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Case report

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Treatment of Necrobiosis Lipoidica in the left forearm with association of Intense Pulsed Light and Erbium-Yag Laser 2940nm

Tratamento de necrobiose lipóidica no antebraço esquerdo com associação entre luz intensa pulsada e laser Erbium-YAG 2940nm

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ABSTRACT

Necrobiosis Lipoidica (NL) is a granulomatous dermatosis, mainly affecting people with diabetes due to collagen degeneration. Although there are different treatments, all have little response. Among the options, the Intense Pulsed Light (IPL) and the Laser Erbium-YAG enhance the production and remodeling of the collagen treating the atrophy, besides reducing the erythema by the coagulation of blood vessels. We report a case of a 24-year-old woman with type I Diabetes Mellitus who underwent NL treatment on her left forearm in seven sessions with the association of IPL and 2940 nm Erbium-YAG laser. We observed improvement in central atrophy and erythema.

Keywords: Necrobiosis lipoidica; Diabetes mellitus; Lasers; Laser therapy; Intense pulsed light therapy; Collagen

RESUMO

A necrobiose lipóidica (NL) é uma dermatose granulomatosa, que acomete principalmente diabéticos devido à degeneração do colágeno. Embora existam diferentes tratamentos, todos apresentam pouca resposta. Dentre as opções, a luz intensa pulsada (LIP) e o laser Erbium-YAG permitem aumentar a produção e remodelamento do colágeno tratando a atrofia, além de diminuir o eritema pela coagulação de vasos sanguíneos. Relata-se caso de mulher, 24 anos, com diabetes mellitus tipo I, submetida a tratamento de NL no antebraço esquerdo em sete sessões com a associação entre LIP e laser Erbium-YAG 2940nm. Observou-se melhora da atrofia central e do eritema.

Palavras-chave: Colágeno; Diabetes mellitus; Lasers; Necrobiose lipóidica; Terapia a laser; Terapia de luz pulsada intensa

INTRODUCTION

Necrobiosis Lipoidica (NL) is a relatively rare chronic granulomatous disease that affects more adults, women, and diabetic patients.^{1,2} It may occur associated with autoimmune thyroiditis, obesity, dyslipidemia, systemic arterial hypertension, rheumatoid arthritis, sarcoidosis, and inflammatory bowel disease.² Its etiology is unknown and may be the result of hypoxia due to microangiopathy and abnormal glucose metabolism by fibroblasts, resulting in collagen degeneration.^{1,2}

Clinically, it manifests as a circumscribed oval plaque, with an erythematous raised border and an atrophic center

with telangiectasia on the surface. It is typically located in the pre-tibial region,^{1,3} but can also be found on the face, trunk, and extremities.³ There is a possibility of ulceration related to overweight, hypertension, or trauma.^{1,2,3}

Histopathological examination shows collagen disorganization and degeneration, with T cells' inflammatory infiltration in the dermis and hypodermis.³

NL therapy usually consists of topical, intralesional, or oral corticosteroids. But there are several other therapeutic options such as topical retinoid and calcineurin inhibitor, PUVA, fumaric acid esters, antimalarials, anti-TNF-alpha, cyclosporine,^{1,2} pentoxifylline, intravenous immunoglobulin, skin graft, acetylsalicylic acid, dipyridamole, hyperbaric oxygen therapy, nicotinamide, benzoyl peroxide, photodynamic therapy, thalidomide, bovine collagen, clofazimine,¹ and mycophenolate mofetil.³

Intense pulsed light (IPL) treatment is based on its ability to increase collagen production (types I and III), reorganize it, and coagulate the blood vessel,³ improving the lesion's texture, and erythema. The treatment with fractional ablative lasers, which use water as their absorbing chromophore, would have a more selective action, with remodeling and increased collagen fibers production (types I and III) reducing the atrophy.

Although treatments with different types of laser and IPL appear to be promising in approaching NL, the pulsed dye laser (PDL) has case reports with conflicting results.⁴ A study reports a case of NL successfully treated with IPL after 13 sessions.³ The literature does not describe the treatment with Erbium-YAG 2940nm laser.

This paper reports a case of NL treated with IPL and Erbium-YAG 2940nm laser in a patient with long-term diabetes mellitus.

