Eales’ disease is an idiopathic occlusive inflammatory vasculopathy resulting in peripheral retinal ischemia, neovascularization, recurrent hemophthalmos, and proliferative tissue formation. It is often complicated by tractional retinal detachment, secondary glaucoma, and central retinal vein occlusion. The management of patients with Eales’ disease includes mainly glucocorticosteroid therapy, the use of angiogenesis inhibitors, vitreoretinal surgery and laser photocoagulation. The clinical case reported demonstrates the potential of retinal laser photocoagulation for treatment of the Eales’ disease in the ischemic and proliferative stages. The results of retinal laser photocoagulation used as monotherapy demonstrate the clinical and functional indices improvement: enhanced visual acuity, stabilized central retinal sensitivity value, restored clarity to the ocular media, regression of neovascularization and macular edema in the patient’s eye being in the proliferative (3b) stage, and the process stabilization in the eye being in the ischemic (2a) stage of the disease.

Keywords: Eales’ disease, laser photocoagulation, optical coherence tomography, fluorescein angiography

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Compliance with ethical standards: the patient submitted informed consent to laser treatment and personal data processing.

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Stage 2
(2a): Capillary nonperfusion
(2b): Neovascularization of the disc and/or retina
Stage 3
(3a): Fibrovascular proliferation
(3b): Hemorrhages
Stage 4
(4a): Traction and/or rhegmatogenous retinal detachment
(4b): Rubeosis iridis, neovascular glaucoma, complicated cataract, optic atrophy

The current diagnosis procedures together with wide range of treatment options significantly improve the Eales’ disease prognosis and outcome [3, 7]. The management tactics depends on the stage of the disease [14–20] and includes the following: taking glucocorticosteroids (systemic and/or periocular) in the stage of inflammation [7]; intravitreal injection of angiogenesis inhibitor [16]; vitreoretinal surgery (in patients with recurrent hemorrhages, vitreoretinal traction and/or retinal detachment) [21].

Laser photocoagulation is one of the first-line therapeutic options for Eales’ disease in the ischemic and proliferative stages [3, 15, 16, 19–22]. According to the foreign authors, regression of retinal neovascularization and vitreoretinal traction after laser photocoagulation is detected in 80–90% of patients [16, 23–25]. Moreover, bilateral photoablation in the ischemic areas of asymptomatic eyes is an effective measure for prevention of the Eales’ disease complications [16, 26]. In this case study we attempted to assess the effectiveness and safety of retinal laser photocoagulation for management of Eales’ disease in the ischemic (2a) and proliferative (3b) stages.

Clinical case

Patient А., aged 20, complaining of floaters and decreased visual acuity in his left eye contacted the Scientific Research Center for Ophthalmology of Pirogov Russian National Medical Research University. It was also known from his case history that the described manifestations emerged spontaneously and persisted for six months. The patient sought medical assistance from ophthalmologist at his place of residence, and was diagnosed with uveitis of unknown etiology in both eyes. He received conservative management, which included administration of glucocorticosteroids. No response to treatment was observed.
The patient underwent complex assessment by the following methods: visometry aimed at determining the best corrected visual acuity (BCVA), ophthalmoscopy using the MaxField 78D lens (Ocular Inc.; USA), fluorescein angiography (FA) and spectral domain optical coherence tomography (SDOCT) imaging using the Spectralis HRA+OCT, OCT2 platform with a scanning speed of 85,000 Hz (Heidelberg Engineering; Germany), computer perimetry using the Humphrey Field Analyzer II (Carl Zeiss Meditec Inc.; USA) and the 30-2 SITA-Standard test, computer microperimetry and assessment of central light sensitivity using the MAIA system (CenterVue Inc.; Italy). The patient had normal chest x-ray and negative Mantoux test. Serology testing revealed no changes. The patient did not associate the onset of the disease with anything, and he had no hereditary taint. Laser photocoagulation was performed using the VISULAS Trion laser workstation working in the 532 nm mode (Carl Zeiss; Germany).

At initial examination, the BCVA in the right eye (OD) was 1.0, and in the left eye (OS) it was 0.1. Biomicroscopy OU revealed no pathological changes in the anterior segment of both eyes.

Ophthalmoscopy OD revealed pale-pink optic disc with sharp margins, normal macular reflex. Pathological reflex was detected in the paravasal area, the artery to vein (A/V) ratio was 2/3. Aneurysmal dilations and ischemic lesions were observed in peripheral retina. The venous phase FA detected contrast media extravazation and ischemic lesions in the area of altered vasculature involving the full circumference of the peripheral retina (Fig. 1). SDOCT revealed normal macular profile, structured retinal layers, and retinal thickness of 310 µm (Fig. 2).

