

Successful treatment of facial port-wine birthmark in a premature infant



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INTRODUCTION

Port-wine birthmark (PWB) is a congenital slow-flow capillary malformation of the cutaneous superficial vascular plexus. Occurring in up to 0.5% of newborns, PWB shows no gender predilection and is equally prevalent in premature and full-term infants.¹ PWB appears most often on the face and persists throughout life. At birth, PWB typically presents as a well-defined, bright or deep red patch. With time, it expands commensurate with the child's growth, but has a propensity to become darker, hypertrophic, nodular, and potentially disfiguring, leading to significant functional impairment and psychosocial morbidity later in life.²

The current modality of choice for treatment of PWB is high-energy pulsed dye laser (PDL), which selectively targets hemoglobin and results in photo-coagulation of the PWB vessels.¹ When performed by a highly trained expert at sufficient frequency, PDL is a safe, effective treatment and successful in most patients, with earlier treatment yielding maximal clearance.³

Infants can begin treatment of PWB safely within the first few days after birth as an in-office procedure. Early initiation of PDL therapy during infancy is well-tolerated, provides superior long-term results, and produces a much less evident lesion by the time the child is psychologically aware.^{1,3,4} However, optimal timing of the initiation of treatment has yet to be established in prematurely born infants.

We present a case of facial PWB in a premature infant who initiated treatment 20 days before his due date using the 595-nm PDL with no adverse effects. This early approach appears to represent a safe treatment option for premature infants with PWB.

Abbreviations used:

PWB: port-wine birthmark
PDL: pulsed dye laser

CASE REPORT

A premature male infant born at 35 weeks of gestation presented at 2 weeks of age with a PWB on the left part of the upper cutaneous lip, nose, medial part of the left cheek, and medial part of the left upper and lower eyelids (Fig 1, A).

Treatments were performed in the clinic using the 595-nm PDL (Vbeam Perfecta, Candela Corp) without topical or general anesthesia. Fluence settings ranged from 7.5 to 8.75 J/cm², with a 10-mm spot size, 1.5-ms pulse duration, and dynamic cryogen spray cooling (30 ms prior to each laser pulse followed by a 20-ms delay). Treatment endpoint was purpura. Treatments were performed every 2 weeks for a total of 14 treatments with complete resolution by 6 months of age (Fig 1, B).

Eye protection was achieved by placing a stainless steel corneal shield in the left eye after applying an ophthalmic anesthetic solution. External protection was utilized for the right eye. The patient's head was stabilized by nurses during treatment. Side effects included only expected short-term erythema, edema, and purpura. No atrophic or hypertrophic scarring, hyperpigmentation, or hypopigmentation occurred.

DISCUSSION

A strong body of evidence supports the prompt institution of PDL therapy for PWB during early infancy. The superior clinical outcomes achieved

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Fig 1. Successful treatment of facial port-wine birthmark (PWB) in a premature infant. Clinical photographs of a premature infant who underwent 14 in-office sessions of pulsed dye laser treatment for facial PWB. Treatment began at 2 weeks of age (**A**) and was completed at 6 months (**B**) with excellent clearance.

with this early approach include improved clearance, earlier clearance, fewer overall treatments, and lower risk of recurrence.³ Furthermore, PDL has an excellent safety profile in infancy and can be performed in the clinic setting at this age, circumventing the negative neurologic sequelae in young children exposed to repetitive general anesthesia.³

In this report, early PDL treatment of the facial PWB of our premature patient was instituted with excellent clearance by 6 months of age and no adverse effects, underscoring the value of treating PWB in early infancy. The immature cutaneous barrier and microcirculatory network are critical factors of premature infant skin contributing to the efficacy of early treatment in this patient population.

The skin of premature neonates is much thinner than that of full-term newborns. The stratum corneum matures rapidly after birth, but fully functional and structural epidermal maturation requires more than 4 weeks in premature infants.⁵ Additionally, premature neonates have a more edematous papillary dermis composed of smaller collagen fibrils compared with that of full-term neonates.⁶ These characteristics of the premature skin barrier may allow optimal targeting of vessels, as less collagen in the thinner skin barrier allows for less back-scattering and better penetration of the laser beam.⁷

The microvascular capillary network in the skin of premature neonates is considerably different from that of full-term neonates. In an analysis of premature infants (gestational age, 24-34 weeks), a distinct premature microvascular phenotype was characterized through non-invasive in vivo photothermal imaging technology.⁸ Compared with healthy age-matched full-term neonates, premature infants have

an increased density of proportionately smaller-diameter vessels, resulting in an overall lower cutaneous surface area covered by vessels. Interestingly, this premature vascular phenotype persists, as the infants reach term age, and is not yet organized until 14-17 weeks of age.⁹

Furthermore, premature infants exhibit a physiologically increased fetal hemoglobin concentration during the early neonatal period.¹⁰ Based on the principle of photothermolysis, the increased hemoglobin concentration would be expected to result in enhanced conversion of laser light into thermal energy and subsequent photocoagulation of vessels.

With a decreased vessel surface area composed of hemoglobin-rich small-caliber vessels accessed through a reduced skin thickness, premature infant skin is primed to respond maximally to PDL treatment. These characteristics unique to premature infant skin may explain the enhanced efficacy of PDL treatment in our patient. We conclude that in infants born prematurely with PWB, PDL treatment can be safely initiated within the first few days after birth and confers a benefit of enhanced efficacy; however, larger studies are warranted for stronger evidence.

Conflicts of interest

Dr Chelsea Fidai has no conflicts of interest to declare. Dr Roy G. Geronemus is on the medical advisory board for Candela.

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