

Case Report

Intense Pulsed Light in Infantile Hemangiomas

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Abstract. For more than 70 years, the watchful-waiting management of infantile strawberry hemangiomas still prevails in a number of clinical settings. This concept appears now outdated since the introduction of well-suited beta-blockers, as well as noncoherent light and laser therapies. The aim of this work was to revisit the effect of intense pulsed light (IPL) therapy on infantile hemangioma. Information was collected from the peer-reviewed literature and illustrated by personal cases. When applied early in the evolution of infantile hemangiomas, IPL treatment stops the growth phase and induces regression with minimal cosmetic adverse effects and psychological damage. Initiating an adequate treatment is important because damage due to hemangiomas can be diminished by a timely and adequate approach. Beta-blockers have revolutionized the therapeutic strategy of infantile hemangiomas. The flash light therapy (IPL) represents an alternative therapy for some patients.

Keywords: Hemangioma, Intense pulsed light, Pediatric dermatology, Tumor regression.

1. Introduction

Infantile hemangiomas correspond to benign tumors of the vascular endothelium that usually appear shortly after birth. In 30–50% of the cases, lesions represent a precursor birthmark to more extensive vascular lesions. According to the International Society for the Study of Vascular Anomalies (ISSVA), vascular tumours of the hemangioma type are distinguished from vascular malformations (Table 1). Such distinction is of importance with regard to differences in evolution, morbidity, prognosis, and therapy [1, 2]. However, the distinction between hemangiomas and vascular malformations is sometimes tricky at their initial stage of evolution.

In most instances, infantile hemangiomas arise between the second and fourth weeks of life. By contrast, vascular malformations result from errors in vascular development.

They are generally recognizable at birth, do not regress spontaneously, and grow in concert with the child development. Histopathology reveals a mixture of dilated sinusoidal lymphatic, venous, or arterial vessels without any alteration in the endothelial cell cycle [3, 4].

In the recent past decades, intense pulsed light (IPL) technology became established in some fields of practice (5–9). However, only little information is available about the IPL efficacy in the field of infantile hemangiomas. Another matter of concern results from the increased popularity of IPL equipments. They are used in some instances by estheticians and nonmedical individuals with an increased risk of professional errors [5, 8].

This review aims at revisiting the IPL indication in the treatment of infantile hemangiomas.

Table 1: Classification of vascular anomalies (after the International Society for the Study of Vascular Anomalies).

Vascular tumours	Vascular malformations
Nascent hemangioma	Arterial
Congenital hemangioma	Capillary
Kaposiform hemangioendothelioma	Lymphatic
Tufted angioma	Venous
	Combined

2. Natural Evolution of Infantile Hemangiomas

The superficial (strawberry) hemangiomas are characterized by an initial proliferative growth phase followed by spontaneous involution occurring around 3–5 years of age [10–13]. An average 90% full regression is expected by 9 years, but some of the lesions persist until the age of 10–12 years [14]. These hemangiomas are superficial, deep, or mixed, and about 60% of them develop on the head and neck [12]. The diagnosis generally relies on the combination of the clinical history and physical examination [15]. During the growth phase, endothelial cells exhibit high proliferative rates [10]. The extravascular stromal components are variably abundant including fibroblasts, dermal dendrocytes, mast cells, and pericytes [16].

The peculiar pathobiology of hemangiomas is not yet fully elucidated [12]. Nevertheless, it likely results from altered vasculogenesis, in a context of hypoxia [18, 19]. It has notably been demonstrated that the vascular endothelial growth factor (VEGF) serum level in expanding hemangiomas was significantly higher than in patients with regressing hemangiomas, vascular malformations, and healthy subjects [3]. The VEGF serum levels using ELISA testing could represent a potential clue for distinguishing hemangiomas from vascular malformations [3, 20, 21]. In addition, VEGF dosage helps staging hemangiomas (proliferative or regressing phase), predicting the duration of each phase, and assessing the posttreatment efficacy. This finding possibly provides the clinician with an objective follow-up criterion through a simple, repeatable blood sampling procedure.

3. The Watchful-Waiting Policy

The decision whether infantile hemangiomas should be treated or not remained controversial for many decades. The “wait and see” dogma still prevails in some settings [15]. Such noninterventional policy dates back to more than 70 years when a case series showed that all but two out of 92 hemangiomas followed a spontaneous and complete involution within 5 years. This finding made a forceful argument for a conservative management [22]. At that time, considering the benign nature of the tumor, the risk of anesthesia, and the lack of any effective and safe treatment, a consensus for a “watchful-waiting” procedure emerged and

widely spread in the pediatric, dermatologic, and plastic surgery literature [23].

