



The Nature of Dynamic Changes in The Ciliary Body After Micropulse Transsclera Laser Coagulation

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Abstract:

Refractory glaucoma is the most severe group of eye diseases caused by increased intraocular pressure. The group of patients with refractory glaucoma includes neovascular glaucoma, repeatedly unsuccessfully operated primary open-angle and closed-angle glaucoma, neglected and untreated primary glaucoma, uveal glaucoma, glaucoma in aphakic and pseudophakic eyes and congenital glaucoma

Main goal of research. To determine the nature of dynamic changes in the ciliary body after micropulse transscleral laser coagulation

Materials and methods. Analysis of morphometric changes of the ciliary body after micropulse transscleral cyclophotocoagulation (MLTC) was carried out in 32 refractory glaucoma patients using ultrasound biomicroscopy (UBM) method repeatedly from 12 to 50 weeks on Sonomed Escalon VuM device (USA). An 810 nm diode laser in micropulse mode (Subcyclo technique) was used to perform MTCT. The following radiation parameters were used: power 2000 mW, duty cycle 31.3%. Laser radiation was delivered by contact with a probe at a distance of 3 mm from the limbus. All patients underwent a thorough general clinical and ophthalmological examination prior to treatment. Visual acuity was determined by Snellen optotypes, the anterior eye was examined with a standard slit lamp, and gonioscopy was performed with a three-mirror Goldman lens. Intraocular pressure was also determined with Goldman slit lamp and Maklakov tonometer. ptyco-coherence tomography of optic nerve area with HRT device, Heidelberg Engineering (Germany).

Conclusion: Ultrasound biomicroscopy of the anterior eyeball on Sonomed Escalon VuMax device (USA) is a highly informative and precise method to study morphological changes of the eye secretory apparatus in glaucoma.

Key words: refractory glaucoma, micropulse transscleral cyclophotocoagulation

Relevance. Refractory glaucoma is often accompanied by chronic pain that cannot be relieved by traditional treatment methods. Another feature of this type of disease is that it most often occurs in older people who suffer from concomitant serious illnesses, which is why it is not possible to perform traditional operations used for glaucoma, or these operations have exhausted their capabilities. Thus, neither the use of fistulizing operations nor the use of traditional options for cyclodestruction can be considered the operations of choice for painful refractory glaucoma. The use of various drainages, ranging from the use of tubes made of synthetic materials to xenodrainage, is not always justified. A more modern method that is less damaging to the eye is the use of laser energy for cyclodestruction. For transscleral cyclophotocoagulation (contact and non-contact methods), a YAG laser, semiconductor, diode and xenon lasers are used. A decrease in IOP in TSCFC occurs due to the destruction of the ciliary epithelium, a decrease in vascular perfusion in the ciliary vessels, as a result of which the ciliary processes atrophy, as well as due to an increase in outflow through transscleral filtration and increased uveoscleral outflow.

Objective of the study: To determine the nature of dynamic changes in the ciliary body after micropulse transscleral laser coagulation.

Material and methods of research: We observed 32 patients with refractory painful glaucoma who were treated with transscleral cyclophotocoagulation (TCCPC). All patients underwent a thorough general clinical and ophthalmological examination before starting treatment. Visual acuity was determined by Snellen optotypes, the anterior part of the eye was examined using a standard slit lamp, and gonioscopy was performed with a three-mirror Goldmann lens. The value of intraocular pressure was also determined using a slit lamp according to Goldman, as well as with a Maklakov tonometer. The condition of the anterior part of the eye was further studied using the method of ultrasound biomicroscopy (UBM).

Results and discussions: Ultrasound biomicroscopy (UBM) was performed on a Sonomed EscalonVuMax device (USA) using a standard immersion technique in the upper and lower meridians for 11 to 13 hours and from 17 to 19 hours (5 measurements were taken in each sector) with the sensor placed parallel and perpendicular to the studied structures of the iridociliary zone. The maximum measurement value was taken as the basis. In this case, the following linear parameters were studied: the thickness of the base of the ciliary body (mm), which was measured along a perpendicular running 1500 μm from the scleral spur, from the inner surface of the sclera to the process part, the maximum length of the process part of the ciliary body (mm) was measured from the inner surface of the base ciliary body to the terminal part of the ciliary body. Basic data on the dynamics of the state of the ciliary body are reflected in Table 1.

Table 1

Dynamics of the thickness of the ciliary body at various times after MTCFC, mm ($M \pm \sigma$)

Ciliary body thickness / observation period	Before surgery (n=32)	3 rd day (n=32)	1-5 weeks. (n=28)	5-10 weeks. (n=24)	10 -25 weeks. (n=20)	30-50 weeks (n=20)
	0,60±0,05	0,81±0,11	0,65±0,07	0,49±0,10	0,39±0,07	0,38±0,003

n – number of eyes of patients who actually came for examination

Thinning of the ciliary body, progressing after laser exposure from the initial 0.60 ± 0.12 mm to 0.38 ± 0.10 ($p \leq 0.01$) in up to 50 weeks. suggests that the determining factor in the hypotensive effect is the laser-induced progressive atrophy of the ciliary body, accompanied by a natural inhibition of the secretion of intraocular fluid.

Conclusion and recommendations.

1. Ultrasound biomicroscopy of the anterior part of the eyeball using a Sonomed Escalon VuMax device (USA) is a highly informative and accurate method that allows you to study morphological changes in the secretory apparatus of the eye in glaucoma.

2. The decrease in ophthalmotonus after micropulse laser transscleral cyclophotocoagulation subcyclo is apparently associated with inhibition of the secretion of ciliary processes in the atrophically altered ciliary body, the degree of atrophy of which is aggravated after antiglaucomatous laser surgery.

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