Microneedling Treatment of Striae Distensae in Light and Dark Skin With Long-Term Follow-Up

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BACKGROUND Striae distensae have notoriously been difficult to treat due to their extensive involvement of nonfacial skin. In recent years, microneedling has been proven useful in the treatment of a wide variety of dermatologic conditions. The lack of thermal injury during microneedling treatment renders it a viable treatment option in darker skin tones and nonfacial regions due to the reduced risk of postinflammatory hyperpigmentation.

OBJECTIVE To describe the clinical results and side effects of microneedling in a series of 25 individuals with striae distensae.

MATERIALS AND METHODS Twenty-five consecutive adults (SPT I–V) with striae distensae involving the trunk and extremities were treated using a microneedling device. Treatments were delivered by the same operator at monthly intervals using a motorized microneedling device with 1.5- to 3-mm needle depths. No additional treatments (topical or intralesional) were applied. Representative clinical photographs were obtained at baseline, prior to each treatment, and 1, 3, 6, and 12 months after treatment. Two assessors blinded to treatment protocol rated clinical improvement of striae on a 5-point scale (0 = no change, 1 = 1%–25% improvement, 2 = 26%–50% improvement, 3 = 51%–75% improvement, 4 = 76%–100% improvement). Side effects were monitored and tabulated.

RESULTS Patients received 1 to 3 consecutive monthly treatments. All striae improved at least 50% after an average of 1.8 treatments, and 28% of patients demonstrated more than 75% clinical improvement. No significant differences were observed in clinical responses of striae in patients with different skin phototypes. Striae in thicker skin regions (e.g., buttocks/thighs) showed comparable clinical improvement than those in thinner skin areas (e.g., breasts) and did not require additional treatment sessions. Side effects were limited to transient erythema in all skin phototypes. No infections or dyspigmentation were observed.

CONCLUSION The clinical results obtained in this study support the safe and effective treatment of striae distensae with microneedling in light and dark skin tones in various body locations. Standardization of treatment protocols are anticipated with further (ongoing) studies.

T.S. Alster developed the A Method products used in the post-treatment period. The remaining author has indicated no significant interest with commercial supporters.

Striae distensae, or stretch marks, are common dermal defects that are a source of psychosocial stress for patients who seek treatment.[1] Similar to scars, striae display histologic disorganization of collagen, elastin, and vascular structures, which present a therapeutic challenge. In addition, striae distensae have notoriously been difficult to treat due to their extensive involvement of nonfacial skin and their different clinical presentations: early (erythematous) striae rubra versus end-stage (white) striae alba.

A wide variety of treatments for striae distensae have been advocated, including topical therapies, laser irradiation, and other energy-based technologies.[2] No single approach has been identified to uniformly and consistently treat these lesions. Studies evaluating the

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ISSN: 1076-0512 • Dermatol Surg 2019;00:1–7 • DOI: 10.1097/DSS.0000000000002081

use of topicals, such as tretinoin, glycolic acid, ascorbic acid, and platelet-rich plasma (PRP), have shown positive histologic and clinical changes of striae, but they require several weeks of treatment and responses are highly dependent on patient compliance.[3,4] Both ablative and nonablative fractional lasers have also been used successfully to treat striae without significant clinical differences between the 2 approaches despite their disparate tissue effects and recovery profiles.[5,6] Not surprisingly, vascular-specific systems, such as pulsed dye laser and intense pulsed light, have demonstrated clinical improvement of striae rubra.[7,8] Although combination treatments with fractionated CO_2 and fractionated microneedle radiofrequency (RF) showed superiority to either fractionated CO_2 or microneedle RF alone in the treatment of striae distensae,[9] another comparative study with microneedling versus fractionated CO_2 laser revealed microneedling alone to be of greater benefit (90% of microneedling patients with clinical improvement vs 50% in CO_2 laser–treated group).[10]

