

## Evaluation of the efficacy of argon laser photocoagulation therapy in patients with retinal tear

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### ABSTRACT

**Aims:** To report the clinical results of argon laser photocoagulation treatment of patients diagnosed in our clinic with retinal tears and/or holes.

**Methods:** Argon laser photocoagulation (0.1-0.2 sec, 200-400 µm spot size in 3-4 rows around the lesion and 250-500 millijoule power) treatment results of patients with retinal tears and/or holes who were treated and followed up in our clinic's retina unit were evaluated retrospectively.

**Results:** During the follow-up period (1-72 months), 61 eyes of 57 patients were treated with argon laser photocoagulation. The success rate of the treatment in retinal detachment prophylaxis was 89.5%. Visual functions improved or remained stable in 82.5% of the patients after argon laser retinopexy. No increase in intraocular pressure or laser-related side effects were observed in any patient during the follow-up period.

**Conclusion:** Argon laser photocoagulation is a safe and effective method for retinal tears and holes. According to our clinical experience, it can be safely applied in the prevention of retinal detachment.

**Keywords:** Argon laser photocoagulation, retinal holes, retinal tear, retinal detachment

### INTRODUCTION

The retinal tear is a full-thickness defect of the retina that usually occurs as a result of posterior vitreous detachment and may lead to retinal detachment when left untreated.<sup>1</sup> It is usually observed as horseshoe, opercular, and linear.<sup>2</sup> Retinal tears may be diagnosed incidentally on examination or patients may present with floaters, photopsia, or visual field defects. Especially degenerative myopia, lattice degeneration, and trauma are important risk factors.<sup>3</sup> When retinal tear is not treated, retinal detachment develops in 30-50% of patients.<sup>4,5</sup>

However, retinal detachment and visual loss can be prevented with prompt treatment. Today, argon laser photocoagulation is used as a safe and effective treatment procedure. The main aim of treatment is to prevent retinal detachment and visual loss.<sup>6</sup>

The widely used argon laser photocoagulation was introduced by L'Esperance in 1968 and Zweng reported in 1972 that it could be used in the treatment of retinal tears and prevented the progression of tears to retinal detachment.<sup>7-9</sup> Argon laser photocoagulation is the main mechanism that prevents retinal

detachment; the formation of strong adhesions between the retina and retinal pigment epithelium that prevent migration of subretinal fluid.<sup>3,10</sup> However, although argon laser photocoagulation is an accepted treatment modality for retinal tears, argon laser photocoagulation has many side effects. Some of these include angle closure, macular edema, deterioration in color vision, and visual loss.<sup>11</sup>

In this study, we aimed to evaluate the clinical characteristics of patients diagnosed with retinal tears and/or holes and the results of treatment with Argon laser photocoagulation in our clinic.

### METHODS

The charts of the patients who applied to the retina unit of Yüzüncü Yıl University, Faculty of Medicine, Ophthalmology Department were scanned retrospectively. Patients who presented with complaints of photopsia and decreased vision and were found to have retinal tears and/or holes or were incidentally found to have retinal tears and/or holes during peripheral retinal examination were included in the

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study. The Declaration of Helsinki conducted our study after the approval of the Van Yüzüncü Yıl University Non-interventional Clinical Researches Ethics Committee (Date: 04.02.2025, Decision No: 2025/01-41).

Patients who underwent peripheral retinal examination with a binocular indirect ophthalmoscope or Goldman's three-mirror lens after a complete ophthalmological examination were included in the study. Information such as best visual acuity, surgical history, presence of comorbidities (diabetes mellitus, hypertension, retinal detachment, glaucoma, degenerative myopia, macular edema, etc.), localization of the holes, power of argon laser, need for additional laser, follow-up period, and best visual acuity after treatment was recorded. Patients with a history of trauma, a follow-up period of less than one month, and corneal edema were excluded from the study.

Detailed information about the diagnosed patients was filed, and argon laser photocoagulation (quantel medical, easyret, 577 nm) prophylaxis was performed after informed consent forms were obtained. The argon laser photocoagulation procedure was performed on the same day after diagnosis. argon laser photocoagulation was applied in 0.1-0.2 s, in 3-4 rows around the lesion with a spot size of 200-400 µm and a power of 250-500 millijoules. Patients were advised to follow up the next day.

### Statistical Analysis

Data analyses were performed using statistical package for the social sciences (SPSS) software. Descriptive statistics were presented as percentages, means, and standard deviations (SD). The chi-square test ( $X^2$ ) was used to compare categorical variables. The significance level was accepted as  $p < 0.05$ .

### RESULTS

The study included 61 eyes of 57 patients. The mean age of the patients was  $37.82 \pm 0.83$  years; 49.1% were female ( $n=28$ ) and 50.9% were male ( $n=29$ ). Among the patients included in our study, 66.7% ( $n=38$ ) had involvement in the right eye, 33.3% ( $n=19$ ) in the left eye, and 4 patients had involvement in both eyes. Of these, 94.7% ( $n=54$ ) were phakic. 5.3% ( $n=3$ ) were pseudophakic, and the follow-up period ranged between (mean of 36,4 month) 1 and 72 months. Regarding ocular pathologies, 43.9% ( $n=25$ ) had a diagnosis of degenerative myopia and 7% ( $n=4$ ) had a history of vitrectomy.

The most common hole localization was in the superior temporal and inferior temporal regions (24.6%,  $n=14$ ). Systemic diseases accompanying retinal tears are shown in **Table 1**.

