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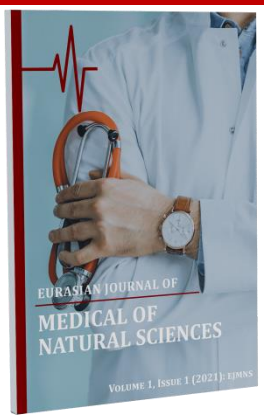

TRANSCLERAL CYCLOPHOTOCOAGULATION

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ABSTRACT

Cyclophotocoagulation is a unique method of treating complex eye diseases. The method is prescribed in the case of a blind eye, with constant pain syndrome and in the final terminal stage of glaucoma. The unpredictability of the hypotensive effect and a number of serious complications during continuous wave cyclophotocoagulation (CFC) limit the use of this operation in the treatment of glaucoma, which led to the development of a new approach known as microimpulse transcleral CFC (mCFC).

Microimpulse transcleral cyclophotocoagulation (mCFC) helps to reduce the production of intraocular fluid and improve its outflow. Laser exposure in micro-pulse mode avoids overheating of tissues and does not cause irreversible damage to the ciliary body. The use of a special MicroPulse P3 (MP3) probe connected to the Cyclone 6 system does not require incisions, which reduces the risk of inflammation and shortens the rehabilitation period. Laser mCFC can be used both in the early stages of glaucoma and in difficult cases, for those patients who are contraindicated for implantation of drains or sclerectomy. Laser cyclophotocoagulation has advantages: it is more controlled and potentially causes less reaction than cyclocryotherapy. The laser procedure can also be repeated with a lower risk of hypotension than cyclocryotherapy. Laser therapy often has a higher failure rate than cyclocryotherapy, and, accordingly, more than one laser procedure may be required. A limitation to the widespread use of laser cyclophotocoagulation is the high cost of laser equipment. In addition, this procedure should only be performed by ophthalmic surgeons who have been trained in its use. With mCFC, a series of repetitive short pulses of laser energy with a wavelength of 810 nm is delivered to the ciliary body (CT), which is well absorbed by melanin. Experimental studies have shown that a decrease in intraocular pressure in mCFC occurs due to the action of several mechanisms. In clinical studies in patients with various forms and stages of glaucoma, similar laser energy parameters were used during mCFC. It is concluded that mCFC is a safe and effective alternative to traditional CFCs. However, with an increase in the duration of laser exposure to CT, the number of complications also increases. The heterogeneity of the initial forms of glaucoma in patients who underwent mCFC, as well as the relatively small sample sizes in the presented studies do not yet allow us to draw unambiguous conclusions, an expanded study of this treatment method is necessary.

Transcleral cyclophotocoagulation is considered the last argument of an ophthalmologist if other methods of combating the disease do not bring the desired effect, and it is not possible to use the necessary groups of drugs and we are talking about the safety of the eye. Cyclophotocoagulation (abbreviated as CFC) is a method of treating certain diseases of the fundus, including glaucoma, mainly. This method uses an intense light beam to stop blood flow to the fundus, which can reduce intraocular pressure. Cyclophotocoagulation is considered the last argument of an ophthalmologist if other methods of combating the disease do not bring the desired effect, and it is not possible to use the necessary groups of drugs and we are talking about the safety of the eye.

The main task of the cyclophotocoagulation procedure is to reduce the volume of fluid in the eye cavity. This is achieved surgically, with partial destruction of the moisture-producing ciliary body. In the recent past, when ophthalmic lasers were only the dream of specialized clinics, the effects on the ciliary body were tried by electrodiathermy (electrotherapy) or cryotherapy sessions. However, such attempts had a weak therapeutic effect and did not allow controlling the volume of artificially destroyed tissue. Often, such destructive effects of the above-mentioned procedures led to undesirable consequences when the normal functioning of the eye was jeopardized due to the loss of the necessary amount of moisture. Unlike previous versions, transcleral cyclophotocoagulation is many times more accurate minimally invasive method. At the same time, its implementation is almost without complications — destruction and infection of the tissues subjected to surgery. Such positive aspects of the cyclophotocoagulation procedure are the reason why it is prescribed to patients with high IOP levels. Indeed, this category of patients often has severe pain syndrome, leading to damage to the optic nerve and complete loss of visual functions.

Types and types of cyclophotocoagulation

Modern ophthalmology can offer a number of methods that make it possible to establish the production of the required volume of intraocular fluid. At the same time, the cyclodestruction procedure is usually divided into separate methods:

- Cyclocryotherapy, a method of exposure to liquid nitrogen, used quite rarely;
- Contact transcleral cyclophotocoagulation, when a semiconductor G-probe of a contact laser is used for exposure;
- Non-contact transcleral cyclophotocoagulation, which uses a neodymium AIG laser;

Endoscopic cyclophotocoagulation.

