

Case Report

Treatment of a Congenital Melanocytic Nevus by New Combination Therapy: Intense Pulsed Light Therapy and Dr. Hoon Hur's Golden Parameter Therapy

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Abstract

A congenital melanocytic nevus (CMN) is present at birth in approximately 1% of newborn infants. Treating CMN with a single laser without complications is very difficult because of the deep-penetrating nature of the nevus cells in this lesion. A 51-year-old female patient presented with a single 8 cm x 14 cm sized dark brown to black plaque with scar on the left side of face. She received 10 treatment sessions of an intense pulsed light therapy and then 20 treatment sessions of Dr. Hoon Hur's Golden Parameter Therapy with a high fluence 1064 nm Q-switched Nd: YAG laser. Complete clearance of CMN was obtained and no side effects were observed. This result has been maintained for up to 24 months' follow-up. We suggest that this new combination treatment will be a good option for treating CMN with minimal scarring.

Keywords: Congenital melanocytic nevus, Intense pulsed light, Q-switched Nd:YAG laser, Dr. Hoon Hur's Golden Parameter Therapy

Introduction

Congenital melanocytic nevus (CMN) is a pigmented lesion composed of nevus cells present at birth or immediately after birth. It is known to be found in approximately 1% of neonates [1]. It is usually categorized by the maximum diameter of the lesion. In general, the lesion less than 1.5 cm in diameter is classified as a small type, the lesion from 1.5 cm to 20 cm as a medium type, and the lesion from 20 cm and more as a giant congenital melanocytic nevus. Currently, various treatment options such as surgical resection, cryotherapy, chemical peeling, electrical cautery and laser therapy are tried for the treatment of CMN. However, there is no satisfactory treatment to remove the entire nevus cells, improve cosmetic problems and preserve perilesional function [2]. We report the case of a female patient with congenital melanocytic nevus of the face who was treated with the new combination therapy of an intense pulsed light (IPL) and Dr. Hoon Hur's Golden Parameter with a high fluence 1064 nm Q-switched Nd: YAG laser.

Case Report

A 51-year-old female patient presented with a single 8 cm x 14 cm sized dark brown to black plaque on the left side of face and also had a single 3 cm x 5 cm sized scar on the forehead due to the previous CO₂ laser treatment and Er-YAG laser treatment (Figure 1,2). She was clinically diagnosed with CMN and received 10 treatment sessions of an IPL (E-tonning, Union Medical, South Korea) therapy with a wavelength of 560 nm, a fluence of 10 J/cm², a pulse duration of 10ms and single pulse, and then 20 treatment sessions of Dr. Hoon Hur's Golden Parameter Therapy with a high fluence 1064 nm Q-switched Nd: YAG laser (Spectra laser, Lutronic, South Korea) with a spot size of 7 mm, a fluence of 2.4 J/cm² and a pulse rate of 10 Hz with slowly one pass by sliding-stacking technique.

In order to remove the CMN and prevent the occurrence of side effects such as bullae and scars, IPL was irradiated at a distance of about



Figure 1: A single 8cm x 14cm sized brown to black plaque with scar on the left side of face (before treatment:2013/1/12).

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Figure 2: A single 8cm x 14cm sized brown to black plaque with scar on the left side of face (before treatment:2013/1/12).



Figure 3: About 95% clearance of CMN (after IPL therapy:2013/12/23).

0.5 cm between the hand piece and the skin surface of lesion without applying the gel to the lesional site. The about 95% of lesional size was significantly reduced after 10 treatment sessions of IPL therapy at a two-week interval (Figure 3,4). And then Dr. Hoon Hur's Golden Parameter Therapy with a high fluence 1064 nm Q-switched Nd: YAG laser was performed 10 treatment sessions at a one-week interval. After that, the remained nevus cells was all removed and the result was clinically satisfactory (Figure 5,6). During the 24 months' follow-up period after the end of the treatment, the patient was observed without any side effects or recurrence (Figure 7,8).

