

Clinical Improvement of Striae Rubrae and Albae with a Fractional Ablative CO₂ Laser

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Background

Striae distensae (SD), also known as stretch marks, are permanent dermal lesions which commonly occur on the breasts, buttocks, abdomen, and thighs. Most SD are associated with pregnancy and pubertal growth spurts. Causes of SD are not yet clear, however a number of theories have been proposed; such as reduced genetic expression of fibronectin, collagen and elastin, mechanical skin stretching from weight (gain or loss), as well as prolonged exposure to increased levels of steroidal hormones^{1,2,3,5}.

Clinically, SD have scar like features namely, an early erythematous phase, followed by a late hypopigmented phase associated with stretching of the dermis. They are commonly classified according to appearance: newly formed, immature SD are flattened areas of skin with a pink-red hue (striae rubrae) which may be itchy and slightly raised (Figure 1 A, B). Over time, the marks fade and become atrophic, hypopigmented (striae albae), appearing scar-like, wrinkled (Figure 1 C).



Figure 1 - Clinical representation of (A,B) Striae Rubrae and (C) Striae Albae

Histologically, SD are similar to scar tissue and for this reason they have been linked to wound healing and scar formation. In SD rubrae, inflammatory alterations with perivascular lymphocytic infiltrate around vessels are observed. Collagen bands in the upper dermis are stretched and aligned parallel to the skin surface. Early SD changes also include accumulation of degranulating mast cells and macrophages around dermal elastic fibers resulting in elastolysis¹⁻². As SD progress and become striae albae, hypopigmentation is observed together with gradual epidermal atrophy and loss of rete ridges as well as loss of collagen and elastin fibers^{1-3,5}.

Common treatments include mainly application of topical creams containing retinoic acid (vitamin A derivatives). Proposed mechanism of action of these treatments include fibroblastic stimulation aimed at reducing redness, inflammation, swelling and irritation in striae rubrae and induction of collagen and elastic fiber synthesis. Topical treatments although commonly recommended yield variable results suggesting improved appearance mainly of striae rubrae¹⁻².

Energy based devices, such as lasers, light and radiofrequency device systems are also commonly used in the treatment of SD. The mechanism of action is based on inducing new collagen synthesis as demonstrated in histopathologic studies¹⁻⁵.

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These studies laid the grounds for the justification of the use of energy based devices to improve appearance of SD. Results have shown that striae rubrae respond better than striae albae, exhibiting improved clinical results. Ablative fractional CO₂ photothermolysis has been previously reported in the treatment of SD shown to stimulate epidermal turnover and dermal collagen remodeling, which lead to significant improvement in SD³⁻⁴ appearance. Other studies show that ablative laser resurfacing can be efficient in reducing wrinkles, pigmentation, improved vascularity as well as induction of collagen remodeling in the deeper parts of the epidermis⁵. The purpose of this white paper is to discuss the effect of fractional ablative CO₂ laser (Pixel CO₂, Alma Lasers, Israel), in the treatment of SD rubrae and albae.

Pixel CO₂, Treatment of Striae Distensae

The Pixel CO₂ laser (Alma Lasers, Israel), is a fractional ablative CO₂ laser modality which has shown high promising clinical results for treating SD. The Pixel CO₂ laser includes the unique roller handpiece that enables practical treatment of large body areas, aimed at facilitating SD treatment.

Results

Our clinical experience with the roller applicator has shown to improve dramatically the appearance of striae rubrae (Fig 2) and striae albae (Fig 3). Effective results required multiple treatment sessions, usually 2-4 sessions with 45-60 days intervals between treatments. Low energy and low density were indicated to avoid hyper-chromia.



Figure 2 - Pixel CO₂ laser with roller applicator improves appearance of striae rubrae. A-F before and after 2 treatment sessions with 45d intervals, laser power 20 mJ/pixel (B) and 30 mJ/pixel. (D, F)

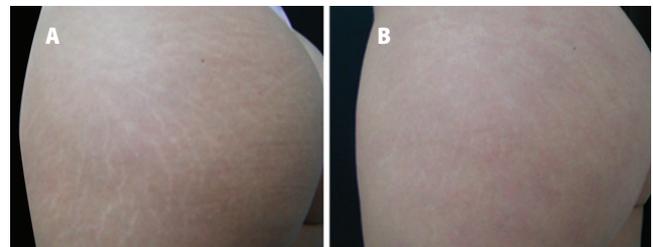


Figure 3 - Pixel CO₂ laser with roller applicator improves appearance of striae albae. A, B before and after 2 treatment sessions with 45d intervals, laser power 30mJ/pixel.

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The following Pixel CO₂ laser treatment protocol was used in the above mentioned clinical cases:

Pre-treatment:

- Skin was cleaned with Chlorhexidine solution and let to dry completely.
- Topical anesthetic was applied prior to the CO₂ laser treatment for small treatment areas, (large treatment areas are usually treated without anesthetic since energy setting suggested are low and treatment bearable).
- A skin test was performed to validate treatment parameters and eliminate risk of adverse events.

Treatment and Recommended Settings: (stationary and roller applicators)

1. Select applicator for treatment according to the following:
 - Roller applicator: treating large areas.
 - Stationary applicator: treating narrow areas, or to complement previous treatment with roller applicator on the same area.
2. Cold air is useful during procedure to ensure patient comfort and treatment tolerance.

Notes:

- Do not use high energies for treatment.
- Treatment is not indicated for photo types V-VI.

Recommended treatment settings for the 9x9 applicator (stationary)

Skin Type	Energy [mJ/Pixel]	Frequency [Hz]	Power	# of Passes
I-III	50-60	2	High	2-3
IV	40-50	2	High	1-2



Recommended treatment settings for the 7x1 applicator (iPixel Roller)

Skin Type	Energy [mJ/Pixel]	Frequency [Hz]	Power	# of Passes
I-II	30	1	High	1
III	20-30	1	High	1
IV	10-20	1	High	1



Post-treatment

- Apply cold air or ice packs on treated areas.
- After treatment the skin becomes red and may feel sunburned for 24-36 hours.
- Healing cream or hyaluronic acid serum can be applied just after procedure, patients should maintain cream application for at least two weeks following treatment.
- Patients are advised to wear loose and light clothes for 24 hours and to avoid sun exposure during all the treatment and for 3 months after the last session.
- Patient may experience itching and must be aware not to scratch.
- Depigment agent can be used between the sessions.
- Sunscreen with SPF>30 must be applied during the treatment regimen and 3 months after the last session.
- Tiny scabs and flaking may appear on the skin 5-7 days post treatment, this may be minimized if the skin is well hydrated.
- Full skin recovery is expected 14-20 days post treatment, slight erythema can be observed until 2 months. Transitory hyperchromia may occur.

Discussion

SD is a very common dermatosis and is a frequent reason for consultation with dermatologists occurring typically in adolescents and after pregnancy. Energy based devices (EBD) such as lasers, are commonly used in the treatment of SD which improve SD appearance mainly by influencing epidermal thickness. The benefits of SD treatment with fractional CO₂ lasers are based on significant clinical results demonstrating stimulation of epidermal turnover and dermal collagen remodeling. Moreover, the results demonstrate that newly formed, immature SD rubrae exhibit greater treatment efficacy than in matured albae SD. The new technology of Pixel CO₂ with the roller applicator was designed with the intent to facilitate treatments of large surface areas. Our results show significant clinical improvement not only in SD rubrae, but also in SD albae with the roller applicator.

References

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