



CASE REPORT

Necrobiosis lipoidica treated with intense pulsed light

Marisa Gonzaga da Cunha^{1*}, Flávia Cury Rezende¹, Ana Lucia Gonzaga da Cunha², Carlos D'Apparecida Santos Machado Filho¹

¹ Faculty of Medicine of ABC, Santo André, São Paulo, Brazil

² Federal University of São Paulo, São Paulo, Brazil

Abstract: Necrobiosis Lipoidica (NL) is a chronic degenerative disease of the collagen with higher incidence on the anterior part of lower extremities, especially the tibial area. There were a number of proposed treatments, but none is 100% effective. We present a case of a fifty-year-old female patient with a suspected diagnosis of necrobiosis lipoidica, confirmed by histopathological examination. After two years of treatment with topical corticosteroids and weekly applications of Psoralen and ultraviolet A radiation (PUVA), there were no signs of improvement and we decided to perform a treatment with intense pulsed light therapy. Over a period of 14 months, a total of 13 sessions were carried out and a satisfactory treatment result was obtained.

Keywords: Necrobiosis lipoidica; treatment; intense pulsed light

Citation: da Cunha MG, Rezende FC, da Cunha ALG, Machado Filho CDAS. Necrobiosis lipoidica treated with intense pulsed light. *J Surg Dermatol* 2021; 6(2): 65; <http://dx.doi.org/10.18282/jsd.v6.i2.65>.

*Correspondence to: Marisa Gonzaga da Cunha, Faculdade de Medicina do ABC, Santo André, SP, Brazil; dramarisagonzaga@yahoo.com.br

Received: 6th December 2020; **Accepted:** 24th February 2021; **Published Online:** 21st April 2021

Introduction

Necrobiosis Lipoidica (NL) is a chronic degenerative disease of the collagen with higher incidence on the anterior part of lower extremities, especially the tibial area. However, it occasionally occurs on other sites of the trunk, arms and face as well^[1]. It mainly affects young women, although the literature has described some cases in children^[2].

NL presents as one or more unilateral or bilateral inflammatory plaques with erythematous border and shiny atrophic center, which attributes to its characteristic yellowish color that allows the visualization of blood vessels and subcutaneous fat. The plaques slowly extend over the years and painful ulcerations occur in 15% of the cases.

The disease is frequently associated with diabetes mellitus; 65% of the patients with NL have diabetes mellitus and a significant rate of individuals present

abnormal results in glucose tolerance tests. Nevertheless, the etiopathogenic relation between NL and diabetes mellitus has not been clearly determined yet, and several hypotheses have been proposed: an abnormality in glucose transport by fibroblasts, abnormalities in the synthesis and degradation of collagen, and vascular occlusion caused by platelet aggregation alterations due to microangiopathy or by immune complex deposition.

Histological findings show that NL is essentially a granulomatous inflammatory disease whose first manifestations occur as vasculitis of small vessels, evolving into granulomatous vasculitis of medium vessels with degeneration of collagen fibers. It involves the dermis and the hypodermis in a septal panniculitis pattern. The lymphocytic component of the dermal infiltrate is predominantly composed of T-cells, in particular the T-helper cells. In many cases, studies with direct immunofluorescence show immunoglobulin deposits, especially of IgM, and complement in vessel walls.

The proposed treatments include the following: potent topical corticosteroid therapy with tacrolimus and tretinoin; intralesional corticosteroid therapy; and therapy with systemic drugs such as aspirin and dipyridamole, ticlopidine, pentoxifylline, nicotinamide, chloroquine, corticosteroids, cyclosporine and mycophenolate mofetil. Moreover, physical treatments with surgery, artificial skin grafts, PUVA, laser and hyperbaric oxygen are widely used therapies.

However, there is no treatment that is 100% effective for most cases of NL. The literature lacks more detailed studies with sufficient number of patients that demonstrate the effectiveness of the therapies mentioned above. Studies using any of these therapies show variable responses, typically with flattening of borders and almost always a partial clearing with persistent central atrophy.

Case report

We present a case of a 50-year-old female patient with a diabetic history of 23 years who in the past five years had started developing a progressive enlargement of plaques with erythematous border and yellowish atrophic center on the bilateral anterior tibial area, which allowed the visualization of blood vessels (**Figure 1A** and **1B**). She was treated with topical corticosteroids and weekly applications of PUVA over a period of two years without signs of improvement.

