

Rapid onset anterior segment complication following diode laser photocoagulation for retinopathy of prematurity: a case report

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Abstract

Laser treatment for retinopathy of prematurity (ROP) has been proven to be beneficial. We present a case of uncommon, progressive anterior eye segment complication treated with diode laser photocoagulation for ROP which subsequently required surgical management. A 1210 g premature infant, born at 28 weeks of gestation, had bilateral stage 3 threshold ROP on his first screening, at 5 weeks of age. Confluent, laser ablation of avascular retina (Iris Medical, OcuLight S) in order to prevent the progression of ROP was applied. On the next ophthalmological examination, only in the right eye, an uncommon complication, not responding to conservative treatment, was noted. It was described as excessive conjunctiva hypertrophy, misdirected toward the center of the cornea. Indispensable surgical excision of hypertrophied conjunctiva was required, yielding a beneficial outcome. Histology revealed the presence of fibrous tissue. Hypertrophy of conjunctiva after diode laser photocoagulation requires surgical removal in order to prevent vision impairment.

Key words: retinopathy of prematurity, hypertrophy, diode laser photocoagulation, complication.

Introduction

Retinopathy of prematurity (ROP) is an eye disorder that affects infants born prematurely [1]. Untreated, it may lead to significant vision loss already in early childhood and lifelong severe consequences including blindness [2]. Infants with ROP are considered to be at higher risk for developing certain eye problems later in life; e.g. retinal detachment, myopia, glaucoma and strabismus frequently occur.

Among the most effective, proven treatments for ROP are laser therapy and cryotherapy [3]. Relatively atraumatic, easier to administer laser photocoagulation of the avascular retina compared with cryotherapy of prematurity is associated with a lower risk of retinal detachment [4], less myopia [4, 5] less postoperative eyelid oedema and conjunctival chemosis [6].

However, this type of treatment is not without potentially serious complications.

Furthermore, it has been suggested that intensive laser photocoagulation of the avascular retina increases the risk of corneal burns, band keratopathy, hyphaemia, glaucoma, cataract, hypotony as well as necrosis of the anterior segment of the eye [7-9]. The severity of the ocular injury is dependent on the wavelength of the incident light. Thermal injury can lead to anterior eye segment ischaemia, assuming that the energy of the laser beam acting on this region of the globe can be absorbed, which can lead to destruction of the major nutrient branches for this eyeball area, i.e. posterior ciliary arteries [10].

As the literature is mainly dominated by detailed accounts of the physical presentation of ROP cases, this report emphasizes the need for eye status control

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in case of complications that might occur after laser therapy for ROP as well as in order to extend the knowledge on the long-term visual organ condition.

This case study presents the ocular complication arising after diode-laser photocoagulation described as progressive hypertrophy of the conjunctiva. To the best of our knowledge, there has been no such report in the literature before.

Case report

A 1210 g birth weight infant, born at 28 weeks' gestation, was screened for ROP at 33 weeks' post-conceptual age (PCA). The funduscopy visualized by Ret-Cam II method (Clarity Medical Systems) showed bilateral stage 3 of threshold ROP with definitely more expressed changes in the right eye, defined by the International Committee for the Classification of Retinopathy of Prematurity [11]. Ultrasonography (US-3300 EchoScan ultrasonic B- scan with 10-MHz sector probe equipment – Nidek Co. Japan) additionally confirmed the diagnosis. Intraocular pressure measured by I-care PRO Tonometer (Icare Finland Oy) was within the normal range (15.9 mm Hg).

Transpupillary diode-laser photocoagulation (diode laser Iris Medical, OcuLight S), considered as the technique of choice [12], performed by indirect ophthalmoscope and +28.00 Dptr lens for stereoscopic fundus visualization, was implemented in both eyes, under general inhalatory anaesthesia, after tripled mydriasis with 1% sol. tropicamide and 2.5% sol. phenylephrine hydrochloride administered to the conjunctival sac at 10 min apart. Treatment intensity ranged from 200 mW to 350 mW, with 3525 applications to the right eye and 2501 to the left eye and 100 ms duration. It was performed by one and the same ophthalmologist, experienced in this type of procedure among premature infants.

The first ophthalmological follow-up examination, undertaken after 5 days, revealed that the left eye responded favorably to the laser therapy, but clinically significant abnormalities were seen at the anterior segment in the right eye. Initially on biomicroscopy (hand slit lamp), then by observing, in the anterior eye segment advanced severe conjunctival hyperaemia, and its oedema causing partial coverage of the cornea was recorded. Topical therapy with anti-inflammatory eye medication, such as combination of dexamethasone 0.1% and diclofenac, did not result in a desirable outcome. Gradually, on the fol-

lowing examinations progressive and severe oedema augmentation, hypertrophy of the conjunctiva, hyperaemia and complete coverage of the cornea preventing light perception by the visual organ was observed (Photo 1). Additionally, skin lesions at the right periocular skin were assessed on examination. Based on the patient's medical records, after dermatological consultation they were classified as atopic dermatitis (AD).