Expectant therapy or nonintervention has been advocated as a general rule since it was admitted that solitary uncomplicated hemangiomas followed a natural course to complete regression in nearly 50% of the patients by the age of 6 years [24] and an additional 10% per subsequent year. Accordingly, treatment appeared to be only required in specific circumstances including severe haemorrhage, thrombocytopenia, threatened cardiovascular compromise, nasal or ear canal obstruction, hepatic hemangiomatosis, skin ulceration, or risk of vital function impairment (feeding, breathing, passage of urine and stool, or vision). Treatment was further considered in cases of potential disfigurement or long-term psychosocial consequences such as larger infantile hemangiomas of the ear, nose, glabella, or lips [12]. Thus, it was usually considered that only 10–20% of hemangiomas required radical medical or surgical treatment, making some 80–90% of “wait-and-see” management.

4. Psychosocial Impact

It is acknowledged that only 50% of infantile hemangiomas have completely regressed by the age of 6 years [24]. Moreover, of the 50% that did completely regress by age 6 years, about 40–80% left substantial residual cosmetic deformity [23, 25]. In addition to the unpredictable outcome of hemangiomas, it is particularly difficult to estimate the risk of cosmetic residual deformity [4]. These changes include yellowish discoloration, hypopigmentation, persistent telangiectasias, atrophic wrinkling, and anetoderma. All these conditions may prove to be disfiguring [4, 15, 24, 26]. Some specific areas such as the nose, perioral skin, nasal side-wall, medial cheek, and ear are more likely to involute leaving a residual scar. Lesions on the scalp often lead to focal alopecia [4, 10]. Aversive behavior of feelings of shame, shyness, or stigmatization possibly affects older children and adolescents [27].

Little data are available about the psychosocial impact on children with infantile hemangioma. Parents generally overestimate the size of their child’s vascular birthmark [28]. A vast majority of them wanted the lesion to be treated regardless of its site, raising problematic issues for their child, especially teasing at school, self-blame and embarrassment, unpleasant comments, and suspicion of child abuse [4, 28]. Frequent offensive remarks from friends, family members, or strangers possibly affect parents too, who develop feelings of guilt and shame [15]. Disfiguring facial hemangiomas were found to be associated with parental reactions of disbelief, fear, and mourning, particularly during the growth phase. In 8 out of 12 children aged over 3.5 years, parents described teasing from other children that they witnessed or that their child reported to them. The results of this study were derived from the parents of children suffering from relatively severe and disfiguring lesions requiring medical or surgical

intervention in more than 40% of them [26]. Assessment of health-related quality of life in children with infantile hemangioma aged 1–15 years and most of their parents revealed that they thought that their children experienced an undisturbed life. However, any complicated course or a visible location could result in psychosocial problems later in life, mostly related to physical appearance. It was established that children started developing body image from 3 years of age, and by age 7 years they were able to differentiate between “pretty” and “ugly” images [23].

For these reasons, some authors suggested that early intervention should be considered when poor esthetic outcome is anticipated, weighing risks and benefits of specific treatments [15].

5. Revisiting Treatment Modalities

Infantile hemangiomas grow quickly during the first few weeks of life, reaching a maximum size between the third and sixth months of life, before entering a quiescent phase and beginning a slow involution between the 12th and 18th months of life. However, these general growth/regression features do not allow anticipation of the potential of growth of any hemangioma, considering the high degree of interindividual versatility in evolution. Accordingly, the evolution remains almost unpredictable at the very early proliferative phase, since some strawberry hemangiomas barely proliferate whereas others achieve complete growth after 12–24 months [5, 15].

Until recently, there was no gold standard treatment nor sufficient randomized double-blind clinical trials to define undisputable therapeutic guidelines [17, 29, 30]. Thus uncontrolled studies are the standard of medical evidence. Currently, the first-line therapy includes the beta-blockers propranolol [31–35] and topical timolol [36, 37]. These drugs rapidly trigger hemangioma regression. Second-line therapy consists of corticosteroids [38], interferon-alpha (2a–2b), laser therapy (pulsed dye laser, Nd-Yag) [14], and surgery. Other therapies were proposed including light therapy, electrosurgery, cryosurgery, imiquimod, bleomycin, cyclophosphamide, and vincristine [4, 28, 39]. Adverse effects of each therapeutic modality have to be taken into account. Systemic corticosteroids possibly cause infections, cushingoid facies, growth delay, and hypertension. Interferon has to be used with caution because of the risk of neurotoxicity and adverse effects such as neutropenia, elevated liver enzymes, fever, and malaise. Propranolol administration requires close medical monitoring because it can induce hypoglycaemia, hypotension, hyperkalemia, and bradycardia [4, 15, 39, 40]. Electrosurgery and cryotherapy are associated with high risk scarring and seem obsolete since the development of laser and light therapy [14]. Laser and light therapy can leave dyschromia and scarring.

