

## **Transient Hypopigmentation induced by Q-switched Nd:YAG Laser**

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### **Abstract**

Laser Facials or laser toning has become increasingly popular in Asia. Q-switched Nd:YAG laser is the most commonly used laser for skin rejuvenation because of its deeper penetrating properties and safety in pigmented skin. However, as with any laser procedure, laser toning is associated with adverse effects. Most dreaded complications is laser toning induced hypopigmentation as they generally do not respond well to treatment (Wong et al., 2015). From our clinical experience using lower fluence (0.8-2 j/cm<sup>2</sup>), large spot size (6-10mm), sufficient treatment intervals (3-4 weeks) and less tissue response can prevent such complications. We report a case of laser-induced hypopigmentation in an Indian patient who developed hypopigmentation after laser toning despite using fluence less than 1 J/cm<sup>2</sup>, 6mm spot size and 3 week treatment intervals. Surprisingly hypopigmentation recovered with steroid cream within few days.

### **Keywords:**

Q-switched Nd:YAG laser, hypopigmentation, laser toning, steroid cream

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The Q-switched Nd:YAG laser is the most widely used laser for the treatment of melasma and non-ablative skin rejuvenation in darker skin types. Recently laser toning or low fluence, large spot size, multiple pass technique has been used in the treatment of melasma and skin rejuvenation. There is improvement in the skin tone as a result of this technique hence the term 'laser toning' (Shah & Aurangabadkar, 2019). The rate of complications after Q-switched laser is significantly lower than other lasers. The most frequently encountered adverse reactions are hyperpigmentation and hypopigmentation. Hypopigmentation in a dark skin patient causes much anxiety and is the most difficult to treat adverse effect.

The incidence of hypopigmentation following laser toning in Asian population is as high as 10% (Park & Yeo, 2016). Few cases of mottled pigmentation and confetti-like hypopigmentation have been reported following laser toning but most of the patients did not have re-pigmentation even after few months of stopping the laser treatment (Chan et al., 2010; Jang et al., 2015; Park & Yeo, 2015; Polnikorn, 2008; Wattanakrai et al., 2010; Wong et al., 2015). We are presenting a case report of Q-switched 1064nm Nd:YAG laser-induced transient hypopigmentation which resolved completely with topical steroid treatment in few days

### Case presentation

A 29-year-old male patient of Fitzpatrick skin type V approached us for uneven skin tone and skin rejuvenation. On

examination, he had hyperpigmented macules over his forehead, nose, and lower lips. He used sunblock and glycolic acid cream 10% as his daily skin care. He was treated with Q-switched 1064nm Nd:YAG laser (Tribeam, Jeisys). The parameters used for the first session for the whole face were 2 passes of 6mm spot size, 1.5 J/cm<sup>2</sup> Fluence, frequency of 6 Hz and 2 passes of 4mm spot size, 1.5 J/cm<sup>2</sup> Fluence, frequency of 6 Hz using top-hat beam mode. The endpoint was mild erythema.

The subsequent session was scheduled after 3 weeks. During the second session patient didn't want to shave his beard but insisted on laser treatment for melasma. After discussing about the possibility of pigmentary complications, laser toning was done. The parameters used for the upper face were 2 passes of 6mm spot size, 1.8 J Fluence, 6 Hz of frequency, and 2 passes of 4mm spot size 1.5J Fluence, 6 Hz frequency avoiding the beard area. Area below the lower lips where there was no hair was treated with 2 passes of 6mm spot size, 6 Hz frequency and 0.7 J Fluence. As much as possible the area of the face with hair was avoided. Clinical endpoint of mild erythema was achieved. The patient was given an appointment after 3 weeks for next treatment. The patient noticed hypopigmented macules below the lower lip 3 days after the 2nd session. There was no family history of vitiligo. The patient was advised to apply mometasone 0.1% ointment and visit the clinic as early as possible for further evaluation. The patient visited the clinic after 2 weeks and noticed the hypopigmentation has completely re-pigmented.



Figure 1: 3 days after the 2<sup>nd</sup> session of laser toning



Figure 2: 2<sup>nd</sup> week after the 2<sup>nd</sup> session

## Discussion

Traditional Q-switched Laser treatment is based on the principle of selective photothermolysis which uses a high fluence to destroy the pigment containing cells (melanocytes), because of cell death there will be a release of prostaglandins and cytokines which results in an inflammatory state and damage to the basement membrane. In laser toning due to the use of low frequency and large spot size Q-switched laser, subcellular selective photothermolysis takes place (Kang et al., 2011; Kim et al., 2010; Mun et al., 2011). This causes minimal damage to the melanocytes but destroys the melanosomes and melanin granules within the melanocytes and keratinocytes but keeping the cell membrane and nucleus intact thus avoiding cell death. The long dendritic process of hyperactive melanocytes is cut off (dendrectomy) and there is functional downregulation of melanocytes which results in the production of a reduced number of melanosomes (Kang et al., 2011; Shah & Aurangabadkar, 2019).

Laser toning parameters and techniques have the biggest impact on the development of hypopigmentation. Laser-induced hypopigmentation was thought to be associated with skin inflammation and epidermal disruption caused by excessive thermal damage with high fluences. Most of the published studies emphasized the use of lower fluences (0.8-2.0 j/cm<sup>2</sup>), larger spot size (6-10mm), longer treatment intervals (2-4 weeks), and mild tissue response (faint erythema or 3-4 passes) to prevent the complication of hypopigmentation and close monitoring of signs of complications and immediate discontinuation once hypopigmentation appears to optimize the outcome and avoid irreversible hypopigmentation (Park & Yeo, 2015; Shah & Aurangabadkar, 2019).

Ideally beard and mustache have to be shaved in male patients before performing the procedure. But this patient had a video shoot the

following week and his hyperpigmentation has reduced after the first session and so insisted on continuing laser treatment avoiding the hairy areas. We assume our patient developed hypopigmentation in spite of using lower fluence of 0.7J/cm<sup>2</sup> and larger spot size (6mm) due to more energy absorption by thick hair follicles and darker skin tone. Hypopigmentation resolved once the skin inflammation was treated with steroids.

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