The consensus of these studies is that striae rubra respond best to vascular-specific laser treatment, and these energy-based devices are more efficacious than topical therapy for striae distensae. In addition, although fractional ablative lasers yield impressive clinical results, their use is often limited by prolonged erythema and risk of skin dyspigmentation. Fractional nonablative lasers and RF are highly effective with reduced side effects but are costly and require multiple treatments.[11–14]

Given the relatively low cost of microneedling and its ability to be used over large treatment areas, its use for the treatment of striae has yielded much interest.[15,16] In addition, the lack of thermal injury during treatment makes microneedling a viable treatment in darker skin tones and nonfacial regions due to the reduced risk of postinflammatory hyperpigmentation. Because no prior studies have been conducted, to the author's knowledge, on microneedling striae distensae in individuals with a wide range of skin phototypes, the authors describe the clinical results and side effects of the procedure for this patient population.

Materials and Methods

Twenty-five consecutive adults (23 women and 2 men) with striae distensae involving the trunk and extremities who received microneedling treatment at a single center without concomitant therapies were included in the analysis. Patients ranged in age between 25 and 60 years (average, 41.8 years) and exhibited a wide range of skin phototypes (I–V) (Table 1). Patients were excluded from analysis if the striae were less than 6-month duration, previous treatments had been obtained within 6 months of initial microneedling application, or if follow-up after treatment was less than 12 months. No patients were treated if sun exposure to the treatment areas was evident at the time of presentation.

Prior to treatment, topical anesthetic cream (compounded 30% lidocaine cream in an aqueous cream base) was applied to the treatment areas without occlusion for 30 minutes. Extensive treatment areas (>400 cm^2) received 5% lidocaine cream in an aqueous

TABLE 1. Patient/Striae Demographics

	Gender		*Patient Age, Yrs (Mean)*		*Skin Phototype*				
Location	*Female*	*Male*	*Female*	*Male*	*I*	*II*	*III*	*IV*	*V*
Abdomen	10	0	25–59 (43)	0	1	7	0	0	2
Arms	2	0	30–56 (43)	0	0	2	0	0	0
Breasts	4	0	25–60 (42)	0	1	3	0	0	0
Buttocks	2	1	36–44 (40)	40	0	2	0	1	0
Flanks	1	0	29	0	0	1	0	0	0
Popliteal fossa	1	0	56	0	0	1	0	0	0
Thighs	3	1	30–44 (37)	40	0	3	1	0	0
TOTAL	23	2	25–60 (42)	40 (40)	2	19	1	1	2

cream base. The cream was removed with water-soaked gauze, and the skin was prepped with alcohol or hypochlorous acid (Lasercyn; Intraderm Pharmaceuticals, Petaluma, CA) immediately prior to treatment.

All striae were treated with a handheld motorized microneedling device (Collagen P.I.N.; Induction Therapies, Louisville, KY) by a single operator (T.S.A.). Sterile disposable needle cartridges (30 gauge/36-needle array) were used at needle depths of 3 mm. The deeper dermal depth was selected in an attempt to achieve maximal dermal collagen synthesis. The device was operated with battery power for virtually all treatments with the speed fixed at 13,500 revolutions per minute.

Hyaluronic acid gel (HA Glide; Induction Therapies) was applied on the striae to facilitate gliding action of the microneedling device during treatment. Gentle traction of the skin using one hand with simultaneous application of the microneedling tip perpendicular to the striae with the other hand assisted the smooth delivery of microneedles into the skin. A combination of horizontal, vertical, and oblique device passes over the treatment areas were delivered until uniform pinpoint bleeding was observed (range, 4–10 passes). Ice water–soaked gauze was applied to the treated areas to remove excess hyaluronic gel and achieve hemostasis. A thin layer of soothing balm (A Method Soothe HC; Induction Therapies) was applied to the treatment regions. No additional treatments (topical or intralesional) were applied.