Discussion

Congenital melanocytic nevus (CMN) is histologically presented by the proliferation of nevus cells in the epidermis, dermis, or both. It tends to better involve the hair follicles, sweat glands, sebaceous glands, blood vessel walls and nervous tissues than acquired melanocytic nevus. Sometimes the nevus cells penetrate deep into the reticular dermis or the subcutaneous fat layer [1,2]. The color of the lesion is mainly brown or black. The shape of the surface is most commonly flat, but may be raised, rugged, nodular, or accompanied by hair. In proportion to the growth of the body with age, the size may gradually increase, the color may darken, and the thickness may become thicker [1,2]. Because the CMN not only causes cosmetic problems, but also has the possibility of progressing to the malignant melanoma, the treatment method should be decided in consideration of this [3,4]. It is very rare that the small-sized CMN and medium-sized CMN progress to a malignant melanoma, so prophylactic resection is still controversial. But 2.3% of the Korean patients with giant CMN may progress to a malignant melanoma [3]. Therefore, treatment should be performed to preserve the function of the lesional site, to improve cosmetic problems, and to remove the nevus cells as much as possible



Figure 4: About 95% clearance of CMN (after IPL therapy:2013/12/23).



Figure 5: Complete clearance of CMN (after Dr. Hoon Hur's Golden Parameter Therapy:2014/11/17).



Figure 6: Complete clearance of CMN (after Dr. Hoon Hur's Golden Parameter Therapy:2014/11/17).



Figure 7: There is no recurrence at 24 months' follow-up (2016/12/16).



Figure 8: There is no recurrence at 24 months' follow-up (2016/12/16).

[5,6].

If the lesion occurs in a cosmetically or functionally important area or the lesion is large, laser treatment is performed to minimize scarring [7]. Laser resurfacing with CO₂ laser or Er: YAG laser delicately vaporizes the lesions of the CMN from the epidermis to the upper dermis. But it often damages the papillary dermis or deeper dermis, leaving a depressed scar or hypertrophic scar [8,9]. In addition, conventional laser treatments may also result in exudate or edema. And the recovery time is very long. If the nevus cells are in

deep dermis, it is difficult to remove effectively [10]. The Q-switched Nd: YAG laser, the Q-switched ruby laser, and the Q-switched alexandrite laser, which targets melanocytes, have been used to remove CMN with scarring using selective photothermolysis. But the therapeutic effect is not permanent and recurrence is common [6]. Thus, it is difficult to treat the CMN with single type of laser effectively. Therefore, the combination treatment of laser has been attempted, and this combination treatment can be expected to shorten therapeutic period and minimize side effects.

The goal of the combination therapy of laser is to remove both the epidermal nevus cells and the nevus cells that located deeper than epidermis without scarring [11]. Removal of the epidermal nevus cells using a non-selective laser allows more efficient penetration than the selective laser to remove nevus cells [12]. In order to provide safer and more effective treatment, various methods of combination therapy have been reported. Dave and Mahaffey [13] treated three patients by combination of CO₂ laser and Q-switched Nd: YAG laser. As a result, one patient had a partial recurrence, while the other two patients showed a relatively good improvement. They reported that CO₂ laser is superior to curettage because it has less bleeding. Abdelaal and Iman [11] compared the single use of Q-switched Nd: YAG laser with the combination of Q-switched Nd: YAG laser and Er: YAG laser or CO₂ laser, and reported that the combination therapy of Er: YAG laser and Q-switched Nd: YAG laser was more effective and minimized adverse effects. But generally, the treatment of CO₂ laser or Er: YAG laser have a long recovery time. Since exudates are generated in the treated area, dressing must be performed and the possibility of scarring is very high. There is a disadvantage that in most cases, local or general anesthesia is required to remove pain and anxiety in children.

In our case, a combination of an IPL therapy and Dr. Hoon Hur's Golden Parameter Therapy [15,16] with a high fluence 1064nm Q-switched Nd: YAG laser with a spot size of 7 mm, a fluence of 2.4 J/cm² and a pulse rate of 10 Hz with slowly one pass by sliding-stacking technique was tried to find a safer and more effective treatment for CMN than the methods tried so far. The advantage of IPL therapy is that the recovery time is short, the dressing is not necessary because of no exudates, and the side effects such as scar formation are relatively low [14]. IPL therapy is also suitable for multiple treatments of children. Because there is no need for anesthesia and the procedure time is as short as 1-2 minutes, it is easy to cooperate with pediatric patients.

