Microneedling in skin of color: A review of uses and efficacy

Brandon E. Cohen, BS, and Nada Elbuluk, MD, MSc
New York, New York

In ethnic skin, traditional skin resurfacing procedures such as dermabrasion, chemical peels, and laser therapy can be effective but can also be associated with prolonged recovery and risk of complications. These complications can include a higher risk of dyspigmentation and scarring, and unsatisfactory clinical outcomes. Microneedling is an evolving treatment technique for an expanding number of dermatologic conditions. Microneedling may offer a more advantageous safety profile, particularly in the skin-of-color population (Fitzpatrick skin types IV-VI), compared with more conventional resurfacing modalities. Thus far, it has been shown to be effective for a number of dermatologic conditions in this population, including scarring, melasma, melanosis, skin rejuvenation, acne vulgaris, and primary hyperhidrosis. This article aims to provide a comprehensive review of the literature regarding the efficacy and safety of microneedling in skin of color. (J Am Acad Dermatol http://dx.doi.org/10.1016/j.jaad.2015.09.024.)

Key words: acne vulgaris; hyperhidrosis; melasma; microneedling; scarring; skin of color: skin rejuvenation.

Microneedling is an evolving treatment modality for a growing number of dermatologic conditions.[1-4] Microneedling instruments (Fig 1) are devised of rows of fine needles, which are rolled over the skin to create rapidly healing punctures (Fig 2), resulting in a wound-healing response and subsequent collagen and elastin production.[1-3,5-7] This technique is also used to augment transdermal drug delivery through pores created through the stratum corneum.[3] The use of microneedling has further expanded with the advent of fractional radiofrequency microneedling (FRFM). In FRFM, insulated needles penetrate the skin and release radiofrequency currents from the needle tips producing therapeutic changes in dermal structural components and accessory glands without destruction of the epidermis.[8]

Procedures traditionally used for skin resurfacing include dermabrasion, chemical peels, and lasers. Although these modalities can be effective, they may be associated with prolonged recovery and adverse effects. These complications, which are at higher risk of occurring in patients with skin of color (Fitzpatrick skin types [FST] IV-VI), can include dyspigmentation, including postinflammatory hyperpigmentation (PIH) and hypopigmentation, infection, milia, and scarring.[2,9,10] These potential adverse effects can all lead to decreased use of resurfacing procedures when treating patients with skin of color.

Abbreviations used:

FRFM:	fractional radiofrequency microneedling
FST:	Fitzpatrick skin type
PIH:	postinflammatory hyperpigmentation

Microneedling therapy carries a decreased risk of many of the cutaneous adverse effects that can occur with conventional resurfacing modalities. Compared with ablative procedures, microneedling keeps the epidermis partially intact, and the retained skin barrier hastens recovery and limits the risks of infection and scarring. Although other modalities, such as nonablative and fractional lasers, also preserve much of the epidermis, patients with darker phototypes can continue to be at risk for dyspigmentation from potential thermal activation of

From the Ronald O. Perelman Department of Dermatology, New York University School of Medicine.
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Reprint requests: Nada Elbuluk, MD, MSc, Ronald O. Perelman Department of Dermatology, New York University School of Medicine, 240 E 38 St, New York, NY 10016. E-mail: Nada.Elbuluk@nyumc.org.
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melanocytes. Other lasers can also use wavelengths that are absorbed by melanin. In contrast, microneedling does not target specific chromophores in the skin or use thermal energy, and therefore has minimal effect on pigmentation.[2,9,11,12]

This review aims to provide a comprehensive overview of the current literature and evidence regarding the efficacy and safety of microneedling in the skin-of-color population. PubMed/MEDLINE databases were used to identify studies pertaining to the use of microneedling in the skin-of-color population. All studies and reports available in English since 1966 were included with priority given to prospective randomized trials. Search terms included "microneedling," "percutaneous collagen induction," "dermaroller," "skin of color," and "skin types IV-VI." The literature search yielded studies investigating the use of microneedling in patients with skin of color for several conditions, including acne vulgaris, atrophic acne scars, melasma, melanosis, skin rejuvenation, and primary hyperhidrosis (Table I).

CAPSULE SUMMARY

- Microneedling is an evolving treatment that has been studied in skin of color.
- Microneedling modalities have been used to treat scarring, melasma, skin rejuvenation, acne vulgaris, and primary hyperhidrosis in the skin-of-color population.
- Available evidence, although limited, suggests that in darker skin types, microneedling can be a useful therapeutic option.

ACNE SCARS

Acne scarring is a common consequence of acne vulgaris. Lasers and chemical peels are often used to improve the appearance of atrophic scars primarily through the induction of collagen and elastin.[22,23] However, these modalities can be associated with risks, such as dyspigmentation and scarring, especially for patients with darker skin types.[6,24] Microneedling can also treat acne scarring through stimulating dermal remodeling and production of dermal components with minimal risk of dyspigmentation in patients with skin of color.

Fabbrocini et al[6] investigated the use of microneedling for acne scars and directly compared the outcomes and safety profile among patients with FST I to II (n = 10), FST III to V (n = 45), and FST VI (n = 5). After 3 monthly treatments, there was a statistically significant improvement of acne scars in all groups. Notably, adverse effects were comparable between skin types. The most significant side effect was transient postprocedure erythema occurring most prominently in patients with FST I to II. There were no reports of dyspigmentation in any group at 1 year after final treatment.[6]

Hassan[14] conducted a trial comparing microneedling alone to microneedling with subcision in patients with atrophic acne scars. Subcision is a technique in which depressed lesions are undercut using a needle to release attachments to deeper structures.[25] In the study, Hassan[14] included 70 patients who reported to be Asian with "dark skin." After 3 treatments, "efficacy," defined by at least 25% improvement on subjective photographic assessment, was demonstrated in 77% of patients who received microneedling alone, compared with 100% of patients receiving microneedling and subcision. Adverse effects were limited to transient posttreatment erythema, edema, and scabbing.[14]

In another study, 60 patients (FST III-V) with acne scars were treated with 5 sessions of either microneedling alone (group 1, n = 30) or microneedling combined with 35% glycolic acid peels (group 2, n = 30).[10] At 3-month follow-up, mean improvement was 31% in group 1, compared with 62% in group 2. Adverse effects included transient bruising and edema immediately after treatment in both groups, milia occurred in 2 patients within each group, and 3 patients within group 1 experienced PIH.[10]

Garg and Baveja[7] treated 50 patients (FST III-V) with atrophic scars with microneedling and 15% trichloroacetic acid peels performed at alternative sessions, at 2-week intervals during a 6-week period. At the initiation of the study all patients underwent 1 session of subcision with a 24-gauge needle. Outcomes were assessed using the Goodman and Baron qualitative scale, which grades scars as macular (grade 1), mild (grade 2), moderate (grade 3), and severe (grade 4). All patients with grade-2 scars showed full resolution of scarring, whereas patients with grade-4 scars at baseline improved to grade 2 and 3 in 63% and 38% of patients, respectively. PIH occurred in 6% of patients, which resolved 5 months after topical treatment with tretinoin, hydroquinone, and mometasone.[7] The lack of a comparison group treated with either microneedling or trichloroacetic acid alone is a limitation to this study, which makes it difficult to assess which modality primarily contributed to the dyspigmentation reported.

In 1 retrospective study by Chandrashekar et al,[8] the use of microneedling with a fractional radiofrequency device was investigated in 31 patients