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Organ-Conserving Therapy for Neovascular Glaucoma

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Abstract: Neovascular glaucoma (NVG) is a serious type of secondary glaucoma, marked by the growth of abnormal blood vessels in the iris and anterior chamber angle, typically linked to systemic conditions. This study aimed to assess the efficacy of transscleral cyclophotocoagulation using a micro-pulse diode laser for the treatment of painful NVG. Thirty patients with neovascular glaucoma were clinically observed, with evaluations focusing on visual acuity, intraocular pressure (IOP), and pain alleviation. The procedure involved micro-pulse diode laser cyclophotocoagulation, followed by treatments to reduce inflammation and lower IOP. The findings showed a notable decrease in IOP and significant pain relief, highlighting this method as an effective organ-preserving option for NVG management.

Keywords: neovascular glaucoma, transscleral cyclophotocoagulation, micro-pulse diode laser, intraocular pressure, pain relief, ophthalmology, glaucoma therapy, laser treatment.

Relevance: Neovascular glaucoma (NVG) is classified as one of the most severe manifestations of secondary glaucoma, due to the systemic complications and localized changes characterized by the formation of newly developed blood vessels in the iris and the anterior chamber angle. Several diseases can trigger the onset of NVG. The therapeutic approach to glaucoma management includes both hypotensive pharmacological treatments and surgical interventions. A notably effective cyclodestructive treatment for NVG is the novel application of contact micro-pulse transscleral laser cyclophotocoagulation, a promising technology in the field.

Objective: The purpose of this study is to evaluate the efficacy of transscleral cyclophotocoagulation using a diode laser in a micro-pulse mode, as well as to analyze its effects on the clinical progression of neovascular glaucoma.

Materials and Methods: The clinical trials were performed at the Department of Ophthalmology in the multidisciplinary clinic of Samarkand State Medical University and at the "A.A. Yusupov" Eye Center, LLC, in Samarkand, with 30 patients diagnosed with painful neovascular glaucoma. Of these, 21 were women and 9 were men. The accompanying systemic conditions among the patients included ischemic heart disease, hypertension, and diabetes mellitus.

The functional status of the visual system was evaluated using several diagnostic techniques: anterior eye segment examination through biomicroscopy, assessment of visual acuity, peripheral field examination on a perimetry device, intraocular pressure measurement using a Maklakov tonometer, examination of the ocular fundus with direct and indirect ophthalmoscopy, ultrasonography, and gonioscopy.

Historically, the loss of visual function and the presence of severe pain had often led to the surgical removal of the eye in cases of terminal painful glaucoma. However, an organ-preserving approach to

glaucoma treatment has become more viable, with laser cyclophotocoagulation playing a pivotal role in this shift.

The laser photocoagulation procedure was performed on the ciliary body using a micro-pulse diode laser ("SubCyclo Supra-810"), at a 4-mm distance from the limbus over the projection of the pars plana. Each patient underwent 2–3 procedures, spaced 3–4 days apart. Post-procedure, a 1% solution of pred-forte was prescribed (1 drop twice daily) to mitigate the inflammatory response, along with a cupen-forte solution (1 drop three times daily). To induce pupil dilation, a 2.5% midoptic solution was used (1 drop twice daily for a week). In addition, to reduce IOP, a 0.5% timolol solution was administered (1 drop twice daily).

Results and Discussion:

The effect of laser cyclophotocoagulation was evaluated based on the following factors: corneal clarity, pain relief, and intraocular pressure (IOP) reduction. Prior to the procedure, corneal swelling was noted in 24 eyes (80%). One day after the laser photocoagulation of the ciliary body, 19 eyes (63.33%) demonstrated a clear cornea, and by the end of the week, the number increased to 26 eyes (86.6%).

Before treatment, severe and moderate pain was reported in 18 eyes (60%). Immediately after the procedure, the number of eyes experiencing pain, regardless of their IOP levels, decreased by over fourfold.

Prior to surgery, 21 eyes (70%) exhibited an IOP of 50 mmHg or more. On the first day post-surgery, 23 eyes (76.7%) presented with IOP readings of 35 mmHg or lower, and by the end of the month, 24 eyes (80%) demonstrated IOP levels not exceeding 32 mmHg. An exception was made for 2 eyes (6.6%) with IOP levels of 40–45 mmHg, which were later treated with trabeculectomy.

We observed no improvements in visual acuity following the procedure, as patients with neovascular glaucoma had preoperative visual acuity readings of 0 (zero).

Conclusions:

Laser transscleral cyclophotocoagulation of the ciliary body in micro-pulse mode in cases of painful neovascular glaucoma results in IOP reduction, elimination of pain syndrome, and represents a pathogenetically justified treatment method. Furthermore, it serves as a preparatory step before anti-glaucoma surgery.

This method is organ-conserving by design, with the primary objective being the achievement of an analgesic effect through the lowering of intraocular pressure while preserving the eye as an organ.

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