laser and a nonablative laser for the treatment of acne scars in Asian patients. *Dermatol Surg*. 2009;35(7):1089-1098.
18. Woo SH, Park JH, Kye YC. Resurfacing of different types of facial acne scar with short-pulsed, variable-pulsed, and dual-mode Er:YAG laser. *Dermatol Surg*. 2004;30(4 Pt 1):488-493.
19. Tanzi EL, Alster TS. Comparison of a 1450-nm diode laser and a 1320-nm Nd:YAG laser in the treatment of atrophic facial scars: a prospective clinical and histologic study. *Dermatol Surg*. 2004;30(2 Pt 1):152-157.
20. Alster TS, West TB. Resurfacing of atrophic facial acne scars with a high-energy, pulsed carbon dioxide laser. *Dermatol Surg*. 1996;22(2):151-154.
21. Halachmi S, Orenstein A, Meneghel T, Lapidoth M. A novel fractional microplasma radio-frequency technology for the treatment of facial scars and rhytids: a pilot study. *J Cosmet Laser Ther*. 2010;12(5):208-212.
22. Montesi G, Calvieri S, Balzani A, Gold MH. Bipolar radiofrequency in the treatment of dermatologic imperfections: clinicopathological and immunohistochemical aspects. *J Drugs Dermatol*. 2007;6(9):890-896.
23. Barnett JG, Barnett CR. Treatment of acne scars with liquid silicone injections: 30-year perspective. *Dermatol Surg*. 2005;31(11 Pt 2):1542-1549.
24. Cooper JS, Lee BT. Treatment of facial scarring: lasers, filler, and nonoperative techniques. *Facial Plast Surg*. 2009;25(5):311-315.
25. Epstein RE, Spencer JM. Correction of atrophic scars with artefill: an open-label pilot study. *J Drugs Dermatol*. 2010;9(9):1062-1064.
26. Goldberg DJ, Amin S, Hussain M. Acne scar correction using calcium hydroxylapatite in a carrier-based gel. *J Cosmet Laser Ther*. 2006;8(3):134-136.
27. Smith KC. Repair of acne scars with Dermicol-P35. *Aesthet Surg J*. 2009;29(suppl):s16-s18.
28. Lee JW, Kim BJ, Kim MN, Lee CK. Treatment of acne scars using subdermal minimal surgery technology. *Dermatol Surg*. 2010;36(8):1281-1287.

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