Visualization during ophthalmoscopic examination OS was hampered by partial hemophthalmos. The optic disc was hyperemic, blurry, and protruded into the vitreous chamber. There was a fibrous cord over the optic disc extending to the inferior outer quadrant of the retina, the macular area was blurry. The veins were dilated and tortuous. In peripheral retina, there was a protruding lesion with blurry margins, retinal and preretinal hemorrhages in the clock hour sector 5. The venous phase FA detected the hyperfluorescent optic disc. The petaloid (flower-like) pattern of hyperfluorescence (macular edema) was observed in the central retina. Hyperfluorescent focus with hypofluorescent areas was detected on the periphery in the lower sector (Fig. 3). SDOCT revealed the retinal thickness increase up to 600 µm in the macular area, and cystic cavities in the outer and inner nuclear layers (Fig. 4).
Taking into account the complaints, medical history and complex ophthalmological assessment data, the patient was diagnosed with Eales’ disease, stage 2a (ischemic areas detected by FA), OD, and stage 3b (proliferation and hemophthalmos), OS.

We agreed to perform laser photocoagulation. The extent of coagulation was determined by the amount of damage to retina. In OD (stage 2a) the extensive laser photocoagulation of the peripheral retina was performed (single session), in OS (stage 3b) the panretinal photocoagulation (four sessions at monthly intervals) was carried out. The following energy parameters were used in OD: the power was 100 mW, the exposure time was 0.1 s, the spot size was 200 µm, the distance between the spots was 300 µm, and the total number of burns was 500. The following energy parameters were used in OS: the power was 100–120 mW, the exposure time was 0.1 s, the spot size was 200 µm, the distance between the spots was 300 µm, and the total number of burns was 3,000. The following energy parameters were used for central retina in OS: the power was 50–100 mW, the exposure time was 0.05–0.1 s, the spot size was 100 µm, and the distance between the spots was 150 µm.

After a month of treatment BCVA OD was 1.0, and BCVA OS had increased to 0.7. Ophthalmoscopy OD revealed pale-pink optic disc with sharp margins. The retinal AV ratio was 2/3. The macular anatomy was intact. Pigmented coagula were observed across the peripheral retina, aneurysms and ischemic lesions were sealed (Fig. 5). Examination OS revealed declined hemophthalmos; the optic disc was pale-pink with sharp margins; the fibrous cord became smaller. The AV ratio was 2/3. Partial regression of macular edema and lightly pigmented coagula were detected in the central retina (except the avascular zone). Pigmented coagula were revealed in the peripheral retina, the protruding lesion was sealed (Fig. 6).

After two years BCVA OU was 1.0. Biomicroscopy OU revealed no pathological changes in the anterior segment, the ocular media were clear.
Fig. 7. Macula OCT scan, right eye: normal macular profile, structured retinal layers; no signs of clinical worsening have been revealed during the 2-year follow-up period.

SDOCT detected no signs of clinical worsening in OD (Fig. 7). Ophthalmoscopy revealed pigmented coagula with sharp margins in the peripheral retina, no new lesions were observed. The central retinal sensitivity was 25.7 dB.

Ophthalmoscopy OS revealed pale-pink optic disc with sharp margins, the fibrous cord over the optic disc became smaller. The retinal A/V ratio was 2/3. There were lightly pigmented coagula in the macular area (except the avascular zone). SDOCT detected restored macular profile, and regression of edema (Fig. 8). The fibrotic neovascularization focus with sharp margins was observed in the peripheral retina (Fig. 9). Pigmented coagula were detected in the paravasal area and across the peripheral retina. The central retinal sensitivity value was 25.4 dB.

Computer perimetry OU revealed no visual field deficits.

Discussion

Successful implementation of laser photocoagulation as monotherapy for patients not responsive to glucocorticosteroids was reported by many foreign [14, 27] and national authors [28, 29]. However, the energy parameters of laser treatment play a vital part in the prognosis of the disease. The use of "rigid" retinal laser photocoagulation may result in complications, such as exudative retinal detachment, iatrogenic choroidal neovascularization, cystoid macular edema, epiretinal fibrosis, visual field deficits, deterioration in color vision and decline in contrast sensitivity [30–32]. According to literary sources, the most commonly used spot size is 400–500 µm, and the proposed pulse duration is 0.15–0.2 s with an interpulse interval of 0.15–0.3 s [3]. Similar energy parameters have been used in other studies: spot size of 400 µm, pulse duration of 0.15 s, and the individually adopted average power value of 160–200 mW [28, 29].

In this study, in contrast to the international experience, we performed laser photocoagulation using the smaller spot size (200 µm), lower power (100–120 mW) and exposure time of 0.1 s in order to improve the clinical and functional treatment results in patient with Eales’ disease. The retinal laser photocoagulation safety in patient with stage 2a (ischemic) and...
3b (proliferative) Eales’ disease and preserved retinal function were confirmed by advanced diagnosis methods: computer perimetry (no visual field deficits), computer micropereimetry (preserved central retinal sensitivity), and optical coherence tomography imaging (regression of cystoid macular edema).

The proposed energy parameters made it possible to obtain good clinical and functional results within the long-term postoperative period, including the improved BCVA, stabilized central retinal sensitivity value, restored clarity to the ocular media, regression of neovascularization and macular edema in the eye being in the proliferative (3b) stage, and the process stabilization in the eye being in the ischemic (2a) stage of the disease.

CONCLUSION

The results obtained suggest that the use of retinal laser photocoagulation as monotherapy for patients with Eales’ disease in the ischemic (2a) and proliferative (3b) stages contributes to the improvement of clinical and functional treatment results, and the late fate of laser treatment shows long-term success.

References

Литература

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