

# Perioral rejuvenation with fractional carbon dioxide (CO<sub>2</sub>) laser

## Rejuvenescimento Perioral com Laser de Dióxido de Carbono (CO<sub>2</sub>) Fracionado

### ABSTRACT

**Introduction:** Several therapeutic modalities, such as surgeries, cutaneous filling, and ablative techniques are used for perioral rejuvenation.

**Objective:** The present study was aimed at evaluating the efficacy and side effects of an ablative method, using fractional carbon dioxide (CO<sub>2</sub>) laser in the treatment of perioral wrinkles.

**Methods:** A retrospective study was carried out with 20 female patients who underwent a single session of fractional CO<sub>2</sub> laser, with high energy and density, for the treatment of perioral wrinkles. Photographs taken before and 90-days after the procedure were evaluated by two examiners unrelated to the study, who looked at the effect of the laser on the deep static wrinkles, fine lines, skin texture, and color. The patients were also classified, pre- and post-treatment, according to the classification of Baker for perioral wrinkles.

**Results:** Three months after the treatment, it was possible to observe clinical improvement in 100% of the patients, in all the variables evaluated. In the classification of Baker, five patients classified as Grade II, and three who classified as grade III became Grade I and Grade II, respectively. Patients initially classified as Grade I did not have alterations in their classification for presenting few superficial wrinkles. Observed side effects were: transient erythema and edema in the early post-procedure period.

**Conclusion:** Fractional CO<sub>2</sub> laser has proven to be a safe and effective option for the treatment of perioral wrinkles.

**Keywords:** skin aging; laser therapy; carbon dioxide.

### RESUMO

**Introdução:** diversas modalidades terapêuticas são utilizadas para o rejuvenescimento perioral, como cirurgias, preenchimentos e técnicas ablativas.

**Objetivo:** o objetivo deste estudo é avaliar a eficácia e os efeitos colaterais do uso de método ablativo, utilizando-se o laser de Dióxido de Carbono (CO<sub>2</sub>) fracionado no tratamento das rugas periorais.

**Métodos:** realizado estudo retrospectivo com 20 pacientes do sexo feminino submetidas à aplicação do laser de CO<sub>2</sub> fracionado, em sessão única, com alta energia e alta densidade, para o tratamento das rugas periorais. As fotografias antes e 90 dias depois do tratamento foram avaliadas por dois examinadores alheios ao estudo, que observaram o efeito do laser nas rugas estáticas profundas, linhas finas, tonalidade e textura da pele. As pacientes também foram catalogadas, no pré e pós- tratamento, conforme a classificação de Baker para rugas periorais.

**Resultados:** três meses após o tratamento foi possível observar melhora clínica em 100% das pacientes, em todos os quesitos avaliados. Na classificação de Baker, cinco pacientes catalogadas como grau II e três, como grau III tornaram-se respectivamente grau I e grau II. Pacientes rotuladas como grau I, por apresentarem poucas rugas superficiais, não tiveram alteração nessa classificação. Os efeitos colaterais observados foram eritema e edema transitórios, no período de pós-procedimento imediato.

**Conclusão:** o laser de CO<sub>2</sub> fracionado demonstrou ser opção segura e eficaz para o tratamento das rugas periorais.

**Palavras-chave:** envelhecimento da pele; terapia a laser; dióxido de carbono.

## Article Original

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## INTRODUCTION

Aging in the perioral and lower third regions of the face contributes significantly to the final result of facial aging.<sup>1</sup>

Resulting from chewing and speech movements, perioral wrinkles are dynamic in their early stages, becoming more static during advanced aging.<sup>2,3</sup> Other factors also contribute to the aging process in this area of the body, for instance, actinic damage, sagging of the adipose tissue of the middle and lower thirds of the face, and the looseness of the osteocutaneous ligaments.<sup>1</sup>

In 1998, Baker classified perioral wrinkles into three types, based on their number, location, and depth. Those of Type I are deemed superficial and can affect a third to half of the upper lip, and are eight or fewer in number; Type II are deemed as moderate, present in more than two thirds of the upper lip, and range in number from 9 to 15; and Type III are deemed as deep, affecting the upper and lower lips in numbers greater than 16.<sup>4</sup>

The perioral region has anatomical characteristics that make it responsive to different types of rejuvenating treatments, including surgeries, cutaneous fillings, and ablative techniques, such as chemical peels, dermabrasion, and ablative lasers, which promote the ablation of the epidermis and part of the dermis.<sup>2,3</sup> The treatments that yield the best results for these wrinkles are the ablative processes,<sup>3</sup> which can be used separately or combined to optimize results.<sup>5</sup>

Traditional CO<sub>2</sub> and Erbium:YAG (non-fractional) ablative lasers, deep peels, and dermabrasion yield highly satisfactory results, however they have the disadvantage of low patient acceptance due to the need for effective anesthesia, prolonged recovery, increased risk of depigmentation and scars, more complicated post-operative care and a risk of prolonged residual erythema, demanding strict restrictions to exposure to the sun.<sup>6</sup>

As a result, fractional lasers have been gaining popularity more recently due to their less intense side effects, decreased recovery time, and significant clinical outcomes.<sup>6</sup>

The present study was aimed at evaluating the clinical efficacy and possible side effects of using fractional CO<sub>2</sub> laser in the treatment of static perioral wrinkles. A single protocol, with high energy and high density, was proposed as treatment.