Patients were instructed to gently clean the areas twice daily with a mild cleanser (A Method Cleanse; Induction Therapies) followed by the application of soothing balm and a mineral sunblock with SPF 30 (A Method Protect SPF 30; Induction Therapies). Tight clothing or activities that caused friction on the treatment areas were avoided. Showers were permitted, and ice or cool water compresses were advocated on an as-needed basis. No prophylactic oral or topical antibiotics were prescribed. Patients did not apply any therapeutic topical products after treatment but were permitted to resume their regular moisturizers and exercise after treatment erythema had resolved (within 7–10 days). Clinical evaluations and additional microneedling treatments were performed at monthly intervals until either complete resolution of striae was noted and/or desired clinical improvement was attained.

TABLE 2. Global Assessment Scores

Score	*Degree of Improvement*
0	No change
1	1%–25%
2	25%–50%
3	51%–75%
4	76%–100%

Representative clinical photographs were obtained at baseline, prior to each treatment, and 1, 3, 6, and 12 months after treatment. Two trained assessors blinded to treatment protocol independently rated clinical improvement of striae after final treatment from baseline on a 5-point clinical scale (0 = no change, 1 = 1%–25% improvement, 2 = 26%–50% improvement, 3 = 51%–75% improvement, 4 = 76%–100% improvement) (Table 2). The assessors were trained medical assistants in the practice who were blinded to the study protocol and were not present when the microneedling treatments were delivered. The global assessment score (GAS) was determined by comparing photographs of clinical outcomes at different treatment time points to baseline in random order. Side effects were monitored and tabulated. At the final follow-up visit, patients were asked to complete a survey to assess their satisfaction with the treatment.

Results

Patients received 1 to 3 consecutive monthly treatments (average, 1.68) (Table 3). Most striae were located on the abdomen (10 patients). Four patients had striae on the breasts or thighs, 3 patients on the buttocks, 2 patients with upper arm striae, and 2 patients with either popliteal fossae or flank involvement. Thirteen patients opted to discontinue further therapy after 1 treatment due to high clinical satisfaction with a mean GAS of 2.2. Patients who received additional treatments, showed progressive clinical

TABLE 3. Clinical Results

	*Global Assessment Scores- Range (Mean)**		
Location	*S/P Tx 1*	*S/P Tx 2*	*S/P Tx 3*
Abdomen	*n* = 7 1–4 (2.3)	*n* = 1 3	*n* = 2 4 (4)
Arms	—	*n* = 2 3–4 (3.5)	—
Breasts	*n* = 2 2 (2)	*n* = 1 3	*n* = 1 4
Buttocks	*n* = 2 2	—	*n* = 1 4
Flanks	—	*n* = 1 3	—
Popliteal fossa	*n* = 1 2	—	—
Thighs	*n* = 1 2	*n* = 2 3 (3)	*n* = 1 3
TOTAL *n* = 25	*n* = 13 1–4 (2.2)	*n* = 7 2–4 (3.1)	*n* = 5 3–4 (3.8)

Global Assessment Score: 0 = no change, 1 = 1%–25% improvement, 2 = 26%–50% improvement, 3 = 51%–75% improvement, 4 = 76%–100% improvement.

*Identical Global Assessment Score was obtained at each of the follow-up assessment points (1, 3, 6, and 12 months).

S/P, status-post; Tx, treatment.

improvement with a mean GAS of 3.1 and 3.8 after 2 and 3 treatments, respectively. All striae improved at least 50% after an average of 1.8 treatments, and 6 patients (28%) demonstrated more than 75% clinical improvement after an average of 2.5 treatments. All results were maintained at each of the follow-up periods (1, 3, 6, 12 months after treatment) (Figures 1–3A, B).

No clinical differences were observed in treatment responses of striae distensae in patients with different skin phototypes. Abdominal striae tended to respond best to treatment (mean GAS, 2.81) and required the fewest number of sessions (mean, 1.5) to achieve satisfactory clinical outcomes. Striae in thicker buttock/thigh skin regions showed comparable clinical improvement than those in thinner breast skin areas (mean GAS, 2.7 vs 2.75, respectively) and did not require additional treatment sessions to achieve clinical improvement (mean, 1.86 vs 1.75, respectively).