In this case, surgical treatment was required due to expanding conjunctival lesions, in order to limit the adverse effects of laser panphotocoagulation. Performed surgery consisted of excision of the excess conjunctiva (with a circular scar) covering the cornea up to the corneal limbus (Photo 2).

Histopathological examination revealed that fibrous tissue similar to a hypertrophic scar has been a major component of the hypertrophied conjunctiva. Subsequent follow-up examinations showed that the eye had a beneficial anatomical result from this therapy, allowing an easy fundus examination revealing retinal attachment, and regressed ROP with no signs of an inflammatory or ischaemic processes.

Discussion

Complications after diode laser treatment for ROP that may lead to many pathological changes both in



Photo 1. Uncommon anterior segment complication in the form of massive hypertrophy of the conjunctiva related to diode laser therapy for retinopathy of prematurity

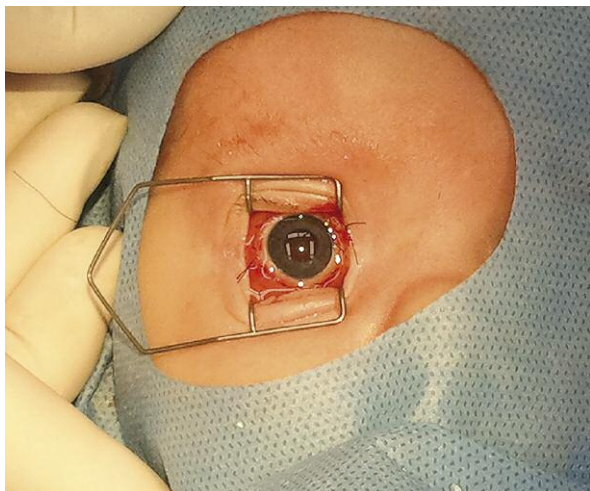


Photo 2. The fellow eye after beneficial surgical reconstruction of palpebral aperture

the anterior and posterior segment of the eye have been previously reported [13-16]. We present an uncommon, undesired outcome in the right eye in the form of massive oedema and hyperaemia of the conjunctiva, along with its sudden hypertrophy that developed shortly after retinal transpupillary diode laser panphotocoagulation.

The lesion initially did not exceed the margin of the pupil, but it gradually expanded, which led to massive oedema of the conjunctiva and a completely covered cornea, resulting in lack of light access to the eye, which might slow down in this period proper vision formation and could have an adverse effect on further development of binocular vision. Conservative treatment of this complication in the form of topical anti-inflammatory drops administration did not bring the expected results.

In an attempt to reinstate function and structural integrity of the fellow eye as well as to prevent the sight-threatening proliferation, surgical excision of the excess conjunctiva up to the corneal limbus was conducted, yielding a favorable therapeutic outcome.

Interestingly, according to available internet resources the presented complication associated with diode laser therapy seems to be the only case reported so far. Frequently mentioned in the medical literature, as well as observed in our ward, undesired outcomes of diode laser therapy involving infantile eyes include subconjunctival haemorrhages, conjunctival thickening in areas with surgical hook oppression (used for scleral bulking) as well as tempo-

rary, mild oedema of the conjunctiva [3]. In addition, it should be mentioned that in those preterm infants with extremely low birth weight whose tissues are thin and immature, transpupillary laser photocoagulation may be associated with increased risk of corneal opacities formation or corneal injuries in the course of their increased susceptibility to overheating or secondary to laser therapy ischaemia.

Based on our experience in the field of available treatments for ROP, even higher doses of laser applications than used by the authors have not previously caused such massive side effects as presented. Hence, we can assume that this complication could be the result of overheating of the thin conjunctiva tissue. Therefore, it is important while implementing diode laser treatment in a group of extremely low-weight, and low-weight premature infants to consider the number of laser burns used per eye, power of the laser wavelength and duration of the laser application procedure, as eyes of infants born prematurely due to high immaturity are prone to thermal injury [15, 17, 18]. It is likely that a higher amount of energy generated during the procedure contributed to tissues overheating, which might be a cause of conjunctiva hypertrophy due to its thermal injury [19, 20]. This is perhaps the origin of the hypertrophy that we have observed in the eye where the number of laser applications was greater. It is possible that in preterm infants, after transpupillary laser photocoagulation, thermal damage to the posterior ciliary arteries could lead to ischaemia, the consequence of which could be stimulation of conjunctival epithelial cell proliferation [21]. Coexistence of dermatological findings in the region of the affected eye may support the hypothesis that immunological background is an additional factor that might predispose to progression of this ocular complication in children after diode laser therapy for ROP.

It should be emphasized that our prompt surgical treatment (excision of the excess conjunctiva) has been shown to be effective; therefore it could be suggested as a therapeutic approach in similar cases. In summary, in premature infants it is recommended to start follow-ups after diode laser treatment as early as possible, in order to detect any complications of the anterior segment of the eye. Such action in newborns is extremely significant, because omission of this procedure may result in irreversible impairment of vision, formation of which is attributed to the first 2 years of life.

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