## METHOD

A retrospective study was conducted between 2007 and 2011 at a private practice, when 20 female patients aged between 50 and 70 years old, with skin phototypes I, II, III, and IV were evaluated and subsequently underwent treatment of perioral wrinkles with fractional CO<sub>2</sub> laser (SmartXide® - dot, 10,600 - Dekalaser, Firenze, Italy).

Prior to undergoing the procedure, all patients read and signed an informed term of consent, with the study being conducted according to the Declaration of Helsinki's recommendations. The exclusion criteria for undergoing the application of fractional CO<sub>2</sub> laser were: use of systemic isotretinoin in the previous six months, pregnancy, and presence of infection in the body site to be treated on the day of the procedure. Patients with a previous history of infection with herpes simplex virus began prophylaxis with antiviral drugs two days before the laser application.

All patients were photographed in a standardized way with regards to the camera, lighting, and distance, before the procedure and after 30 and 90 days (Visia® system, Canfield Imaging Systems, NJ, USA). The perioral wrinkles were classified according to the Baker's scale<sup>3</sup> by two examiners (dermatologist physicians) unrelated to the study. Treatment site antisepsis was performed prior to the procedure with aqueous chlorhexidine and, due to the painful nature of the procedure, regional blocks was carried out in the infraorbital and mentonian nerves bilaterally with 2% lidocaine and 1:100,000 epinephrine. Patients underwent a single treatment session with two passes of fractional CO<sub>2</sub> laser in the perioral region, observing the following parameters: power = 30W, spacing = 1,000mm, dwell time (depth) = 2,000ms, and stack 2. In case the patient also underwent treatment on the rest of the face, an interval of 30 minutes was observed before the new laser application, with the use of topical anesthesia, and skin cooling with cold air (Siberian® - Industra Technologies, São Carlos (SP), Brazil) during the procedure, since injectable anesthesia was not used, with the exception of the perioral region. In the remaining areas of the face there was no standardization of laser parameters in those patients, although a certain criteria was observed.

After the procedure the patient remained with a cold gel mask for 10 minutes. Patients were instructed to use soap for cleaning sensitive skin, silicone gel hydration at home, and sunscreens to assist with re-epithelialization. Red spectrum LED (light emitting diode) (Multiwaves® - Industra Technologies, São Carlos, SP, Brazil), analogous to low-power lasers, was used immediately after the laser application for its anti-inflammatory and healing effect.<sup>7</sup> Although systemic antibiotics and antifungals can be prescribed as prophylaxis or on the occurrence of clinical signs of bacterial infection or candidiasis, the authors deemed them an unnecessary resource and they were not used in the study patients.

At return visits after the procedure, the patients were evaluated regarding possible side effects. In the literature, the authors found descriptions of minor complications: erythema, edema, acneiform eruption, milia, purpura and superficial erosions; moderate complications: persistent erythema, bacterial infection, activation of herpes simplex, hyperpigmentation; and even serious complications such as hypertrophic scarring and ectropion.<sup>5</sup>

In post-procedure photographic records, the action of the treatment on deep wrinkles, fine lines, skin tone, and texture was considered. These characteristics were assessed according to the following rating: absence of improvement (-), slight improvement (1-25%), moderate improvement (26-50%), significant improvement (51-75%) and very significant improvement (76-100%). Three months after the procedure a further assessment of patients based on perioral wrinkles classification was carried out according to the Baker's scale.

## RESULTS

Twenty patients who underwent a single fractional CO<sub>2</sub> laser application session in the perioral region (two passes; 30W;

1,000mm spacing; 2,000ms dwell time; stack 2) were evaluated.

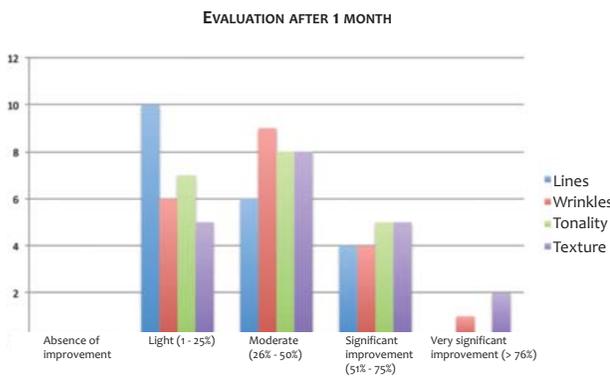
When initially classified according to the Baker's scale, five patients in our sample had Grade I, eight had Grade II, and seven had Grade III.