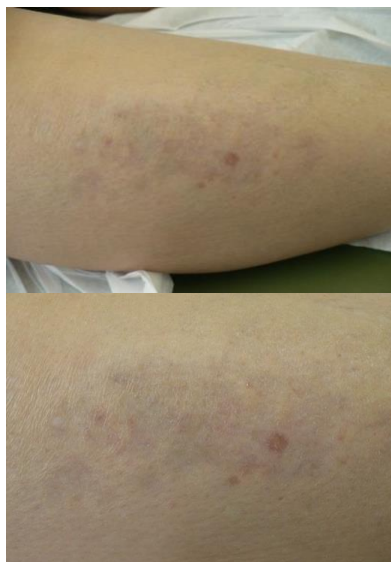


Figure 1A. Right leg before the treatment: Plaques with erythematous border and yellowish atrophic center on the bilateral anterior tibial area with the visualization of blood vessels. Skin atrophy can be observed in detail.

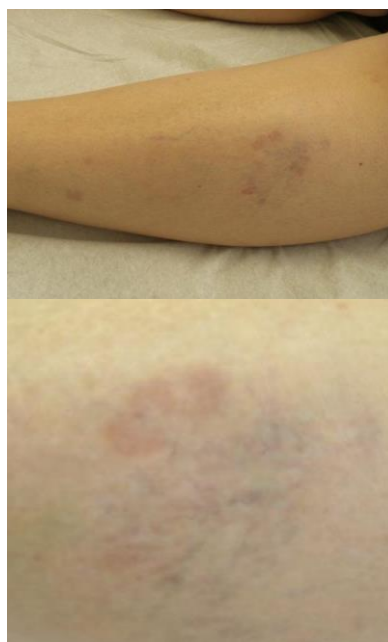


Figure 1B. Left leg before the treatment

Since there was unresponsiveness to the established treatments, the patient was treated monthly with intense pulsed light therapy. For a period of 14 months, a total of 13 treatment sessions were performed with an Intense Pulsed Light device (Active Optical System, Israel). This device is based on Geometrical Energy Management (GEM-IPL) technology, which utilizes a range of wavelengths from 420 nm to 1100 nm, pulse duration of 10 milliseconds (single-pulse mode), energy ranging from 10 to 20 sec/cm², output power levels ranging from 0 to 12, and air cooling system with pointer of 1.5x5 cm. A combination of wavelengths for oxyhemoglobin (vascular) and for collagen stimulation (rejuvenation) was chosen, with the application of 2 pulses of each (pulse duration of 8 milliseconds) and the program set to 8. The patient noticed improvement in her condition from the second session onwards. We decided not to do a biopsy of the lesion after treatment due to the diabetic patient fearing a new scar, and also due to satisfactory clinical improvement with no gain or change in medical management.

Results

After thirteen sessions an improvement in skin quality was observed, showing less vessels and the erythematous edges returned to normal, similar to the surrounding skin area (**Figure 2A** and **2B**)



Figure 2A. Right leg after treatment: Improvement in skin atrophy can be observed in detail. The central erythematous lesion is the biopsy site, hence, the diagnosis could be confirmed.

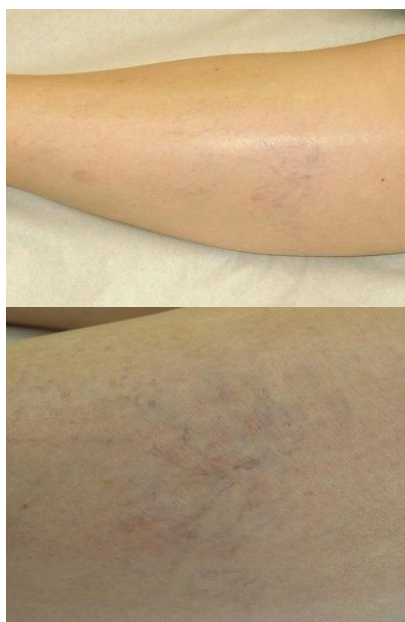


Figure 2B. Left leg after the treatment: Improvement in skin texture can be observed and the erythematous skin color has disappeared

Discussion

The Intense Pulsed Light (IPL) device, with a xenon lamp, emits incoherent polychromatic light of broad

spectrum with wavelengths between 390 and 1200 nm at varied intervals and pulse durations. Its basic principle consists of selective photothermolysis—in other words, light energy is absorbed by a specific target chromophore with energy transfer and heat generation, which promotes its subsequent modification. Wavelength can be established according to the absorption peak dependence of the target chromophore. Pulse duration should last less than the thermal relaxation time, which limits heat diffusion and lesion to nearby structures^[3,4].

