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Efficacy of 1470nm fractionated nonablative resurfacing (Halo) laser for treatment of severe striae distensae in setting of Wegner's vasculitis and chronic corticosteroid therapy.

Introduction

Striae distensae (SD; striae, stretch marks) are common skin lesions that can pose a significant psychological burden for patients (1). The prevalence of SD is substantial, reportedly ranging from 11-88% (2-10). The most commonly afflicted regions include the abdomen, breasts, thighs, and buttocks. SD are thought to develop from mechanical and hormonal factors, often arising during periods of weight gain, pregnancy, and/or endocrine imbalance, most typically in the setting of excess corticosteroid levels. Histologically, end-stage SD are characterized by epidermal atrophy and structurally altered collagen and elastic fibers (1).

Although there exist numerous traditional treatment methods for SD, ranging from topical agents, to chemical peels, to various procedural modalities, none have been demonstrated as uniformly efficacious (11-16). More recently, nonablative fractionated resurfacing lasers (NAFR) have been reported to improve SD, with the majority of studies describing efficacy with 1540nm, 1550nm, and to a lesser extent, 1410nm and 1565nm wavelengths (17). These technologies induce collagen generation by creating minute zones of thermal damage, seemingly directly targeting the histologic changes characteristic of SD. This report describes the clinical utility of a new wavelength of NAFR (1470nm, Sciton Halo Laser) in a patient with severe striae arising in the setting of Wegner's vasculitis and chronic systemic corticosteroid use.

Case Report

A 30-year-old woman with PR3 ANCA-vasculitis (granulomatosis with polyangiitis) complicated by alveolar hemorrhage and respiratory failure, along with pauci-immune glomerulonephritis leading to end stage renal disease despite therapy with corticosteroids, cyclophosphamide, rituximab, and mycophenolate mophetil, who was approximately one year status post renal transplantation, presented to our clinic with exquisitely tender SD afflicting the bilateral medial thighs and axillary regions. These had developed over the prior approximately two years of high-dose corticosteroid therapy administered for her vasculitis and renal transplantation, and were of the striae atrophicans type with tissue-paper like thinness. Due to significant discomfort with even light touch, the patient was unable to wear certain clothing and at times experienced difficulty with ambulation and limb mobility due

to her SD. At the time of her initial visit, the patient's vasculitis was well-controlled, and her prednisone dosage had been tapered to 5mg daily for several months.

After discussion of treatment options, the patient was first initiated on tretinoin 0.1% cream daily to all SD for six months. While she tolerated this medication without significant skin irritation or other side effects, she reported no improvement, with continued exquisite tenderness, at follow-up. As such, the patient elected to discontinue tretinoin and to pursue a trial of NAFR with the Sciton Halo laser.

The patient ultimately underwent eight total treatments to both axillary and thigh regions. These were performed approximately every 6-8 weeks to each site, alternating between the afflicted regions to help mitigate potential risks of systemic absorption of topical anesthesia. Four percent topical lidocaine was applied for 15 minutes prior to each treatment. The patient was not pre-treated with hydroquinone or other bleaching agents. No prophylactic antiviral or antibiotic were utilized.

All treatments were performed with the 1470nm component of the Sciton Halo laser, with the ablative 2940nm component deactivated. Treatment depths ranged from 250 -375 microns, depending on the patient's level of discomfort. Density was gradually increased from an initial 5% up to 15% for later treatments as the patient tolerated these well without side effects. Postoperatively, ice was applied for 15 minutes, followed by application of a bland moisturizing cream.

The patient tolerated all treatments well, with no reported adverse events other than the expected 4-7 days of mild erythema and edema. No blistering or scarring occurred throughout her treatment course. Despite having type 5 skin, the patient experienced no pigment changes even in absence of topical bleaching therapies. She reported diminished tenderness in her SD starting after her second treatment, which continued to improve throughout the treatment course. By the final treatment, her mobility had ceased to be diminished due to her SD, and she could wear form-fitting garments without discomfort. Clinically, her SD had improved visibly with reduced depth and breadth (Figure 1). Seven months after her last treatment, she continued to report marked overall improvement, with no recrudescence of tenderness or visible worsening. As her angiitis had stabilized and her striae had improved so significantly, the patient happily reported that she had become pregnant, with no signs or symptoms of worsening SD at 26 weeks gestation.