Three months after the procedure, patients were photographed and re-classified according to the same scale. We observed that five patients previously classified as Grade II and three patients classified as Grade III became, respectively, Grade I and Grade II. Those initially rated as Grade I who had a positive response to the treatment, but still showed some superficial wrinkles, remained as Grade I.

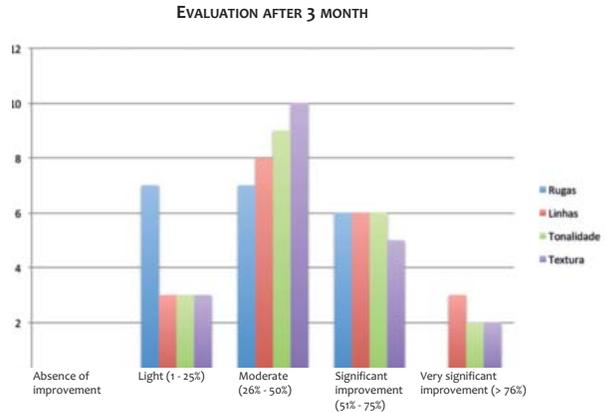
The examiners assessed the action of the laser on deep wrinkles and fine lines, as well as on the tone and texture of the skin. The improvement was classified as slight (when an attenuation of 1-25% of the criteria above was observed), moderate (26-50%), significant (51-75%), very significant (over 76%) or with absence of improvement.

Thirty days after the procedure, the assessment of fine lines suggested 6 patients had slight improvement; 9 had moderate improvement; 4 had significant improvement; and 1 had very significant improvement. Regarding deep wrinkles, 10 patients had slight improvement; 6 had moderate; and 4 had significant; regarding tonality, 7 patients had slight improvement; 8 had moderate; and 5 had significant improvement; regarding texture, 5 patients had slight improvement; 8 had moderate improvement; 5 significant improvement; and 2 had very significant improvement (Graph 1).

As depicted in Graph 2, at 90 days after the procedure it could be observed that regarding deep wrinkles, 7 patients had slight improvement; 7 moderate; and 6 significant; for fine lines, 3 patients showed slight improvement; 8, moderate; 6 significant; and 3 very significant; regarding skin tone, 3 showed slight improvement; 9 moderate; 6 significant; and 2 very significant; finally, with respect to texture, 3 patients showed slight improvement; 10 moderate improvement; 5 significant improvement; and 2 very significant improvement.



GRAPH 1: Evaluation after 1 month. Distribution of patients according to the degree of improvement after 1 month



GRAPH 2: Evaluation after 3 months. Distribution of patients according to the degree of improvement after 3 months

Figures 1 and 2 illustrate the clinical improvement in two patients after three months of treatment. Regarding side effects, erythema and edema could be observed predominantly in the first week after the procedure in all patients. These side effects receded spontaneously in 100% of cases. No other side effects were observed in the present study.

DISCUSSION

According to the present study's results, which were evaluated by two examiner dermatologists unrelated to the research being carried out, it was possible to verify clinical improvement in all patients. Since the first month of follow-up, it was possible to note clinical improvement in all the variables assessed, i.e., no patient was classified by "absence of improvement".

It was possible to confirm the clinical improvement in the mitigation of perioral wrinkles, even in the most severe cases of aging in that body site (8 patients), through improvements of one to two grades in the Baker's classification.



FIGURE 1: Do to D90



FIGURE 2: DO TO D90

The present study's findings are consistent with the literature,<sup>5,6</sup> confirming the use of the fractional CO<sub>2</sub> laser as an effective treatment for static perioral wrinkles.

Mitigation of deep wrinkles and fine lines and the improvement in the tone and texture of the skin were observed from the first month after treatment, although there was more

noticeable improvement in the third month of follow-up. The fact that the laser's effect was better rated three months after the procedure is linked to the remodeling of collagen, which continues to occur three months or more after the skin has been exposed to the laser, clinically translating into the long-term effect of the treatment. 8, 9

This finding leads to the reconsideration of the time interval in which the indication of new sessions of fractional CO<sub>2</sub> laser currently occurs. If the study's patients were reassessed after more than three months, better results would probably arise for the variables analyzed.

Regarding the observed side effects, although the present study's sample had only 20 patients, no moderate or severe complications were observed, which suggests a good safety profile for the procedure. Further studies on the application of fractional CO<sub>2</sub> laser for perioral wrinkles, with different standardizations of use and other assessment methods (such as pathological studies, for instance), with longer followup times and with broader sample sizes may corroborate our clinical findings.

## CONCLUSION

Fractional CO<sub>2</sub> laser is safe and effective for the treatment of perioral wrinkles, presenting a high degree of satisfaction in the post-procedure evaluations and a low incidence of complications. ●

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