

CASE REPORT: Sub-millisecond 1064 nm Nd:YAG Laser Hair Removal on Indian Skin

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ABSTRACT

Among many light sources currently available in the market for hair reduction, 1064 nm Nd:YAG has proved to be the safest for dark skin types like Fitzpatrick types IV and V, which are the most common in India. Large laser spots with long laser pulse durations have traditionally been used for hair reduction. This technique, although efficient, is also associated with patient discomfort and potential side effects. Recently, the use of sub-millisecond 1064 nm Nd:YAG was introduced for hair reduction and was found to be more appropriate for darker skin.

In this case report we evaluate the efficacy, discomfort and safety of the sub-millisecond FRAC3 Nd:YAG modality for long-term hair reduction. Five cases are described ranging from dark and thick to light and very fine hair.

Clinical results showed more than 50% hair reduction in all patients at 6-month follow-ups. Patient assessment was even better, with 75% average improvement described. The technique was well tolerated by the patients and no adverse effects were observed.

Key words: Sub-millisecond pulse, 1064 nm Nd:YAG laser, hair reduction.

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I. INTRODUCTION

Laser hair removal is already a very well established technique for long-term hair reduction. There are many light sources currently available in the market for hair removal, including broad spectrum IPL, ruby lasers (694 nm), alexandrite lasers (755 nm), diode lasers (810 nm), and Nd:YAG lasers (1064 nm) [1,2]. Among them, 1064 nm Nd:YAG has proven to be the safest for dark skin types like Fitzpatrick types IV and V, which are the most common in India [3–6].

Until recently, large laser spots and medium to long laser pulse durations were the generally accepted technique in laser hair removal. Typical Nd:YAG hair-removal parameters ranged between 35 to 55 J/cm² with 6 to 20 mm spot size and 15 to 50 ms pulse duration [7–10]. Most studies of 1064 nm Nd:YAG laser for hair removal on dark skin type were performed using long pulses (ms range) [3,5,6]. Long-pulsed Nd:YAG treatment was found to be efficient, but also associated with patient discomfort and occasional side effects like burns and hyperpigmentation. Recently, sub-millisecond 1064 nm Nd:YAG hair reduction was introduced and found to be more suitable for darker colored skin (types IV and V) [11,12].

In this case report we have evaluated the efficacy, discomfort and safety of this sub-millisecond FRAC3 Nd:YAG modality.

II. CASES

Five female patients of skin type V with unwanted hair over the chin and neck (2 patients with PCOS), armpits (2 patients) and cheeks (1 patient) underwent up to six sessions of laser hair removal with a SP Dynamis laser (Fotona). Hair reduction was performed with an S-11 scanner with a sequential scanning pattern using a 3 mm spot, 0.3 ms long pulses, at low fluences ranging between 20 to 25 J/cm² and frequencies varying from 6-10 Hz. Although pain was minimized in comparison to long-pulsed Nd:YAG treatment, air cooling (Zimmer Cryo 6) was still used to additionally reduce the patients' discomfort. The efficacy of the hair removal was assessed on the basis of photographs by two independent observers according to a four-grade hair reduction scale: poor (0-25%), moderate (26-50%), significant (51-75%) and excellent (76-100%). Patients were also asked to assess the hair reduction using the same scale, as well as their discomfort during the treatment using a 10 point VAS. Safety evaluation included observation of pigmentation changes and scarring.

a) Case 1

Hair reduction treatment of the underarms was performed in the Skinsense Skin and Laser Clinic in a young female with Fitzpatrick skin type V. A total of 5 sessions at one month intervals were performed using the S11 scanner (SP Dynamis, Fotona, Slovenia) with a 3 mm spot and fluence that ranged between 20 to 25 J/cm² and at 8.0 Hz and 0.3 ms pulse duration. Excellent results were achieved with an almost complete removal of hair after 4 sessions.