Side effects were limited to transient erythema in all skin phototypes. One patient (SPT I) experienced transient purpura after each of the 2 microneedling sessions. No infection or dyspigmentation was observed in any patient (Table 4).

The subjects' own assessment of striae improvement mirrored those of the masked assessors. Patients with abdominal striae opted for fewer treatments due to high clinical satisfaction after an average of 1.5 treatments. Similarly, equivalent clinical responses were observed in the different skin phototypes.

Discussion

The presence of striae distensae can have significant physical and psychosocial implications in affected individuals. A wide range of topical and energy-based treatments have been used with varying degrees of success; however, access to these treatments may be limited, and the treatments themselves are often time consuming and costly. Treatment of striae in patients with dark skin is further complicated by the risk of undesirable dyspigmentation, particularly with the use of lasers due to thermal effects during skin irradiation.

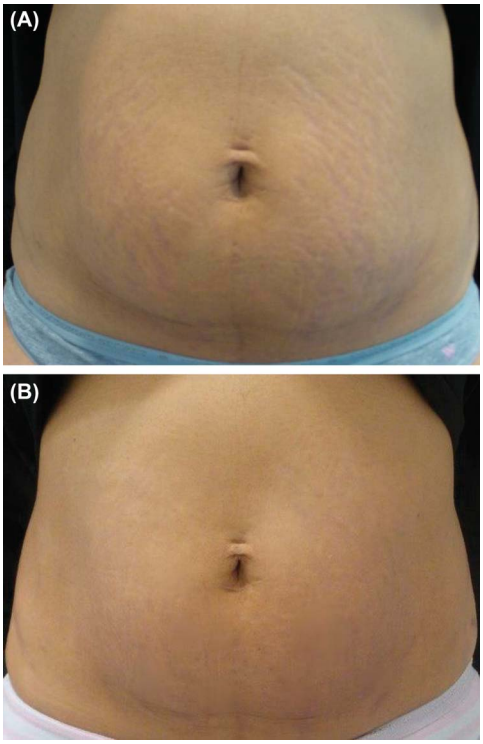

Figure 1. (A) Striae distensae on the abdomen before treatment. (B) Improved striae after 2 microneedling sessions (global assessment score: 3).

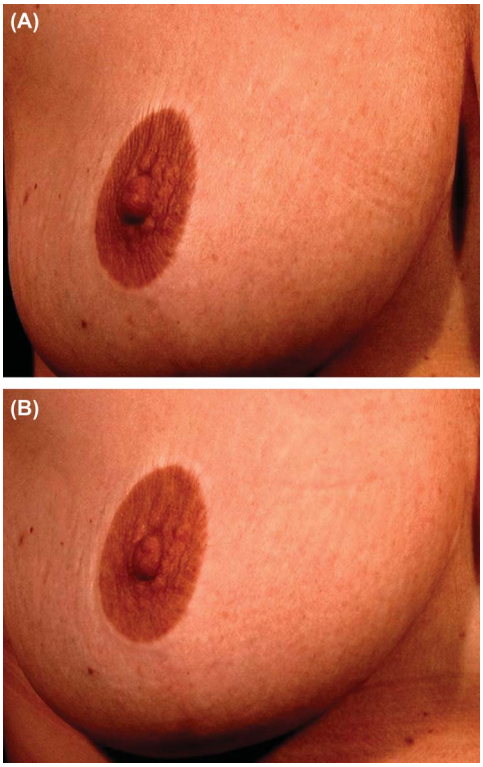

Figure 2. (A) Striae distensae on the breasts before treatment. (B) Improved striae after 2 microneedling sessions (global assessment score: 3).