Discussion

Although SD is typically a cosmetic concern, it can rarely be associated with significant physical discomfort. In this case, we report the efficacy of a 1470nm NAFR laser for exquisitely tender SD arising in the setting of a severe systemic disease requiring chronic corticosteroid therapy. While only a single report, the

rather remarkable response of this patient carries potential implications for future treatments of SD with this laser for both medical and aesthetic indications.

Most theories as to the etiology of SD implicate hormonal and mechanical factors (18-21). Adrenocorticotrophic hormone and cortisol have been demonstrated to promote fibroblast activity, thereby inducing protein catabolism and alterations in collagen and elastin fibers (19). Weight gain and pregnancy are also highly associated with development of SD, with orientation of striae typically parallel to tension vectors.

Unfortunately, no consistently effective therapeutic modality has been elucidated for SD. Tretinoin is considered a first-line treatment and is often most helpful for striae rubrae, with conflicting and often unsatisfactory responses reported in striae albae (11, 13-14). Other topical creams, including cocoa butter and olive oil, among others, are sometimes utilized, again with inconsistent results (12). Glycolic acid and other chemical peels have been reported to reduce the width of striae as well as to help even associated dyspigmentation, but strong clinical studies are lacking, and side effects can be significant if incorrect concentrations are applied (15-16).

In light of these inconsistent results, lasers have increasingly been utilized for SD, with a variety of wavelengths reported (22-25). The pulsed-dye laser (PDL) is a vascular laser most efficacious for reducing the erythema associated with striae rubra, although it has also been reported to increase collagen content as well (24). Still, clinically significant improvement in striae atrophicans (characterized by hypopigmented, linear, scar-like plaques without erythema) would be unexpected with PDL, as unlike other lasers directly targeting collagen growth, PDL has highest affinity for hemoglobin.

Particularly as end-stage histologic features characteristic of SD include epidermal atrophy and densely packed, horizontally-oriented collagen bundles, it would seem fractionated resurfacing would represent a logical treatment modality. Indeed, several studies support both fractionated ablative and nonablative lasers for mitigating SD. Fractionated ablative resurfacing, namely the 10,600nm CO₂ laser, has been reported as effective for striae albae, although the ablative nature increases risks of dyspigmentation, particularly in darker skin types (26). In contrast, NAFR lasers have a lower risk of causing pigment changes and scarring, and these lasers have also been demonstrated to clinically improve SD. Whereas most studies have focused on 1540 nm, 1550 nm, and to a lesser extent 1410 nm and 1565 nm, wavelengths, there have been no prior reports, to the best of our knowledge, of a 1470 nm NAFR laser utilized for SD (17).

It is the author's opinion that this particular laser provided several advantages in this case via enhancing the tolerability and precision of treatments. First, the laser allowed for precise adjustment of depth of penetration at an ideal range to stimulate dermal collagen regeneration while minimizing discomfort. As this patient's SD

were markedly atrophic, even small (25-50 micron) variances in depth markedly affected her ability to tolerate treatments. Integrated cooling further increased intraoperative tolerability. By precisely measuring the surface area of affected regions preoperatively, the Halo laser helped enable uniform treatments at the desired density. Finally, the incorporated Dynamic Temperature Optimization measures the temperature of the skin and automatically changes energy density and pulse width to ensure uniform treatments are achieved.

In conclusion, the Sciton Halo laser was safely and effectively utilized for treatment of tender SD in a patient with Wegner's vasculitis and chronic systemic corticosteroid use. Further clinical and histological studies should be performed to further evaluate the efficacy of this technology for mitigating SD for both medical and aesthetic indications.

Figures:



Figure 1: The patient exhibited exquisitely tender striae involving the bilateral medial thighs before treatment (top two photos), with tenderness resolving alongside visible clinical improvement after eight treatments (bottom photos).

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