

## Early Intervention in Pediatric Hemangiomas with the VascuLight™ Intense Pulsed Light / Laser Source

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### INTRODUCTION

Infant hemangiomas are a common occurrence, yet the pathogenesis, classification and treatment management of such vascular conditions is embroiled in controversy. Proponents for early aggressive treatment propose that intervention may prevent spreading of the lesion, as well as hasten regression. Furthermore, early treatment addresses the issue of the psychological effects of such anomalies on the patient's family. Adversaries to this approach argue that in most cases involution occurs

spontaneously and that treatment is not warranted except when the hemangioma is life threatening.

Despite the benign course of many cutaneous hemangiomas, a considerable number of these tumors may cause severe complications or even permanent functional impairment or disfiguring lesions. Rapid growth with ischemia, necrosis and ulceration causes pain and poses a risk of hemorrhage, infection and scarring. Even vital structures, such as ears, eyes and



A



B



C

**Case 1:** A) Female baby with a congenital hemangioma on the right upper eyelid. B) Systemic therapy with corticosteroids over a period of several months resulted in reopening of the eye. Reduction in systemic therapy led to hemangioma regrowth. IPL therapy was initiated at one year to reduce the risks of prolonged steroid therapy. C) Complete involution of the tumor at ~ 2 years after the initial IPL treatment and a total of 12 treatments (drug therapy was terminated after the 3rd IPL treatment). No occurrence of scarring or pigmentation.

airways may be occluded by bulky hemangiomas. Furthermore, infants afflicted with hemangiomas are often irritable, feed poorly, have disturbed sleeping patterns and may show developmental delays. Therefore, due to the clinical heterogeneity of hemangiomas, which vary in depth and location, as well as onset, stage of evolution, rapidity of growth and involution, it is necessary to carefully evaluate and monitor hemangiomas and to determine a treatment plan. The clinical details of the lesion should be documented with photography and duplex ultrasonography and in critical cases, MR tomography should be a regular part of patient monitoring.

A number of treatment options exist for the management of hemangiomas. There are minimally invasive techniques such as cryotherapy, local or systemic medications with corticosteroids or interferon alpha, as well as more aggressive techniques such as surgical excision. Recently, advances in laser technology have revolutionized treatment of hemangiomas. Early systems were successful for superficial hemangiomas, but those that addressed deeper lesions posed a high risk of scarring.

In addition to advances in the treatment of hemangiomas, new information has been discovered. Different immunohistochemical markers have been identified that appear to correlate with the various growth stages of the hemangioma. Possible risk factors, such as chorionic villus sampling, premature infants, and genetic factors, have been suggested. These recent findings in regard to the evolution of normal vascular development and angiogenesis may

lead to a complete understanding and further treatment options for hemangiomas. Nevertheless, it is the author's belief that the "wait and see" approach should be rejected and that alternative options to the standard therapies should be investigated.

This article presents treatment of four different cases of infant hemangiomas, using a non-invasive device, VascuLight. This device combines two treatment modalities: an intense pulsed light (IPL) source and a Nd:YAG laser head to target both the superficial and deeper, larger portions of hemangiomas, as well as therapy-resistant vascular lesions. Individual therapy regimes can be employed with this system to treat hemangiomas of varying depth and location, as well as various patient skin types. The system has been shown to be safe and effective in treating hemangiomas, as well as other vascular lesions, and offers an excellent alternative to standard treatment therapies.<sup>6-10</sup>

## TREATMENT METHOD

### *VascuLight IPL / Laser System*

The VascuLight system consists of an IPL source and a laser source. The IPL source operates with a broad wavelength spectrum from 515 to 1200 nm and a fluence range of 3 to 90 J/cm<sup>2</sup>. The laser source consists of a 1064 nm Nd:YAG laser with high energy fluences up to 150 J/cm<sup>2</sup>. A range of wavelengths and high energy, as well as a multiple synchronized pulsing option (single, double and triple pulses) with long pulse capability (2 - 16 msec) provide differential



**Case 2:** A) A 5-month old boy (born prematurely at the 31st week of pregnancy) with a congenital hemangioma of the nose tip. B) Complete involution after ~10 months (a total of 9 treatments). A small residual fibrotic tumor remains, likely due to the relatively late onset of therapy.

heating and cooling of the various sized vessels, located at different depths. Thereby, a range of vessel sizes and skin types can be safely and effectively treated.

#### **Treatment Procedure**

Prior to treatment and at follow-up visits, the medical history of each patient was documented, clinical photos were taken, and an ultrasound examination of the lesions was performed. IPL therapy was initiated immediately in cases where there was rapid anamnestical growth and no sign of involution (i.e. no evidence of fibrosis, many small and large vessels, and a spongy appearance), as confirmed by sonography. Patients were administered general anesthesia prior to treatment. Before directing the IPL energy to the skin, water based gel was applied to the lesions to reduce heating of the skin and to ensure uniform light distribution.