With the aid of cut-off filters, the main advantage of this device is its versatility in promoting a wide range of wavelengths, fluencies, pulse duration and intervals, which allows for the treatment of a great variety of lesions. It is possible to adjust them according to the type, depth and size of the lesion as well as the patient's skin type so that maximum improvement can be achieved without epidermal loss or collateral effects^[5].

IPL has been used in the treatment of many dermatologic conditions such as acne vulgaris, vascular and pigmentary disorders, photo-aged skin and scars^[3,4]. The wavelength for the oxyhemoglobin absorption occurs between the yellow and green light portion of the spectrum, peaking at 418 nm, 542 nm and 577 nm. Collagen absorption peaks in the visible light range, close to the infrared spectra^[3].

Regarding facial rejuvenation, IPL has been used as a non-ablative resurfacing technique, which targets the dermis without affecting the epidermis. Although the exact mechanism is not completely known, tissue remodeling occurs through the formation of new dermal collagen (types I and III), the increased activity of fibroblasts and the decrease in content and rearrangement of elastin fibers with a resulting clinical improvement^[4]. A study with fibroblast cultures showed that IPL did not cause structural changes in fibroblasts; there was, however, a proliferation of fibroblasts, an increase of mRNA expression for procollagen types I and III and the consequent increase of procollagen I and III secretion rate and neocollagenesis^[5].

Today, IPL is also implemented in the treatment of a series of vascular alterations, targeting the oxyhemoglobin chromophore which is abundant in blood vessels^[3]. When activated, it causes the photocoagulation of vascular endothelium, leading to fibrosis and obliteration of blood vessels, thus ensuring improvement of the clinical condition^[4] without regulatory effects on vascular endothelial growth factors (VEGF)^[5].

We decided to use intense pulsed light as the patient had already tried all the recommended treatments, which

had resulted in zero recovery rates. As IPL stimulates neocollagenesis, it was selected due to its use as a therapeutic attempt, resulting in an excellent response.

Conclusion

Taking into consideration the positive results of IPL concerning the stimulation of the neoformation of collagen and its action on blood vessels, its use in the treatment of NL was considered. The successful outcome (**Figures 1B** and **2B**) of this case report suggested that IPL may represent a worthwhile option in the treatment of NL, offering low risks of collateral effects, especially when administered by experienced professionals^[4].

References

1. Rupley KA, Riahi RR, Hooper DO. Granuloma annulare and necrobiosis lipoidica with sequential occurrence in a patient: Report and review of literature. *Dermatol Pract Concept* 2015; 5(1): 29–34. doi: 10.5826/dpc.0501a03.
2. Ianoși SL, Tutunaru C, Georgescu CV, Ianoși NG, Georgescu DM, *et al.* Specific features of a rare form of disseminated necrobiosis lipoidica granuloma annulare type: A case report. *Rom J Morphol Embryol* 2014; 51(4): 1455–1461.
3. Sarkar A, Dewangan YK, Bain J, Rakshit P, Dhruw K, *et al.* Effect of intense pulsed light on immature burn scars: A clinical study. *Indian J Plast Surg* 2014; 47(3): 381–385.
4. Piccolo D, Marcantonio DD, Crisman G, Cannarozzo G, Sannino M, *et al.* Unconventional Use of Intense Pulsed Light. *Biomed Res Int* 2014; 2014: 618206. doi: 10.1155/2014/618206.
5. Wu D, Zhou B, Xu Y, Yin Z, Luo D. Impact of intense pulsed light irradiation on cultured primary fibroblasts and a vascular endothelial cell line. *Exp Ther Med* 2012; 4(4): 669–67. doi: 10.3892/etm.2012.664.