

# CASE REPORT: Treatment of Patients with Congenital Capillary Angiodysplasia (PWS) of the Face with 1064 nm Nd:YAG Laser

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## ABSTRACT

Port-wine stains (PWS) are a benign congenital, progressive capillary vascular malformation of the skin. The current standard of treatment for PWS is the pulsed dye laser (PDL) of 595 nm wavelength, but unfortunately only approximately 40% of PWS patients respond optimally to PDL. The two presented cases demonstrate the safe and effective use of 1064 nm Nd:YAG in facial PWS treatment. We achieved significant clearance with high patient satisfaction and no side effects in our 2 cases of patients with common PWSs (non-resistant, shallow and thin) with long-pulse 1064 nm Nd:YAG.

**Key words:** Port-wine stain, Nd:YAG, facial.

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## I. INTRODUCTION

Port-wine stains (PWS), also referred to as “nevus flammeus,” are a benign congenital, progressive capillary vascular malformation of the skin, occurring in 0.3% to 0.5% of newborns, affecting males and females and all racial groups equally. It most often occurs on the face [1,2]. A port wine stain is usually a large flat patch of purple or dark red skin with well-defined borders, frequently darkening at puberty because of progressive dilation of the abnormal vessels. It often becomes raised as a result of the development of vascular papules or nodules (“cobblestone formation”) [3] or due to thickening by adulthood. It is often reported that facial port-wine stains cause greater self-doubt in interpersonal interactions and can result in a significant degree of psychological morbidity [4,5]. There are no known risk factors for PWS. PWS may also be acquired secondary to trauma in rare cases [6,7].

The current standard of treatment for PWS is

pulsed dye laser (PDL) with 595 nm wavelength [8]. Unfortunately, only approximately 40% of PWS patients respond optimally to PDL [9] due to its low penetration depth [10]. The Nd:YAG laser with 1064 nm wavelength is more effective with dark, deeper and thicker resistant PWS [11,12] and at least as good as PDL for the majority of other (non-resistant) PWS [10, 11, 13, 14].

The aim of this Case Report is to evaluate treatment effectiveness among patients with (non-resistant) congenital capillary angiodysplasia on the face using 1064 nm Nd:YAG laser (SP Dynamis, Fotona, Slovenia) based on our own modified method.

## II. CASES

### a) Case 1

A 56-year-old woman came to the Omega Clinic with a port-wine stain, which she had from birth on the left temporal region of her face. The size of the lesion was about 5x6 cm; it was dark purple and blanched or turned to bright pink when pressure was applied. The PWS has not been treated before.



Fig. 1: Before the treatment

The lesion was treated with a long pulse 1064 nm Nd:YAG laser (SP Dynamis, Fotona, Slovenia). The therapy began with test session in which the following parameters were used: 4 mm spot size, fluence of 60-80 J/cm<sup>2</sup>, 10 ms pulse duration and frequency of 1.5 Hz. In the following sessions the fluence was gradually increased up to 180 J/cm<sup>2</sup> in the last session. In total, 10 sessions were performed with one month intervals. To prevent the possibility of scarring in each session, only 1 pass was performed in a “mosaic” pattern with spots separated between each other for 1-2 mm. There was no anesthesia used; only cold air cooling (Cryo 6, Zimmer, Germany) was used during the procedure. A superficial burn-like reaction happened immediately after the procedure that subsided in about 2-3 weeks. After the treatment, dexapanthenol ointment was recommended twice daily for 10 days. The evaluation of the results was performed immediately after each procedure (immediate results) and at every visit before the next procedure (intermediate results). The final results were analyzed 12 months after the first procedure.



Fig. 2: 1 year after the treatment

#### b) Case 2

A 32-year-old woman with a congenital anomaly (port-wine stain) located on the face and scalp came to the Omega Clinic seeking improvement. The patient was previously treated by an unknown laser with unknown parameters. The treatment resulted in a scar formation and the patient was not satisfied with the results. The size of the lesion was about 10x9 cm; it was dark purple and blanched or turned to bright pink when pressure was applied. The lesion was treated with long-pulse 1064 nm Nd:YAG laser (SP Dynamis, Fotona, Slovenia) in the same way as described for Case 1. Also in this case, 10 sessions were performed with one-month intervals and the final results were assessed at 12 months after the first procedure.



