

Efficiency of Laser Coagulation of the Retina in Patients with Complicated Myopia

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Annotation: Complicated myopia, also referred to as pathological or degenerative myopia, is characterized by progressive axial elongation of the eyeball, leading to structural and functional changes in the posterior segment of the eye. These alterations include chorioretinal atrophy, posterior staphyloma, and peripheral retinal degenerations that significantly increase the risk of retinal detachment and irreversible vision loss. The aim of this study is to evaluate the clinical effectiveness of laser coagulation therapy in patients diagnosed with complicated myopia in terms of preventing retinal detachment, halting degenerative changes, and preserving visual function. This prospective clinical study involved 60 patients (120 eyes) aged 18–55 years with high-grade myopia and peripheral retinal degenerations. All patients underwent argon laser photocoagulation targeted at areas of lattice degeneration, thinning, or breaks in the peripheral retina. Follow-up assessments were conducted at intervals of 1, 3, 6, and 12 months to monitor anatomical stability and visual acuity. The results indicated that 85% of treated eyes demonstrated stabilized

retinal conditions with no new peripheral breaks, and 70% showed stable or improved visual acuity. These findings confirm that laser photocoagulation is a reliable and effective prophylactic intervention for the prevention of sight-threatening complications in complicated myopia.

Keywords: complicated myopia, laser coagulation, retinal degeneration, retinal detachment, visual acuity, prophylactic therapy, retinal breaks, peripheral degeneration.

Introduction: Complicated myopia is a severe and progressive ocular condition that differs from simple refractive myopia by the presence of degenerative changes in the fundus, primarily due to excessive axial elongation of the eyeball exceeding 26.5 mm. These anatomical alterations disrupt the architecture of the posterior pole and peripheral retina, leading to the formation of lattice degeneration, snail-track lesions, and increased fragility of the retinal tissue. Patients with complicated myopia are at an elevated risk of developing rhegmatogenous retinal detachment, which is one of the most dangerous sequelae requiring urgent surgical intervention. Given the structural vulnerabilities of the myopic eye, early prophylactic measures such as laser photocoagulation are crucial. Laser coagulation serves to induce chorioretinal adhesions around areas of weakness or retinal breaks, thereby reducing the likelihood of retinal detachment. Despite its widespread clinical use, data on the long-term efficacy and safety profile of laser coagulation in highly myopic patients remains heterogeneous. Therefore, this study seeks to systematically evaluate the role of laser photocoagulation in the management of complicated myopia based on clinical outcomes, anatomical stability, and visual acuity over a one-year follow-up period.

Materials and Methods: This study was designed as a prospective, observational clinical trial conducted at the Department of Ophthalmology of Samarkand State Medical University over a span of 24 months. Sixty patients diagnosed with complicated myopia based on fundus examination, refraction > -6.0 D, and axial length > 26.5 mm were enrolled. All patients presented with peripheral retinal degenerations such as lattice degeneration, snail-track degeneration, or suspicious retinal thinning. Exclusion criteria included patients with previous retinal detachment, vitreoretinal surgery, or active choroidal neovascularization. A comprehensive ophthalmologic examination was performed at baseline, including best-corrected visual acuity (BCVA) assessment using Snellen charts, intraocular pressure (IOP) measurement via Goldmann applanation tonometry, slit-lamp biomicroscopy, fundus examination through indirect ophthalmoscopy with scleral depression, and spectral-domain optical coherence tomography (OCT) imaging to evaluate retinal layers and detect subclinical pathology. Laser photocoagulation was performed using an argon laser system with energy parameters adjusted according to retinal pigmentation and lesion characteristics. Laser burns were applied in a grid or barricade pattern to surround the areas of degeneration or existing breaks. The average number of burns per session ranged from 200 to 400. Patients were monitored at 1, 3, 6, and 12 months post-procedure. Outcomes assessed included stabilization of retinal anatomy, formation of laser scars, incidence of new retinal breaks, and changes in BCVA. Statistical analysis was carried out using SPSS version 25.0. The Wilcoxon signed-rank test was used to compare pre- and post-treatment BCVA. A p-

value of <0.05 was considered statistically significant.

Results: The study cohort included 60 patients (120 eyes), among whom 58% were female and 42% were male. The mean age was 34.2 ± 9.3 years, with a mean axial length of 28.4 ± 1.1 mm. Baseline BCVA averaged 0.4 ± 0.1 on the Snellen chart. After laser photocoagulation, 102 eyes (85%) showed complete stabilization of peripheral retinal degeneration with no progression or new break formation. Laser-induced chorioretinal adhesions were observed in all treated areas during follow-up, indicating successful treatment. At 12 months, BCVA was stable or improved in 84 eyes (70%), while 15% showed mild reductions due to unrelated macular changes. No cases of retinal detachment were recorded during the observation period. Transient side effects included mild ocular discomfort (10%) and conjunctival hyperemia (15%), which resolved spontaneously within 48 hours. No significant rise in intraocular pressure or severe adverse events were documented. Statistically significant improvement in BCVA was observed post-treatment (mean BCVA: 0.45 ± 0.09 , $p = 0.002$). OCT imaging revealed increased retinal thickness and resolution of subclinical schisis in several cases.

Discussion: The results of this study validate the efficacy of laser photocoagulation in managing peripheral retinal degeneration associated with complicated myopia. The high rate of anatomical stabilization and the absence of retinal detachment during the 12-month follow-up underscore the prophylactic benefit of timely laser intervention. Our findings are consistent with prior studies that advocate the use of prophylactic laser therapy in high-risk myopic patients, particularly those with lattice degeneration or retinal breaks. The observed improvements in visual acuity further support its functional benefit. Moreover, the non-invasive nature of the procedure, along with its low complication profile, make it a suitable option for both outpatient and inpatient settings. However, it is crucial to emphasize the role of timely diagnosis and individualized treatment planning. Not all retinal changes in myopic eyes require immediate laser treatment; thus, careful assessment by experienced ophthalmologists remains essential. Additionally, this study highlights the utility of OCT imaging in detecting subclinical pathology and guiding laser placement. Limitations of the study include the relatively small sample size and lack of randomization. Future large-scale randomized controlled trials are recommended to further define the indications and optimize laser treatment protocols for this patient population.

Conclusion: Laser photocoagulation is a safe, effective, and minimally invasive treatment modality for stabilizing peripheral retinal degenerations in patients with complicated myopia. It plays a pivotal role in preventing the progression to retinal detachment and preserving visual function. Early intervention based on thorough clinical and imaging evaluation can significantly reduce the risk of sight-threatening complications. The procedure should be considered a first-line prophylactic option in patients with high axial myopia and peripheral retinal pathology.

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