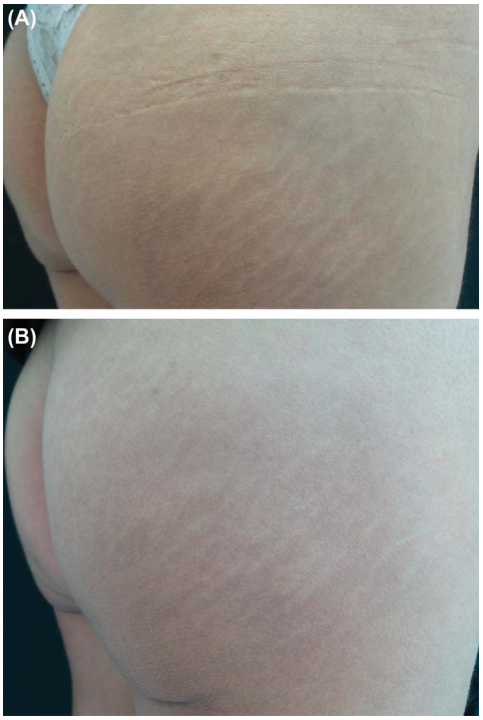

Figure 3. (A) Striae distensae on the buttocks before treatment. (B) Improvement of striae after 1 microneedling session (global assessment score: 2).

Prior reports using microneedling for striae have demonstrated promise for this common and distressing skin condition.[17–19] Improved skin texture, skin tightening, and dermal neovascularization was reported 6 months after 1 microneedling session in 22 women with histology demonstrating dermal neovascularization and increased collagen I and elastin content.[17] In a pilot study, similar clinical improvement of striae rubra and alba with microneedling was reported.[18]

As previously outlined, Khater and colleagues[10] demonstrated the superior clinical effect of microneedling over fractionated CO_2 laser for striae. Patients' abdomens and lower limbs were treated with either needling therapy (1.5 mm) or fractionated CO_2 laser every month for 3 sessions. Although both groups showed increased epidermal thickness and fibroblasts 6 months after the treatment, 90% of the microneedle-treated patients showed clinical improvement compared with 50% of the laser-treated patients. Higher patient satisfaction with significantly faster healing and fewer side effects were reported in the group treated with microneedling.

TABLE 4. Side Effects

Erythema		*Dyspigmentation*		*Purpura*	
#Patients	*#Sessions*	*#Patients*	*#Sessions*	*#Patients*	*#Sessions*
25	46	0	0	1	2

The results obtained in our study support the use of microneedling for striae distensae with minimal risk of untoward side effects across a wide range of skin phototypes and body locations. No serious adverse events occurred, and side effects were minimal and transient. It is unclear why abdominal striae responded better compared with the other sites. Similar to laser skin resurfacing treatment, microneedling promotes neocollagenesis and dermal remodeling through dermal wounding. Although the full clinical effect after laser skin resurfacing typically takes several months due to slow, progressive neocollagenesis, the clinical results obtained after microneedling in our analysis did not show significant additional improvement beyond the first month post-treatment. Also dissimilar to laser treatment, there is no thermal injury to the skin with microneedling, thus reducing the risk of post-inflammatory dyspigmentation—a particular advantage when patients with darker skin phototypes are requesting treatment.

Strengths of this study include the variety of locations treated, the wide range of skin phototypes, and the long follow-up assessment. It is the only known study using a motorized microneedling device (rather than a roller-type device) on striae distensae. A major limitation of this study was the lack of controls and/or a comparison treatment group, but previous studies have already shown comparable clinical results when fractionated lasers were compared with microneedling, with fewer side effects and shorter recovery times noted after microneedling treatment. In addition, this study did not address the concomitant use of other treatments, such as PRP, topical acids, fillers, or RF.

Conclusion

Microneedling is a simple, inexpensive treatment for striae distensae that yields significant and longstanding clinical improvement. Its advantages include rapid post-treatment healing and minimal side effects. This study is the first long-term evaluation using a motorized microneedling device for the treatment of striae distensae across a wide range of skin phototypes. Its clinical efficacy mirrors that reported with various skin resurfacing lasers. These results not only are promising as a stand-alone treatment but also may be even more effective when integrated into a multimodal approach to achieve greater skin texture and contour in these difficult treatment areas. Further studies will help to establish standardized protocols to optimize treatment outcomes and to determine whether combination treatments provide additional therapeutic benefit in the treatment of striae distensae.

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