Fig. 3: Before the first treatment at our clinic

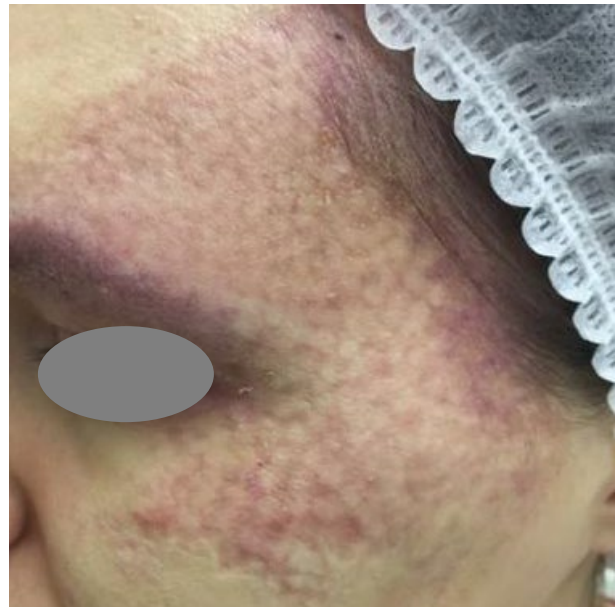


Fig. 4: 1 year after the treatment

### III. DISCUSSION

Prior to the introduction of laser therapy, many different treatment modalities have been used, including excision with skin grafting [15], cryotherapy, ionizing radiation, dermabrasion, electrotherapy, or tattooing [16], which are no longer used presently. The current standard of treatment for PWS is pulsed dye laser (PDL) with 595 nm wavelength, as this is highly absorbed in the oxygen-carrying molecule of the blood, hemoglobin, and has low absorption in melanin, thereby reducing injury to the epidermis [8]. Unfortunately, only approximately 40% of PWS patients respond optimally to PDL [9] due to its low penetration depth with deeper and thicker PWS and because of several other inevitable factors such as

epidermal melanin content and optical shielding by superimposed vessels [10].

The Nd:YAG with 1064 nm wavelength is more effective with dark, deeper and thicker resistant PWS [11, 12] and at least as good as PDL for the majority of other (non-resistant) PWS, but has to be used by an experienced practitioner since it is more likely to cause scarring and/or dyspigmentation [10, 11, 13]. Yang also showed that patients preferred 1064 nm Nd:YAG over 585 nm PDL based on self-assessment using a VAS tool, because of less purpura [13]. On the other hand, he also agrees with Savas [10] and Zhong [11] that 1064 nm laser has a very narrow therapeutic window and that only a small alteration in the treatment can lead to hypopigmentation or scarring. The pulse durations used with 1064 nm Nd:YAG treatment differ quite a lot, from 0.1 ms to a few 100 ms [11–14, 17], but since shorter pulse durations are most frequently used, we chose to work with 10 ms. We achieved significant clearance with high patient satisfaction and no side effects in our 2 cases of patients with common PWS (non-resistant, shallow and thin) with 1064 nm Nd:YAG.

Since this is only a 2-case report, further studies comparing PDL and 1064 nm Nd:YAG with non-hypertrophic (“common”) PWS should be conducted preferably as a split lesion study. The suggested parameters for Nd:YAG would be around 150 J/cm<sup>2</sup> with 10 to 30 ms pulse duration, and for the PDL side 6 – 8 J/cm<sup>2</sup> with 0.5 ms pulse duration should be used. PWS treatment is almost always a multiple-session treatment plan, but the number of sessions differs with different lesions and with different patient expectations. In most of the cases you need at least 5–6 sessions. The suggested follow-up should be at least 6 months if not 1 year after last treatment.

Our cases show that 1064 nm Nd:YAG is a promising laser wavelength not just for treating resistant, hypertrophic port-wine stains as previously suggested, but also for other types and kinds of PWS if proper parameters are used.

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