

## Post-Therapeutic Hypochromia after Fractional CO<sub>2</sub> Laser treated with *Bromisum Gaudchii* tr é cul

Ana Carolina Naves de Castro Rocha<sup>1</sup>, Flávio Barbosa Luz<sup>2</sup> and Marcia Ramos-e-Silva<sup>3\*</sup>

<sup>1</sup>Invited Professor, Sector of Dermatology, PUC-GO-Pontifical Catholic University of the State of Goias, Goiania, Brazil

<sup>2</sup>Associate Professor, Sector of Dermatology and Post-Graduation Course – HUAP-UFF and School of Medicine, Fluminense Federal University, Niterói, Brazil

<sup>3</sup>Associate Professor and Chair, Sector of Dermatology and Post-Graduation Course – HUCFF-UFRJ and School of Medicine, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil

### Abstract

Hypochromia secondary to the use of CO<sub>2</sub> fractional laser, although common, is seldom reported in the medical literature, as well as how to proceed in such cases. We report a patient who was submitted to the procedure for treatment of diffuse atrophic striae in the lower limbs. She noted new lesions more evident than the original, as soon as the post-procedure crusts came off.

She was treated with a progressive improvement after 3 months with oral therapy of *Brosimum gaudichaudii* Trécul, topical psoralen, and a not frequent sun exposure (UVA).

**Keywords:** Hypochromia; Fractional CO<sub>2</sub>; Carbon dioxide; *Brosimum gaudichaudii*

### Introduction

Several dermatoses and dermatological therapeutic procedures may course with post inflammatory hypopigmentation. Some authors believe that the destruction of the melanocytes or controlled fibrosis of some traumatic procedures to the skin is implicated in post inflammatory hypopigmentation. There are frequent reports regarding the appearance of post inflammatory hypopigmentation in aesthetical treatments, such as in deep peelings (chemical or physical) and ablative lasers. In laser therapy, phototype, level of ablation and depth of thermal damage seem important factors related to the complications of the procedure. In case of laser resurfacing, the incidence tends to be lower than in chemical resurfacing with the use of phenol, and appears generally six months after the procedure, with regression of the erythema [1-3]. Presently the use of lasers combining the ablative and fractional methods is becoming widespread, with the most popular being the CO<sub>2</sub> fractional laser treatment, frequently sought for correction of inesthetic conditions such as wrinkles, striae and scars. The target of this laser is the water and by emission of its beams, it generates thermal lesion columns, the so-called micro-thermal zones (MTZ), around which, all the adjacent tissue is spared. The treated zones can reach 15 to 35% of the total skin surface area in each session. Histological studies show that MTZ discloses homogenization of the dermal matrix and formation of microscopic epidermal necrotic debris (MEND), whose formation process occurs with elimination of the pigment containing thermally damaged epidermis. The depth and width of MTZ increase in proportion and progressively with the amount of energy employed [4].

Post-therapeutic hypopigmentation after use of fractional CO<sub>2</sub> is seldom reported, and doubts remain regarding the best treatment approach. We present a therapeutical possibility based on psoralen of vegetal origin, very common in the fields and savannas of the Brazilian hinterland (Midwest), the *Brosimum gaudichaudii* Trécul, with progressive therapeutical success. This substance is among the lowest-cost therapeutic forms, facilitating treatment adhesion. In Brazil it is presented with the brand name Viticromin®.

### Case Report

A 21-year-old woman, Fitzpatrick phototype II, reported a complication from a dermatological procedure with use of fractional

CO<sub>2</sub> laser, indicated for treatment of long-term striae. The patient denied previous treatment with light emitting devices. She denied being submitted to any previous treatment and recalled having her skin with the appearance of a discreet suntan after the treatment, in a single session, a little over three months before this examination. She referred that the post-procedure crusts came off, disclosing hypochromic lesions with contrasting aspect to the previous lesions. The dermatological examination evidenced linear lesions, achromic and hypochromic, with some isolated erythematous spots, distributed along the lower limbs, lateral and posterior thigh regions. No cicatricial or fibrous aspect, or any alteration to the skin texture was found. Complementary exams were not requested.

Formulations containing the active agent *Brosimum gaudichaudii* Trécul, were prescribed, both as 400 mg capsules administered orally twice daily, as well as topical roll-on at 5% in days of sunlight, one and a half hour before exposure.

Sunlight exposure was recommended in a progressive regime, beginning two or three times per week, for 10 minutes each day, which was not followed regularly by the patient. She referred having exposed herself about 10 days at most in the lapse of three months, referring however, greater persistence in the second phase of the treatment. On the other hand, the patient did use the prescribed medication regularly, presenting discrete improvement, with diffuse repigmentation along all lesions after three months. After five months, the remaining hypochromia was very discreet. The treatment was continued for six months and there was no hypochromic area after a year (Figures 1-6).

### Discussion

Fractional CO<sub>2</sub> laser is very popular in dermatological practice, however, there are still no detailed studies regarding its complications.