CASE REPORT

A 24-year-old woman with type I diabetes mellitus presented an oval, atrophic, yellowish plaque, with raised edges, telangiectasia, and slight flaking for two years. The lesion had 4.5 cm in diameter on the left forearm (Figure 1). The patient used injectable insulin glargine and aspart. After a clinical diagnosis of Necrobiosis Lipoidica (NL), she started the treatment with clobetasol propionate cream daily on the lesions' edges. After 45 days of unsuccessful treatment, we proposed a combined treat-

ment of IPL and Erbium-YAG 2940nm laser (Etherea® Platform). Table 1 shows the parameters used, and Table 2 describes the intervals between sessions.

The distal half was treated with IPL, and the proximal half with IPL and Erbium-YAG 2940nm laser in the first three sessions. Subsequently, the same treatment was instituted throughout the lesion.

The improvement in erythema was progressive, already noticed after the first session. After observing that there was no significant clinical difference between the portions of the lesion in the fourth session, we chose to conduct only IPL. The entire lesion was treated with IPL associated with Erbium-YAG 2940nm laser from the fifth session onwards. There was an improvement in central atrophy, less visible vessels, decreased thickness and erythema of the border (Figure 2), in addition to no further progression of the lesion. The patient is undergoing clinical follow-up.

DISCUSSION

NL remains a poorly understood disease, and conclusions about treatment have weak scientific evidence. Most cases use high-potency topical corticosteroids, and our patient received them in monotherapy at diagnosis and as adjunctive therapy in the fourth and fifth sessions. Nonetheless, it can aggravate atrophy and telangiectasia.



FIGURE 1: Pre-treatment clinical lesion presenting as an oval, atrophic, yellowish plaque, slight flaking, with raised edges and telangiectasia, 4.5 cm in diameter, in the left

TABLE 1: Scheme of treatment performed with the association of ILP and Erbium-YAG 2940nm laser in each session.

| Session | IPL (nm filter, fluency mJ / cm ² , ms) | | | LASER ERBIUM-YAG 2940nm (Tip mtz, mode // mJ / cm ² , ms) |
|---------|---|------------------------|------------------------|---|
| | 1 ^a Pass | 2 ^a Pass | 3 ^a Pass | Single Pass |
| 1 to 3 | 540, 16, 15 | 540, 16, 10 | 580, 18, 20 | 100, single // coagulation 45, 5 |
| 4 | 580, 18, 20 | 540, 17, 15 | 540, 17, 10 | — |
| 5 | 580, 18, 20 | 580, 18, 20 | — | 100, double // ablation 15, 300; coagulation 45, 5 |
| 6 | 580, 18, 40 | 580, 18, 20 | — | — |
| 7 | 580, 20, 40 | 580, 20, 20 | — | — |



FIGURE 2: Left forearm lesion six months after end of the treatment with clinical improvement of erythema and atrophy

In addition to traditional treatments, IPL and different types of laser can be used, aiming to decrease inflammatory activity and improve atrophy and telangiectasia.

Two cases already used the pulsed dye laser to treat NL, without success in a few sessions,^{1,4} but with a good response regarding the reduction of symptoms and the lesion's size in six sessions.⁴ It indicates that in NL, the treatment can be more prolonged, with more sessions, to obtain better results.

The fractional ablative Erbium-YAG 2940nm laser stimulates the production of organized type I, III and VII collagen, and elastin, with increased tropoelastin.⁵ These changes would be responsible for the improvement in skin texture, in addition to the reorganization of collagen. These facts may be

| TABLE 2: Intervals between sessions | |
|-------------------------------------|---------------|
| Interval (session) | Time (weeks)s |
| 1° and 2° | 9 |
| 2° and 3° | 7 |
| 3° and 4° | 6 |
| 4° and 5° | 5 |
| 5° and 6° | 8 |
| 6° and 7° | 13 |

responsible for the improvement of the patient's atrophy. There are no cases described with this type of treatment.

It is believed that IPL promotes a reduction in telangiectasia through its action on hemoglobin, anti-inflammatory and antiproliferative activity,⁶ acting in the production and organization of collagen fibers.³

The association of IPL and Erbium-YAG 2940nm laser allows clinical improvement with fewer sessions compared to the use of IPL alone. The production and reorganization of collagen improve the atrophy, moving the vessels away from the dermis in relation to the epidermis. In contrast, tropoelastin enhances the elasticity of the skin (which was aimed at using the combined technologies). IPL also acts by coagulating more superficial vessels, thus reducing erythema. We described an unprecedented case of NL treatment with associated use of IPL and Erbium-YAG 2940nm laser, with a moderate response after seven sessions, which remained six months after the end of the treatment. ●

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Approval of the final version of the manuscript; study design and planning; active participation in research orientation; intellectual participation in propaedeutic and/or therapeutic conduct of studied cases; critical revision of the manuscript.