Fig.1 Successful hair reduction on the left armpit after four sessions, 5 months after the first treatment.

b) Case 2

A female patient suffering from polycystic ovary syndrome (PCOS) came to our clinic for laser hair-reduction treatment of the chin and neck area. Hirsutism (excessive unwanted hair growth) is quite common in women suffering from polycystic ovary syndrome (PCOS). Before the first session, coarse dark hair was observed on a very dark and pigmented skin area of the chin (Fig.2 –left). Five sessions were done with the S-11 scanner with a 3 mm spot size at a fluence of 20 – 25 J/cm², 8.0 Hz and 0.3 ms pulse duration.

Remarkable results were achieved after five sessions, showing a significant reduction of the hair as well as reduced pigmentation of the skin compared to that observed before the treatment. (Fig.2 – right).



Figure 2: Remarkable results noticed 4 months after the first treatment (right picture shows the situation after the fourth session). Reduction of hair as well as lower skin pigmentation can be observed.

c) Case 3

A female patient suffering from polycystic ovary syndrome (PCOS) was treated for hair reduction on the chin and neck. 7 sessions were performed using the S-11 scanner with a 3 mm spot size. The laser parameters were set at 20 J/cm², 8.0 Hz and 0.3 ms pulse duration.

A substantial reduction of hair was accompanied by finer and thinner hair observed after the fourth treatment session (Fig. 3 – right).



Figure 3: Reduction of hair as well as reduced hair thickness was observed after the fourth session of the treatment.

d) Case 4

Laser hair reduction treatment of the underarms is represented using short-pulsed Nd:YAG with 0.3 ms pulse duration. Two sessions were performed using the S-11 scanner with 25 J/cm² fluence at 10 Hz frequency. As seen in Figure 4, a difference in the quantity of hair as well as significant hair reduction was observed, even after just one session.



Figure 4: Significant reduction of the hair on the left axilla was observed four months after a single session of hair reduction treatment.

e) Case 5

A patient with light and fine hair around the ears was treated for hair reduction with the Nd:YAG laser in *FRAC3* mode. Three sessions were performed with 25 J/cm² and a frequency of 6 Hz. A virtually complete removal of unwanted hair was observed after only two sessions (Fig.5).



Figure 5: Nearly complete hair removal was observed after 2 sessions, 3 month after the start of the treatment.

III. DISCUSSION

Recently, a sub-millisecond 1064 nm Nd:YAG treatment mode was introduced for efficient hair reduction, based on findings that pulse duration should be lower or at least equal to the hair follicle's thermal relaxation time (TRT) if the destruction of targeted hair follicle should be achieved without any damage to the surrounding tissue. Since the TRT of the epidermis is relatively long (between 25-50 ms) [14] and the target hair follicle's TRT is typically shorter than 2 ms [15], the optimal pulse durations for hair reduction should be shorter than 5 ms [11,12].

An advanced, non-ablative fractional *FRAC3* laser method was also introduced recently, which utilizes the fractional nature of the selective photo-thermolysis at short laser pulse durations [13]. The method has been found to be highly applicable for hair reduction treatments [11,12] since shorter pulse widths allow selective heating of the hair follicle without overheating the epidermis. This method was found more suitable for darker colored skin (types IV and V), where long-pulsed treatments are more often associated with patient discomfort and occasional adverse effects such as burns and hypopigmentation. *FRAC3*, using sub-millisecond 1064 nm Nd:YAG, is also suitable for treating patients with thinner and lighter hair in which the TRT and absorption in hair follicles are the lowest.

Five cases of successful hair reduction were presented to evaluate the efficiency and safety of the *FRAC3* modality with sub-millisecond pulse duration. Clinical results rated by two independent observers showed that in all patients, more than 50% hair reduction (significant and excellent) was achieved at the 6-month follow-up. The treatment was well tolerated by the patients, who were highly satisfied with the treatment results. The average pain score was evaluated at 2.8 on a 10-point scale. The patients' assessment of the efficacy was even better than the evaluations of the professional observers, describing an average improvement of 75%. Mild transient erythema and perifollicular edema, which resolved in a few hours, were the only side effects observed. No other adverse effects or paradoxical hair growth (worsening) were noticed after the treatment.

