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Fractional ablative carbon-dioxide laser treatment improves histological and clinical aspects of striae gravidarum: a prospective open label paired study

Elisete Isabel Crocco, MD, Guilherme Muzy, MD, Natalia Mendes Schowe, MSc, Marilia Silva Albuquerque, MSc, Mirna Duarte Barros, PhD, Hudson Sousa Buck, PhD

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Fractional ablative carbon-dioxide laser treatment improves histological and clinical aspects of striae gravidarum: a prospective open label paired study.

To the editor: Striae Distensae (SD) frequently lead to psychological distress for the patients[1] and occur in 70% of females, 40% of adolescent males and 90% of pregnant women[2], who usually develop striae gravidarum (SG) during the last trimester of pregnancy[3]. Younger age, maternal and family history of SG, increased pre-pregnancy and pre-delivery weight of the mother, and increased birth weight of the baby are the most significant risk factors identified for SG[4]. Despite the widespread use of ablative lasers, SG have not been clinically and histologically studied post CO_2 fractional system (CO_2 FS) treatment. Improved understanding of histopathological changes may lead to new treatment insights. We performed a single-center, two-arm, prospective, self-control open-label study. Thirteen female volunteers with SG, recruited after signing the informed consent form (Institutional Ethics Committee approval 323/2009), were submitted to the treatment on the right half side of the abdominal region using a 70W ablative 10,600-nm carbon-dioxide fractional single pass, non-overlapping laser (CO_2FS; Pixel-CO2, Alma Lasers, Cesarea, Israel). Each patient was submitted to four sessions of increasing pulse energy levels (80, 90, 100 and 110 mJ/MTZ) with a 30-day interval between each. The left half of the abdominal region was kept untreated (Figure 1).

The largest pre-treatment striae was elected for measurement and skin biopsy before treatment and the same striae was again used one month after treatment (4 sessions), patient satisfaction was assessed through a visual scale. Normal pre-treatment skin biopsy specimens were also obtained. The histological changes were evaluated on the superficial ("Part A": 500±10 μm) and deep portion ("Part B": 501 μm to 1000 μm) of the skin samples for analysis of collagen fibers (Masson's trichrome and picrosirius red) and recent, intermediate and mature elastic fibers (resorcine fucsine with or without oxone and Verhoeff). The thickness of the epidermis was also measured.

We observed a significant increase in the amount of collagen fibers ($p<0.05$) in post-treatment SG samples (Masson´s trichrome: Part A 36.70±4,94 μm^2 to 45.58±7,00 μm^2, Part B 31.08±4.40 μm^2 to 41.69±10.21 μm^2; picrosirius red: 17.19±4.77 μm^2 to 21.27±5.47 μm^2). Additionally, a non-significant difference was observed for collagen, when comparing untreated normal skin with after treatment samples (Table 1). A non-significant increase in the number of mature intermediate and recent elastic fibers was observed ($p>0.05$). Possible reasons for this are the difference between patient's elastic fiber maturation and the higher thermal stability of elastin in comparison to collagen fibers[5].

Also, a significant increase was observed in the thickness of the epidermal cell layer of the after treatment samples when compared to normal skin (normal skin: 67.08±11.55 μm, pretreatment: 77.55±17.19 μm and after treatment: 90.67±18.17 μm; $p<0.05$). Twelve out of 13 patients considered their results to be 'good' or 'very good' 30 days after the treatment. The clinical improvement was evidenced by the significant decrease ($p<0.05$) in the width of the