**\*Corresponding author:** Prof. Marcia Ramos-e-Silva, Rua Dona Mariana 143 / C-32, Barra 22280-020, Rio de Janeiro Brazil, Tel: 55-21-2286-4632; E-mail: [ramos.e.silva@dermato.med.br](mailto:ramos.e.silva@dermato.med.br)

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**Figure 1:** Right thigh 3 months before therapy



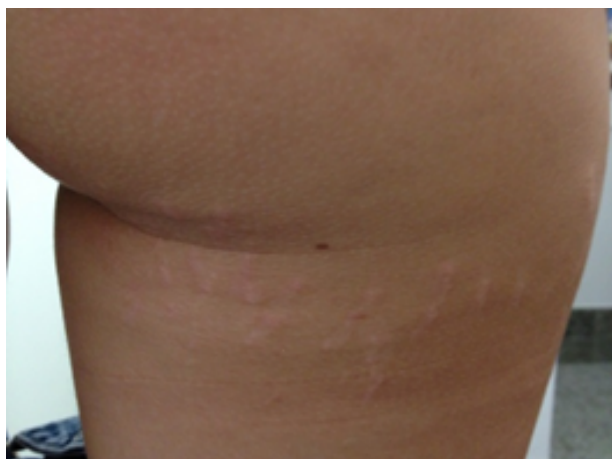
**Figure 2:** Right thigh 1 year after therapy



**Figure 3:** Left thigh before therapy



**Figure 4:** Left thigh 3 months after therapy



**Figure 5:** Posterior superior right thigh before therapy



**Figure 6:** Posterior superior right thigh 1 year after therapy

Post inflammatory hypopigmentation, which still does not have a standard protocol of therapeutic approach, is often disfiguring and/or permanent. Its pathogenesis is not yet clarified in any of the cases entailed from the above-mentioned dermatological treatment.

The therapeutic approach here proposed uses a protocol appropriate for the treatment of vitiligo and vitiloid lesions in general, having *Brosimum gaudichaudii* Trécul. This plant became famous in some dermatological treatments for vitiligo, as the core of melanogenic activation treatment. The skin, roots and fruits of this Moraceae plant has been popular in some vitiligo therapies in Midwest Brazil; its active principle is bergaptene, a furocoumarin. An ethnobotanical study performed in the city of Goiânia reports that it is mentioned by 90% of root medicine practitioners, attesting its popularity [5].

This plant is also known by several regional names, such as; aité, amapá, apê, algodão (cotton), algodãozinho, algodão do campo, apê do sertão, espinho de vintém, amoreira do mato, conduri, conduro, conduru, inharé, inhoré, mamica-de-cadela, mama-cadela, manacá-do-campo, mamica-de-cachorro, mururerana and tapireí [6]. The already studied properties of this vegetable include the following actions: antimicrobial, photo sensitizing, hepatotoxic and anticancer [7]. Demonstration of dermal photo sensitization was carried out by Martins et al. of the Dermatology Department of the Faculty of Medicine of the University of São Paulo, using alcohol solutions at 0.25% in volume and 0.01% in volume of psoralen and bergaptene from *B. gaudichaudii* Trécul. After applying the solutions in the dorsal region of 12 healthy leucodermal volunteers (six men and six women), they were exposed to fluorescent light radiation. Erythema and hyperpigmentation were observed after 72 hours in most volunteers. The most intense result occurred after 60 minutes with the psoralen solutions, showing greater hyperpigmentation than produced by bergaptene, which agrees with its chemical structure, i.e., the non-replaced furocoumarin [8].

The photodynamic property of furocoumarins is the major responsible for its relevant use in medicine and its potential for therapeutic applications deserves additional studies. The appropriate use of *Brosimum gaudichaudii* Trécul can benefit a wide range of patients all over the world. It is considered that 1% of the world population (with 4% of the population of India) have vitiligo and psoriasis patients include also about 1% of the world population, with 6 million in the United States alone. Furthermore, other therapeutic possibilities of the psoralens and vegetables that contain them are being speculated, as in the cases of pigmentous urticaria, mycoses, scleromyxedema, parapsoriasis, follicular mucinosis, palmoplantar pustulosis, lymphomatoid papulosis, alopecia areata, herpes simplex and some human or animal parasitoses, among others [9,10].

The biological importance of coumarins, such as psoralen and

bergaptene found in *B. gaudichaudii* Trécul, is undeniable. The literature on psoralen and its derivatives praise its melanogenic power [10,11]. The authors hope to redeem the importance of the study of this substance in the treatment of hypochromic lesions and other skin diseases. Its vast therapeutic potential and easy access on Brazilian soil, where, in contradiction, expensive treatments with industrialized and imported psoralens are paid for, or photo sensitizing treatments are simply abandoned for lack of resources. Other treatments for hypochromic lesions use topic corticosteroids, calcineurin inhibitors, phototherapy (such as PUVA and narrowband UVB) and photo chemotherapy, comprise the therapeutic frontline, due to their efficacy and safety. The second line of therapeutic options consists of vitamin D analogs, targeted phototherapy, oral corticosteroids and surgery. Antioxidants are also commonly used together with other therapies; on the other hand, the cutaneous depigmentation therapy should be restricted to extensive cases and those that persist to other treatments [11].

## Conclusion

The oral and topical use of *Brosimum gaudichaudii* Trécul plus sun exposure (UVA) is already established for vitiligo, and it is widely used in Brazil, since the fifties.

We now present a new indication of this psoralen for hypochromia secondary to the use of CO<sub>2</sub> fractional laser with a good result.

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