The nevus cells of CMN containing the melanin pigment which is the target of IPL therapy are abundant in the epidermis and dermis [14]. So using any wavelength (400-750 nm) at which melanin pigments absorb light, we can remove the nevus cells and reduce the lesional size. Theoretically, using relatively long wavelengths (615-750 nm) seems to penetrate into the deeper dermis and remove the nevus cells effectively. However, using a long wavelength may cause bullae, which may lead to a depressed scar or hypertrophic scar [14]. In fact, we have experienced these side effects after treating patients with long wavelengths of IPL. If a fluence of 12 J/cm² when treating freckles or lentigines was used, a possibility of scarring due to heat damage might be more. Therefore, it is safe to use a relatively short wavelength and an energy density lower than 12 J/cm² in order to minimize scarring by preventing the destruction of the papillary dermis [14]. In our case, we irradiated with a fluence of 10 J/cm² (560 nm, single pulse). Since the irradiation of 560 nm wavelength penetrates superficially as compared with the longer wavelength, the pulse duration was set to 10 ms, which is the maximum width of the thermal relaxation time of the epidermal cells. To confirm the occurrence of side effect such as bullae, IPL was irradiated at a distance of 0.5 cm between the handpiece and the skin surface of lesion without applying the gel to the lesion. And then, treatment methods of 1 pass with single pulse, 2 passes with double pulse, or 3 passes with triple pulse was used and it could safely destroy epidermal nevus cells and cause less damage to the papillary dermis. When the IPL was irradiated without applying the gel to obtain the visual field, it was observed that the lesion forms a crust with smoke. Dressing was not necessary since bleeding or exudates did not be produced after the treatment.

IPL therapy was performed at a two-week interval, and the 95% of lesion was removed after 10 treatment sessions. And then Dr. Hoon Hur's Golden Parameter Therapy [15,16] with a high fluence 1064 nm Q-switched Nd: YAG laser with a spot size of 7mm, a fluence of

2.4 J/cm² and a pulse rate of 10 Hz with slowly one pass by sliding-stacking technique was used to remove the residual nevus cells in the deep dermis. In this way, Dr. Hoon Hur's Golden Parameter Therapy [15,16] with a high fluence 1064 nm Q-switched Nd: YAG laser was performed 20 treatment sessions at a one-week interval and the lesion of CMN was removed completely. No adverse effects such as hypertrophic scar and depressive scar were observed. It is thought that the significant decrease in lesional size after IPL therapy is due to photothermal effect [14]. In our experience, severely elevated lesions, papillary lesions on the surface, dark black colored lesions with abundant pigments, or hairy lesions were responded to IPL therapy very well. On the other hand, macular lesions, lesions with smooth surface, brown colored lesions with rare pigments, or hairless lesions were poorly treated with IPL. We believe that Dr. Hoon Hur's Golden Parameter Therapy [15,16] with a high fluence 1064 nm Q-switched Nd: YAG laser with a spot size of 7 mm, a fluence of 2.4 J/cm² and a pulse rate of 10 Hz with slowly one pass by sliding-stacking technique to CMN may destroy the residual nevus cells in the epidermis and dermis without keratinocyte damage, accelerate apoptotic nevus cell death and improve the hypertrophic scar and depressive scar due to microsubcision through photothermal effect [17,18]. The mechanism of microsubcision through photothermal effect due to Dr. Hoon Hur's Golden Parameter Therapy is that in the nevus cell, melanin chromophores absorb the photons of a 1064 nm Q-switched Nd: YAG laser light, the melanin-absorbed photons may destroy the nevus cells as a primary target, and photothermal effect and plasma formation may microsubcise the fibrosis of scar tissue as a secondary target, therefore result in scar remodeling [17,18].

Conclusion

To date, there have been no reported cases of CMN treated with combination treatment of IPL and a high fluence 1064 nm Q-switched Nd: YAG laser. In our case, combination therapy of IPL and Dr. Hoon Hur's Golden Parameter with a high fluence 1064 nm Q-switched Nd: YAG laser with spot size of 7 mm, a fluence of 2.4 J/cm² and a pulse rate of 10Hz with slowly one pass by sliding-stacking technique may minimized scar formation and improved patient's satisfaction by complete elimination of the lesion. There is no recurrence at 24 months' follow-up. However, continuous follow-up and additional clinical data is needed to know if it can reduce the incidence of malignant melanoma after treatment. We report a case of new combination therapy for CMN with IPL and Dr. Hoon Hur's Golden Parameter with a high fluence 1064 nm Q-switched Nd: YAG laser because it is thought that more effective and safe treatment results than conventional combination therapy can be expected.

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