#### **Case 1**

A one-year-old girl presented to the clinic with a congenital hemangioma of the right upper eyelid. The hemangioma underwent rapid growth during the postnatal period, which led to occlusion of the eye. Systemic therapy with corticosteroids was administered over a period of several months, which allowed the girl to open the eye; however, reduction of the drug therapy resulted in resumed growth of the hemangioma. Therefore, IPL therapy with VascuLight was used to reduce the risks of prolonged steroid

treatment. The patient underwent three treatment sessions (550 filter, double pulses of 3, 2 msec and a 10 msec delay, fluence of 24 or 26 J/cm<sup>2</sup> and 5 - 10 shots) at 3 - 4 week intervals. At this point, drug therapy was discontinued. This was followed by 12 treatment sessions (550 filter, double pulses of 3, 2 or 4, 4 msec and a 10 msec delay, fluence of 28 - 40 J/cm<sup>2</sup> and 11 - 29 shots) every 8 - 10 weeks. IPL therapy was concluded after complete involution of the tumor at about two years after the initial treatment. The lesion was no longer visible on the skin and there was no occurrence of scarring or pigmentation.

#### **Case 2**

The second case is of a 5-month old boy (born prematurely at the 31st week of pregnancy) with a congenital hemangioma of the nose tip. Sonography revealed rapid growth with more than 7-mm thickness and many large vessels located in the depths. Five initial treatment sessions (550 filter, double pulses of 3, 2 or 4, 4 msec and a 10 msec delay, fluence of 30-50 J/cm<sup>2</sup> and 1-4 shots) were conducted at 3 - 4 week intervals. After the first three sessions, there were no signs of further growth. Four additional treatment sessions (550 filter, double pulses of 3, 2 or 4, 4 msec and a 10 msec delay, fluence of 28 - 40 J/cm<sup>2</sup> and 11 - 29 shots) every 1 - 12 weeks resulted in complete involution and replacement of large and deep vessels by fibrotic tissue. A small residual fibrotic tumor remains, likely due to the relatively late onset of therapy.



A



B

**Case 3:** A) A 2-month old female baby with widespread hemangioma of the right foot. B) Complete remission ~10 months after treatment (6 treatments) with no residual signs of the lesion or growth difference between the two feet.

**Case 3**

Case 3 is of a 2-month old female baby with a widespread hemangioma of the right foot that first appeared two weeks after birth and then grew rapidly. The patient underwent three treatment sessions (550 filter, double pulses of 3, 2 msec and a 10 msec delay, fluence of 30 J/cm<sup>2</sup> and 10 or 17 shots) at 3 - 4 week intervals. At this point, a steady state was achieved. This was followed by three follow-up treatment sessions (550 filter, double pulses of 4, 2 msec and a 10 msec delay, fluence of 40 J/cm<sup>2</sup> and 25, 28, or 31 shots) at 2 - 3 month intervals. IPL therapy led to complete remission with no residual signs of the lesion or growth difference between the baby's feet.

**Case 4**

A two-month old female baby presented to the clinic with a deep hemangioma of the forehead. Rapid growth of the hemangioma occurred during a two-week postnatal period. Due to the critical location of just within the frontal hairline and an absence of involution signs as assessed by sonography (see below), IPL therapy was initiated immediately. Three initial treatment sessions (550 filter, double pulses of 3, 2 msec and a 10 msec delay, fluence of 22 - 27 J/cm<sup>2</sup> and 4 or 5 shots) were performed at 3 - 6 week intervals in order to cease growth and reduce the risk of scarring or hair loss. Resolution of the lesion was achieved with four additional treatment



**Case 4:** A) A 2-month old female baby with a deep hemangioma of the forehead. B) Complete involution without any influence on normal hair growth was achieved after 7 treatment sessions (~1 year after the 1st treatment).



**Case 4:** A) Sonography of the hemangioma revealed no signs of involution. B) After treatment, sonography showed complete involution.

sessions (550 filter, double pulses of 3, 2 msec and a 10 msec delay, fluence of 30 J/cm<sup>2</sup> and 2 - 6 shots). The interval between follow-up treatments was a minimum of three months in order to prevent a reduction in hair growth, resulting from IPL/laser therapy. Sonography revealed complete involution without any influence on normal hair growth after the seven treatment sessions.

#### SUMMARY

Hemangiomas may present as harmless lesions and involve spontaneously; however, they may also proliferate rapidly and cause severe complications, which have a physical and psychological impact on the patient. The management regime should include careful assessment of the hemangioma and consideration of which treatment approach is suitable. VascuLight IPL therapy offers a new approach to treating these lesions with minimal risk to the patient. Furthermore, in cases where the hemangioma poses a risk due to size or location, early non-invasive treatment with IPL can be used to significantly reduce complications or the need of more invasive techniques. Treatment-resistant hemangiomas can also benefit from IPL/laser therapy, particularly lesions with deep vessels that can be addressed by the Nd:YAG laser component.

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