

Case Report

Treatment of Active Acne with a Novel High-Power 1060 nm Diode Laser: A Case Report

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Abstract

Light-based therapies have long been applied to the treatment of acne. Although 1064nm Nd: YAG solid-state lasers have been one of the most frequently used light sources due to its array of pulse durations, it requires additional expensive maintenance over time. We herein report a case of active acne treated with a novel high fluence 1060nm diode laser. The patient was a 19-year-old Caucasian woman with Fitzpatrick Phototype II skin, presenting inflammatory facial acne lesions. A 5 sessions treatment (one per week) was performed with a 1060nm diode laser applicator. The laser parameters were: 40 J/cm² fluence and 30 ms pulse duration. The 1060nm long-pulsed diode laser has been shown to be effective and safe for treating acne.

Keywords: Acne, diode laser, 1060nm, pulse duration

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Light-based therapies have long been applied to the treatment of acne, either as a first-line, second-line or complementary treatment. 1064 nm Nd:YAG solid-state lasers have been one of the most commonly used light sources due to the wide array of pulse durations available.^[1, 2] In its long pulsed and quasi-long pulsed modes, the efficacy of the wavelength has been attributed to a combination of the direct and indirect bacteriostatic effect on *Propionibacterium acnes* (*p. acnes*) through heat and the photoactivation of porphyrins, as well as a sebum regulation effect caused by partial injury of the sebaceous gland.^[1, 3]

Despite its advantages, this kind of therapy has not achieved mainstream adoption, particularly due to the elevated cost of high-energy long-pulsed Nd:YAG lasers that require additional expensive maintenance over time.^[2] However, the

recent appearance of high-energy diode lasers in a broad variety of near-infrared wavelengths (810 nm, 940 nm, 980 nm, 1060 nm, etc.), with excellent pulse quality, contact cooling and low maintenance, may change this situation.^[4] Here, we present a case of active acne treated with a novel high-fluence 1060 nm diode laser with long-pulsed emission capabilities that could emulate the results of solid-state lasers while retaining the advantages of diode lasers.

Case Report

The patient was a 19-year-old Caucasian woman with Fitzpatrick Phototype II skin who presented inflammatory facial acne lesions.

An initial clinical appointment and medical history check were performed before beginning treatment with a 1060

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nm diode laser applicator from the Primelase Excellence device (Cocoon Medical, Barcelona, Spain). The treatment protocol consisted of 5 sessions: one session per week for 5 weeks. The laser parameters were a fluence of 40 J/cm² with a pulse duration of 30 ms. The energy was applied by covering the entire surface of the face (including the upper lip, nose and glabella) with non-overlapping single shots. No topical anaesthetic was required during the procedures, but contact cooling with the applicator was applied for 5 seconds before each shot to numb the skin and increase the comfort of the patient. Evaluation was carried out through clinical imaging assessments of cross-polarised and parallel-polarised photographs.

Results

The patient experienced no pain during the procedures but did experience mild discomfort in some areas. Aside from transient erythema that remained for 5 to 10 minutes, no side effects occurred.

Parallel-polarisation photographs (Fig. 1 a, b) showed a clear reduction of acne lesions and inflammation, but also much less brightness in the skin. At all times, the photography protocol included a skin cleanse with micellar water prior to capturing any photographs, thus, the observed reduction in brightness is caused by a decrease in sebum secretion. Image brightness analysis quantified a 27.9% reduction on the cheek and zygomatic arch (Fig. 1 c, d). A redness analysis, based on the cross-polarised photographs, presented a 17.9% decrease on the cheeks after the treatment (Table 1).

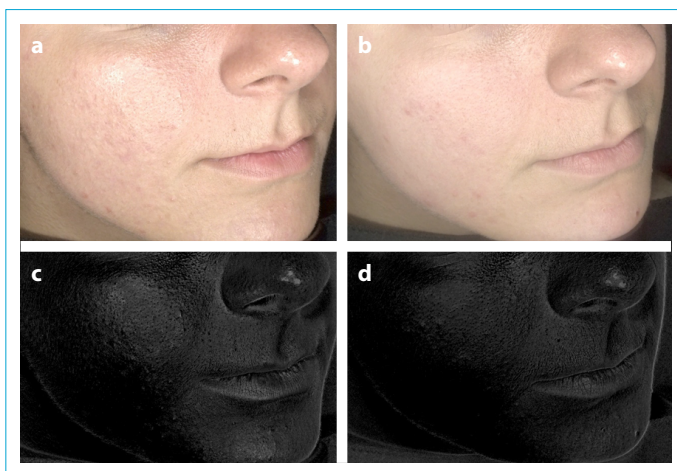


Figure 1. (a) Parallel polarized photograph of the patient before the first treatment. (b) Parallel polarized photograph of the patient one week after the fifth treatment. (c) Brightness analysis of the patient face before the first treatment. (d) Brightness analysis of the patient face one week after the fifth treatment.

Table 1. Skin measurements

	Day 0	Week 6	Change (%)
Redness	33.987	27.894	-17.9
Skin Brightness	0.492	0.309	-27.9

Discussion

Despite its many shortcomings, isotretinoin-based treatments for acne are still considered the gold standard. However, many light-based treatments such as photodynamic therapy, Pulsed Dye Lasers, 1064 nm Nd:YAG lasers, 1450 nm diode lasers, etc. have proven to be helpful and/or effective, but they do have some limitations. The 1450 nm diode has shown a higher propensity for post-inflammatory hyperpigmentation; photodynamic therapy requires an expensive drug which often makes the price of the treatment unaffordable; and Pulsed Dye Lasers have shown mixed results.^[4, 5] The 1064 nm solid-state Nd:YAG laser is the most consistent in terms of results, as its anti-inflammatory and sebum-regulating properties have already been proven in several studies.^[1, 2, 5] However, a protocol of between 4 and 5 sessions is required to obtain and sustain results, which renders the treatment far from affordable or cost-efficient.

It is the combination of producing the desired results and the need for cost-efficiency which make these results so promising. Indeed, the 5-session protocol with a 1060 nm diode laser delivered results comparable to a solid-state Nd:YAG laser. The brightness reduction is indicative of decreased sebum excretion consistent with the effect one would expect from an Nd:YAG laser. Likewise, the redness reduction is a consequence of decreased erythema, therefore the anti-inflammatory effect expected from a long-pulsed Nd:YAG laser is also obtained.^[2] These results corroborate what had been theoretically anticipated: same wavelength, same parameters, same results. The 1060 nm diode laser achieves results comparable to those of a solid-state Nd:YAG laser while still retaining the advantages of semiconductors with equal or superior safety and patient comfort thanks to the contact cooling embedded in the applicator.

Of note that no photothermal agents have been used in this work in order to only analyse the effect from the 1060nm diode laser, although it is known that photothermal agents are found to improve the results.^[6]

Conclusion

The feasibility of treating active acne using a 1060 nm long-pulsed diode laser has been demonstrated. It is an effective and safe procedure and marks the appearance of a new, more approachable and affordable alternative for this indication.

Disclosures

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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