Hypertension	Diabetes mellitus	Diabetes mellitus and hypertension	No history of systemic disease
4	2	3	48
7%	3.5%	5.3%	84.2%

Retinal detachment developed in 10.5% ( $n=6$ ) of the argon laser patients, and the patients were referred for additional lasers and surgery. There was no significant statistical correlation between the development of retinal detachment and the involved eye and hole localization. Clinical characteristics and treatment outcomes of patients with retinal tears are shown in **Table 2**.

Feature	Values
Total number of patients (eyes)	57 patients (61 eyes)
Mean age (SD)	$37.82 \pm 0.83$ years
Gender distribution	Female: 49.1% (28), male: 50.9% (29)
Follow-up period (months)	1-72 months
Location of retinal tear	Superior temporal: 24.6% (14), inferior temporal: 24.6% (14)
System diseases	Hypertension: 7% (4), diabetes mellitus: 3.5% (2), diabetes mellitus and hypertension 5.3% (3), no history of systemic disease 84.2% (48)
Degenerative myopia	43.9% ( $n=25$ )
Phacic/pseudophakic	Phacic: 94.7% (54), pseudophakic: 5.3% (3)
Treatment success rate	89.5% (retinal detachment prophylaxis)
Visual function recovery	Improvement or stability: 82.5%
Complications	Intraocular pressure elevation: none, laser related side effects: none
Number of patients with retinal detachment	10.5% ( $n=6$ )

SD: Standard deviation

Visual functions improved or remained stable in 82.5% of the patients after laser retinopexy. There were no laser-related side effects or increased intraocular pressure in any of our patients.

### DISCUSSION

Retinal tears and holes are important risk factors for the development of retinal detachment. Argon laser photocoagulation has long been used in the treatment of retinal tears and holes as a treatment with proven safety and efficacy. This treatment aims to prevent the development of retinal detachment.<sup>12</sup> Looking at the literature, Khan et al.<sup>12</sup> reported that only 11.6% of 45 patients who were followed up for 6 months after argon laser retinopexy failed to achieve the desired result, and retinal detachment developed in 7.0% of the patients. This was associated with vitreous hemorrhage. Garoon et al.<sup>13</sup> reported that retinal detachment developed in 5.7% of the patients in the 3-year follow-up of laser retinopexy performed in 401 eyes. They explained that this result was related to vitreous hemorrhage, multiple retinal tears, and superior temporal localization. In a similar study, McElhinney et al.<sup>14</sup> reported that retinal detachment developed in 6% of 87 patients who underwent laser retinopexy with a follow-up of approximately 11 months, and the important reason for this was the localization of the tears and holes. Although a similar rate was found in our study, unlike our study, no statistical correlation was found between localization and retinal detachment. However, of the 6 patients who developed retinal detachment, 3 had degenerative myopia, 1 had a history of diabetes and hypertension, and the remaining 2 had inferior temporal and inferior nasal retinal tears. The presence of additional disease, degenerative myopia and inferiorly located retinal tears can be considered as important risk factors for developing retinal detachment.

Finally, in the literature, the incidence of retinal detachment was found to be 0-13.8% in patients with asymptomatic retinal holes or tears and 35-47% in symptomatic patients.

However, there is an incidence of retinal detachment in 2.1-8.8% after prophylactic treatment.<sup>15</sup> This shows us that early diagnosis and treatment of retinal tears are very effective in preventing the development of detachment. The development of retinal detachment in 10.5% of the patients included in our study was found to be relatively high compared to the literature. This condition was associated with a high rate of degenerative myopia (43.9%), which is an important risk factor for retinal detachment. Thus, our study emphasizes the importance of additional risk factors in the success of laser retinopexy prophylaxis.

Pollak and Oliver's study on the treatment of argon laser photocoagulation in patients with retinal tears demonstrated the success of argon laser photocoagulation in retinal tears with a risk of detachment and showed that argon laser photocoagulation was superior to cryopexy because of its easy and convenient applicability as well as the absence of any side effects.<sup>5</sup> Some side effects of argon laser photocoagulation in the prophylaxis of retinal tears are as follows: angle closure, macular edema, foveal involvement, color vision deterioration, and visual loss.<sup>16</sup> Additionally, epiretinal membrane (ERM) development, vitreous detachment, and retinal tears may be observed after prophylactic laser retinopexy.<sup>17</sup> Especially with the development of ERM, anatomical changes occur in the macula, which results in deterioration and loss of vision. Similarly, microcystic structures and deterioration in the ellipsoid zone after ERM surgery may also negatively affect the final visual acuity.<sup>18</sup> However, the incidence of these side effects is quite low.<sup>11</sup> In our study, prophylaxis was found to be adequate in 82.5% of the patients, and the listed side effects were not observed.

### Limitations

The retrospective nature of the study and the small number of cases, short follow-up time may be considered limitations of the study.

### CONCLUSION

Argon laser photocoagulation is an easy and effective treatment method that reduces the risk of retinal detachment and has a very low complication rate. According to our clinical experience, it can be safely applied in the prevention of retinal detachment.

### ETHICAL DECLARATIONS

#### Ethics Committee Approval

The study was carried out with the permission of the Van Yüzüncü Yıl University Non-interventional Clinical Researches Ethics Committee (Date: 04.02.2025, Decision No: 2025/01-41).

#### Informed Consent

Because the study was designed retrospectively, no written informed consent form was obtained from patients.

#### Referee Evaluation Process

Externally peer-reviewed.

#### Conflict of Interest Statement

The authors have no conflicts of interest to declare.

### Financial Disclosure

The authors declared that this study has received no financial support.

### Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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