IV. CONCLUSIONS

From our experience, we can conclude that the sub-millisecond 1064 nm Nd:YAG laser treatment is an efficient and safe method for hair reduction in darker skin types.

REFERENCES

1. Wanner M (n.d.) Laser hair removal. *Dermatologic therapy* 18: 209–216.
2. Landthaler M, Brunner R, Braun-Falco O, Haina D, Waidelich W (1986) Effects of argon, dye, and Nd: YAG lasers on epidermis, dermis, and venous vessels. *Lasers in Surgery and Medicine* 6: 87–93.
3. Chan HH, Ying SY, Ho WS, Wong DS, Lam LK (2001) An in vivo study comparing the efficacy and complications of diode laser and long-pulsed Nd:YAG laser in hair removal in Chinese patients. *Dermatologic surgery: official publication for American Society for Dermatologic Surgery* [et al] 27: 950–954.
4. Galadari I (2003) Comparative evaluation of different hair removal lasers in skin types IV, V, and VI. *International journal of dermatology* 42: 68–70.
5. Mittal R, Sriram S, Sandhu K (2008) Evaluation of Long-pulsed 1064 nm Nd:YAG Laser-assisted Hair Removal vs Multiple Treatment Sessions and Different Hair Types in Indian Patients. *Journal of cutaneous and aesthetic surgery* 1: 75–79.
6. Alster TS, Bryan H, Williams CM (2001) Long-pulsed Nd:YAG laser-assisted hair removal in pigmented skin: a clinical and histological evaluation. *Archives of dermatology* 137: 885–889.
7. Bencini PL, Luci A, Galimberti M, Ferranti G (1999) Long-Term Epilation with Long-Pulsed Neodimium:YAG Laser. *Dermatologic Surgery* 25: 175–178. 3.
8. Goldberg DJ, Silapunt S (2001) Hair removal using a long-pulsed Nd:YAG Laser: comparison at fluences of 50, 80, and 100 J/cm. *Dermatologic surgery: official publication for American Society for Dermatologic Surgery* [et al] 27: 434–436.
9. Raff K, Landthaler M, Hohenleutner U (2004) Optimizing treatment parameters for hair removal using long-pulsed Nd:YAG-lasers. *Lasers in medical science* 18: 219–222.
10. Tanzi EL, Alster TS (2004) Long-pulsed 1064-nm Nd:YAG laser-assisted hair removal in all skin types. *Dermatologic surgery: official publication for American Society for Dermatologic Surgery* [et al] 30: 13–17.
11. Matjaz Lukac, Martin Gorjan, Janez Zabkar, Ladislav Grad ZV (2010) Beyond Customary Paradigm: *FRAC3®* Nd:YAG Laser Hair Removal. *Journal of Laser Health Academy* 1: 35–46.
12. Abdelhakim Eltarky, Marko Kazic ML (2013) Avalanche *FRAC3®* Nd:YAG Laser Hair Removal. *Journal of Laser Health Academy* 1: 23–31.
13. Lukac, Sult T, Zabkar J, Gorjan M, Vizintin Z (2010) Parameters for the New *FRAC3* Nd:YAG Laser Skin Treatment Modality. [published in this issue] No.1: 47–55.
14. Lukac M, Zabkar J, Gorjan M ST (2008) *FRAC3*: Three Dimensional Non-Ablative Fractional Laser Skin Rejuvenation. *Journal of Laser Health Academy* 1.
15. Majaron B, Nelson J.S (2009) Laser treatment of port wine stains. http://complex.ijs.si/publications_PDF/Biosystem/Laser_PWS_Majaron_Nelson_2009.pdf.

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