The option of endoscopic cyclodestruction, or endocyclophotocation, is often more preferable than other methods. It can be performed as an independent procedure or combined with cataract surgery. The procedure involves inserting a special probe into the eye, equipped with a microlaser with a light source. By moving the probe around the iris, the ophthalmologist evaluates the condition of the ciliary body. This is followed by laser exposure, after which the liquid is produced only by the preserved part of the cells of the ciliary body. Both diode and neodymium lasers are used to perform the operation.

The following eye diseases and conditions are indications for the operation of transcleral cyclophotocoagulation:

- Terminal stage of any type of open-angle glaucoma (neovascular, traumatic, primary and secondary).

- The consequences of unsuccessful keratoplasty.
- A sore sightless eye.

Contraindications to the procedure are pronounced manifestations of uveitis, malignant neoplasms in the distal part of the eye, and normal visual acuity.

The most serious complications of transcleral cyclophotocoagulation are called postoperative persistent hypotension, which is noted in every tenth case, and ophthalmia, which occurs much less frequently. Among the unpleasant consequences of the operation, it is worth highlighting the pain syndrome, which can persist for several days after the intervention. As a rule, the appointment of analgesic drugs successfully copes with this problem.

Transcleral cyclophotocoagulation Non-contact difficulty of focusing, dosed exposure, obtaining minimal foci of coagulation significant radiation losses on reflection, scattering lead to the need to increase the energy levels of laser radiation, which increases the risk of complications for the patient. Contact radiation transmission via monofilament by reducing losses on Fresnel reflection radiation scattering in the sclera Contact compression Contact compression dosed indentation sclera with monofilament end face, what changes its optical and physical characteristics and increases its transparency by displacing the interstitial fluid from the zone of action of the compressive force in the illumination zone, laser radiation practically does not dissipate, this allows you to obtain coagulates of a clear spatially limited shape and maximize the use of laser radiation energy.

Laser applications are applied 1.5-2 mm from the limb, according to the projection of the secretory part of the ciliary body, the number of applications and radiation parameters vary from different authors. As a result of laser applications, burns of the ciliary body are formed with the outcome of atrophy of the ciliary processes, which leads to a decrease in the secretion of watery moisture. According to other authors, the hypotensive effect is achieved by detachment of the secretory part of the ciliary body and increased uveoscleral outflow. In addition, "semi-permeable membranes" are formed in the field of laser exposure. This increases the availability of eye structures to medicinal antihypertensive agents used instillationally Complications: High laser power is used, which can lead to irritation of the ciliary body, iridocyclitis. Transcleral cyclophotocoagulation has advantages over diathermy and cryopexy, since it does not cause thinning of the sclera long-term experience of transcleral cyclophotocoagulation shows that it can ensure success in high-risk glaucoma, which includes neovascular, postuveal, glaucoma with aphakia, etc., in which filtering surgery is ineffective or gives a small percentage of success. The effectiveness of zones of increased permeability in the flat part of the ciliary body created using diode laser applications. In recent years, along with the hypotensive effect, it has been possible to achieve a significant positive effect on the state of visual functions. Changes in the technique are achieved by shifting the site of coagulation application posteriorly, to the projection area not only of the crown, but also of the flat part of the ciliary body. As a result of laser exposure, biologically active substances, inflammatory mediators, which have vasodilatory properties, are formed. These substances, entering the vitreous body, reach the retina of the optic nerve, having a beneficial effect on the metabolism of these structures, which helps to optimize visual functions. Studies have been conducted on the effectiveness of this technique in patients with low-pressure glaucoma in order to stabilize and improve visual functions. During the operation, 20-25 laser coagulates were applied

concentrically at 270-300 degrees 3-5 mm from the limb (power from 0.7 to 1.2 W, exposure 3 seconds, radiation wavelength – 810 nm, focal spot diameter – 500 microns). In the postoperative period, all patients had a decrease in IOP to 7-13 mmHg, 1 month after surgery, averaged 14.9 mmHg. In 83% of cases, there was a positive trend in the state of the visual fields, on average, the number of relative and absolute cattle decreased by 26%. Thus, this technique makes it possible to reduce IOP in patients with low-pressure glaucoma, as well as optimize metabolic processes in the optic nerve and retina, thereby increasing the likelihood of a favorable prognosis for stabilization of visual functions in patients with reduced tolerance of the optic nerve to the effects of ophthalmotonus. Analysis of the data obtained shows that the problem of laser treatment of glaucoma remains relevant. This is primarily due to the solution of such issues as determining the indications for these operations, identifying criteria for evaluating their effectiveness, developing simple and low-traumatic surgery techniques, the predictability of the effect and its stability. Despite the negative effects of transcleral cyclophotocoagulation listed above, in most cases of intervention (75%), it is possible to achieve a stable positive effect.

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