6. Therapeutic Potential of Intense Pulsed Light

The intense pulsed light (IPL) method corresponding to the flash light therapy emits polychromatic light. The devices contain flash lamps and a computer system controlling the wavelength spectrum, as well as the pulse duration and intervals [41].

In some patients, IPL appears as one of the effective and safe treatments [42–44]. Treating the vascular tumor at the earliest stage probably controls the excess in endothelial growth [5]. Hence prompt referral of babies and infants with a precursor macular vascular spot gives a chance to halt the hemangioma progression. Thus, the proliferation of a potentially disfiguring or functionally problematic infantile hemangioma is controlled. In some cases, the effects remain minimal (Figure 1 (a) and (b)) or leave prominent residual lesions (Figure 2 (a) and (b)) [13]. Ambulatory management makes the anesthesia-free procedure simple, delivering few light shots with a good tolerance [11, 13]. It is about preventing short- and midterm distressing psychological consequences, accelerating regression phase before schoolisation, and minimizing residual cosmetic deformity as a long-term psychological impact.

7. Discussion

Recent studies advocated to treat infantile hemangiomas as soon as possible following the diagnosis. The rapid growth of the vascular tumor and its location at risk of altering vital functions (nutrition, vision, breathing, ...) represent obvious indications for a rapid management. In addition, the psychological and cosmetic consequences should not be denied, and they merit close attention. Clearly, damage due to hemangiomas is diminished by a timely and adequate approach.

Two major options exist in the therapeutic armamentum. On the one hand, a pharmacological intervention mainly relies on beta-blockers, either administered orally (propranolol) or topically (timolol). On the other hand, some physical treatments are cost-effective and they bring a swift regression of the vascular growth. These approaches concern some laser interventions as well as IPL. Still other older treatments include corticosteroids and cryotherapy.

In general, IPL requires a few sessions administered every second week until stabilization of the size and thickness of the juvenile hemangioma. IPL is limited by the deep and mixed types of the vascular tumours and a size over 5 cm at initiation of treatment, as well as some locations including the eyelids, lips, nostril, and genitalia. These challenging clinical conditions are better treated by beta-blockers.

In many instances, infantile hemangiomas merit medical attention, preferably during their early growing phase. Nowadays, there are many reasons to adopt a true proactive management of this vascular growth because the benefit-risk ratio of the current treatment has dramatically changed since

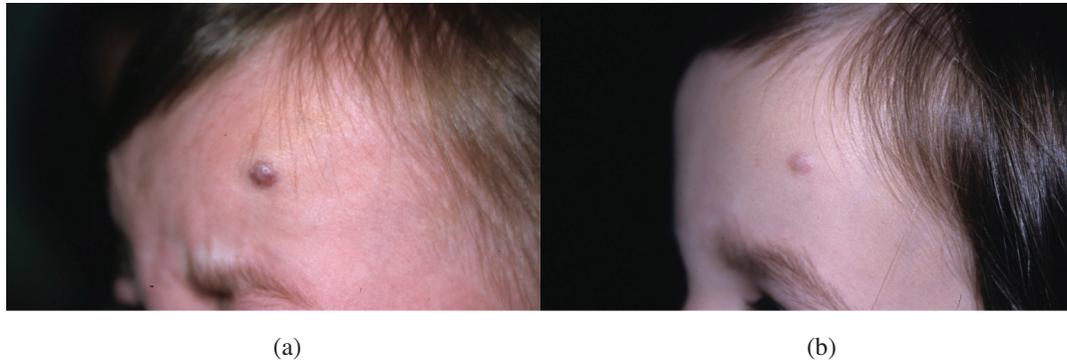


Figure 1: Infantile hemangioma of the forehead, before and after one Photoderm treatments.



Figure 2: Infantile hemangioma of the thigh, before and after 3 Photoderm treatments.

1938, in favor of safe and efficient techniques such as IPL therapy.

In this field of pediatric dermatology, the family of the affected child is frequently full of concerns, questions, and misconceptions. The new generation of options promises a dramatic drop in the natural complications, both physically and psychologically bound to untreated juvenile hemangiomas. Ongoing research and development activities are focusing on pharmacological and physical interventions. Double-blind controlled trials are almost impossible to perform and the comparative outcome comparisons are not available.

The current treatments have placed near the top of the list for needing a rapid regression of the vascular growth

with moderate residual scarring. The combination of efficacy and safety should be guaranteed at an optimal level. The brief discomfort during IPL treatment does not impact on complying with future sessions when needed.

The major drawback of IPL therapy in fast-growing infantile hemangioma is the methodological constraints that have made evidence-based efficacy assessments nearly impossible. In the near future, we expect to witness new advances in precise guidelines for IPL treatment of juvenile hemangiomas leading to the availability of undisputable high efficacy.

The combination between IPL treatment and b-blockers administration should probably be evaluated in randomized

controlled trials using objective analytical methods of assessment.

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