

Improvement of linear scleroderma of the limbs after treatment with long-pulsed 1064 nm Nd:YAG laser: A case report

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ABSTRACT

Linear scleroderma is a variant of localized scleroderma characterized by longitudinal bands of dense scleroatrophic skin sometimes causing deformities of the upper and lower extremities. Some case reports on small groups of patients suggest benefits of lasers in patients with localized scleroderma. We report a case of a twelve-year-old female with a two-year history of linear scleroderma on the right lower limb treated with 1064-nm long-pulsed Nd:YAG laser with successful results. Laser therapy may be a promising tool in the treatment of linear scleroderma.

Key words: Linear scleroderma Nd:YAG 1064 nm laser

INTRODUCTION

Linear scleroderma is a rare variant of localized scleroderma involving the superficial and deeper layers of the dermis usually beginning in childhood [1]. Fibrosis of the dermis and subcutaneous tissue leads to induration and shrinking of the skin. Depending on the extent of the lesions and the level of fibrosis, muscle and underlying bone may be affected and flexion contractures may occur. Changes in collagen tissue in these localized cases are very similar to cases of scleroderma but without visceral involvement.

No specific treatment is available for linear scleroderma.

CASE REPORT

A twelve-year-old female presented herself at our office with a two-year history of skin hardening on the right lower limb with pigmentary changes (Fig. 1). Complete blood count, the erythrocyte sedimentation rate, urinalysis, and liver and kidney function were normal.

Antinuclear antibodies were negative. A physical examination revealed a firm diffuse sclerotic band with blotchy hyperpigmentation extending from the anterior aspect of the thigh to the lower part of the right leg.

A biopsy of the lesions showed a histological pattern of scleroderma with bundles of eosinophilic collagen throughout the reticular dermis and intimal thickening, narrowing, and obliteration of vessels (Fig. 2).

The patient and the patient's relatives were informed of the self-limiting character of the disease, but all insisted on treatment, considering the disfiguring aspect of the disease. Still, no treatment protocol for linear scleroderma exists. Several topical treatments, such as corticosteroids and pimecrolimus, were unsuccessful, with the plaque continuing to increase in area and becoming increasingly hardened. Taking into consideration the patient's young age, treatments based on methotrexate, systemic corticosteroids, and PUVA therapy were not recommended.

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Table 1: Comparison of two treatment methods

Treatment	Wavelength	Spot size	Pulse duration	Fluence	Cooling	Tx Interval
LimeLight	520 to 1100 nm	10x30 mm	B	8 to 11 J	5oC	MONTHLY
Genesis	1064 nm	5 mm	0,8 ms	14J	NO	MONTHLY



Figure 1: A wide, thick sclerotic band with blotchy hyperpigmentation extending from the anterior aspect of the thigh to the lower part of the right leg.

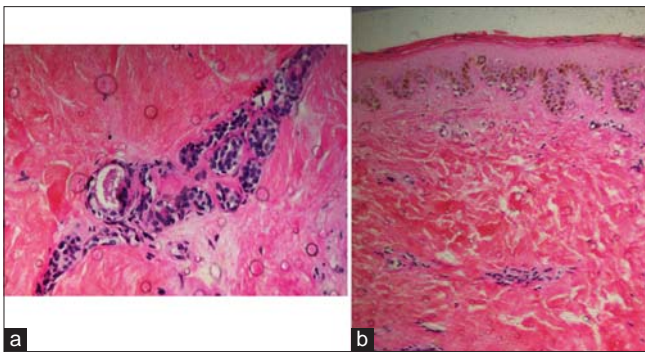


Figure 2: (a) A biopsy from the thigh showing thickened eosinophilic collagen bundles throughout the reticular dermis. (b) Lymphocyte infiltration around blood vessels and progressive vascular injury with persistent endothelial damage and narrowing and obliteration of vessels.

Sessions of 1064-nm YAG laser (Genesis) 14 J/cm² with a 5-mm spot started with monthly intervals associated with pulsed light (LimeLight) 8–11 J/cm², especially for hyperchromic parts (handpiece part of the Xeo Laser portable platform). Five laser sessions were performed (Table 1).

DISCUSSION

Although patients often receive good prognoses and spontaneous remission, linear morphea of the extremities may be accompanied by physical disability and limb length discrepancies when the underlying soft tissue and bone are involved. With the passage of time, the sclerotic bands may become thicker affecting the underlying tissues, specifically the fascia and musculature. In these cases, flexion contractures may occur resulting in the unaffected leg growing faster than the other. MRI of children with unilateral scleroderma



Figure 3: A follow-up five months later after five sessions, demonstrating softening of the plaques and improved mobility on the thigh to the lower part of the right leg area.



Figure 4: Six months after the last laser session showing the effects of the physical fitness exercises that were to normalize the muscles of the thigh and leg.

sometimes shows fascia thickening and deep tissue abnormalities in the extremities [2]. Any change in the size of the limbs may be permanent.

Presently, there is still no single, reliable, and effective treatment protocol for linear scleroderma. Given that physiotherapy may be effective in limiting disease progression and prevent the appearance of contractures, the young patient was advised to engage in physical fitness activity [3,4].

Although the use of laser is not yet enshrined in linear sclerosis, it has already been demonstrated to be very effective in organizing collagen tissue in scars, being also an effective modality in the treatment of morphea [5,6]. 1064-nm long-pulsed Nd:YAG laser suppresses collagen production and flattens keloids, as demonstrated by Abergel on cultures of keloid fibroblasts [7].

We started sessions of 1064-nm Nd:YAG laser 15 J/cm² with a 5-mm spot. After a total of five treatments with this technique, the patient showed a good improvement (Figs. 3 and 4). The treated skin became more pliable, while the plaques softened and restored their mobility nearly to that of normal skin. Pulsed light was immensely effective and was also used especially in the treatment of the hyperchromic parts. Pigmented cells are denatured and epidermal melanin first darkens and, after three days, tends to diminish.

The patient has been followed up now for two years since the procedure. In this report, we investigate the benefits of 1064-nm Nd:YAG laser (Genesis, Cutera Inc.) applied in a noncontact mode on linear scleroderma resulting in visible clinical improvement.

Consent

The examination of the patient was conducted according to the principles of the Declaration of Helsinki.

The authors certify that they have obtained all appropriate patient consent forms, in which the patients gave their consent for images and other clinical information to be included in the journal. The patients understand that their names and initials will not be published and due effort will be made to conceal their identity, but that anonymity cannot be guaranteed.

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