Original Article

The Influence of Size of Nd:YAG Capsulotomy on Refraction, Anterior Chamber Depth and Patients Symptoms

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ABSTRACT

Objective: To find out the influence of size of ND:YAG capsulotomy on refraction, anterior chamber depth and patients symptoms

Study Design: Cross-sectional study.

Place and Duration of Study: This study was conducted at the Department of Ophthalmology, Shalimar Medical & Dental College Lahore from 1st December 2020 to 30th November 2021.

Materials and Methods: A detailed ophthalmic examination including refraction**,** anterior chamber depth and patients symptoms of all the included patients were done before and after Nd:YAG laser capsulotomy.

Results: Statistically, non-significant difference was observed in refraction and anterior chamber depth before and after Nd:YAG laser capsulotomy in both the group ($p<0.05$). In group 1 floater were observed in 10(25%) patients while in 30(75%) patients floaters were not observed. In group 2 floater were observed in 6(60%) patients while in 4(40%) patients' floaters were not observed. In group 1 glare was observed in 9 (22.5%) patients while in 31(77.5%) patients glare was not observed. In group 2 glare was observed in 5(50%) patients while in 5(50%) patients' glare was not observed ($p<0.05$).

Conclusion: The size of ND:YAG capsulotomy has statistically no significant influence on refraction, anterior chamber depth and patients symptoms. Better improvement in visual function and less complication can be achieved by capsulotomy with an opening of 3.5 mm.

Key Words: ND:YAG capsulotomy; Refraction; Anterior chamber depth; Patients symptoms

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INTRODUCTION

Reductions in posterior capsule opacification have been achieved by using sharp-edge optic intraocular lenses and the current phacoemulsification procedure.[1,2]

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In spite of advances in cataract surgery, posterior capsule opacification (PCO) remains the most prevalent postoperative issue[3] and it is caused by the proliferation and migration of remnant lenticular epithelial cells.[4] The standard therapy for PCO is Nd:YAG laser capsulotomy.[5] This technique has been shown to be effective and safe, complications like intraocular lens displacement, retinal detachment, IOL subluxation, increase in intraocular pressure and cystoid macular edema have been reported after the procedure.[6,7] Diffraction, sensitivity, glare and reduced image are all optical factors. Mechanical concerns are predicated on the intact posterior capsule's barrier effect, which favors a modest capsulotomy size.[8] Macular edema is induced the release of inflammatory mediators as a result of blood–aqueous barrier disruption, such as in complex cataract procedures with burst posterior capsule and vitreous loss.[9]

Following Nd:YAG laser capsulotomy, elevated IOP is related with an increased number of aqueous particles[10]. The impact of Nd:YAG laser therapy on refraction and anterior chamber characteristics has produced conflict findings in the literature.[9-12] The relationship between size of capsulotomy, visual acuity, issues of posterior segment and refraction has been studied in many studies.[11-13] According to the literature very limited data

is available about the effect of size of capsulotomy on theanterior chamber depth, refraction and patients symptoms. To our knowledge, this is only study in Pakistan to determine this association.

MATERIALS AND METHODS

This was cross sectional study carried out at the Department of Ophthalmology, Shalimar Medical and Dental College from 1st December 2020 to 30th November 2021. Consent was signed in written from all the patients included in our study. The criteria for inclusion in our study were all adults of both the gender with a PCO impairing visual acuity, cataract surgery history of three months, and had two or more lines of decreased best corrected vision while exclusion criteria was patients with any anterior segment disease and chronic eye problems like uveitis, keratoconus and glaucoma. A detailed ophthalmic examination including refraction, anterior chamber depth and patients symptoms of all the included patients was done before and after Nd:YAG laser capsulotomy. A total of 50 patients were included in this study. They were categorized into group 1 and group 2 based on sizes of capsulotomy. There were 40 patients in the group 1 with capsulotomy size ≤4 while there were 10 patients in group 2 with capsulotomy size >4. SPSS version 23 was used for the statistical analysis of the data. For comparison of data independent samples t test was used. A p-value of less than 0.05 was taken as significant.

RESULTS

In group 1, there were 16 (40%) male and 24 (60%) female while in group 2 there were 5 (50%) male and 5 (50%) female (Fig. 1) In group 1, the mean age was 61.75±11.19 years ranging from 20-80 years while in group 2, the mean age was 64.4±9.03 years ranging from 45-77 years. In group 1 the mean anterior chamber depth before laser was 3.93±0.52 mm while it was 3.97±0.33 mm after laser therapy while in group 2, the mean anterior chamber depth before laser was 3.66±0.21 mm while it was 3.85±0.11 mm after laser therapy. In group 1 the mean refraction before laser was -0.43±0.81 diopters while it was -0.50±0.86 diopters after laser therapy while in group 2. The mean refraction before laser was -0.80±0.91 diopters while it was -0.71±0.66 diopters after laser therapy. Statistically, the difference was non-significant {P>.05) in refraction and anterior chamber depth before and after laser therapy in both the group (Table 1). In group 1 floater were observed in 10 (25%) patients while in 30 (75%) patients floaters were not observed. In group 2 floater were observed in 6 (60%) patients while in 4 (40%) patients' floaters were not observed. In group 1 glare was observed in 9 (22.5%) patients while in 31 (77.5%) patients glare was not observed. In group 2glare was observed in 5 (50%) patients while in 5 (50%) patients' glare was not observed. Statistically, the variation was non-significant (P>0.05) in patients symptoms in both the group (Table 2). Night vision was good in all patients of both the group.

Table No.1: Anterior chamber depth and refraction before and after laser therapy

Parameter	Group 1	Group 2	P value
Anterior chamber depth (mm)			
Before laser	3.93±(0.52	3.66±0.21	0.731
After laser	3.97±0.33	3.85±0.11	
Refraction (diopters)			
Before laser	-0.43±0.81	-0.80±0.91	0.291
After laser	-0.50±0.86	-0.71±0.66	

Table No.2: Patients symptoms after laser therapy in both the groups

Group	Patients symptoms	Sub-category	No. (%)	P value
1	Floater	Yes	10(25%)	0.091
		No	30(75%)	
	Glare	Yes	9(22.5%)	0.231
		No	31(77.5%)	
2	Floater	Yes	6(60%)	0.711
		No	4(40%)	
	Glare	Yes	5 (50%)	0.081
		No	5(50%)	

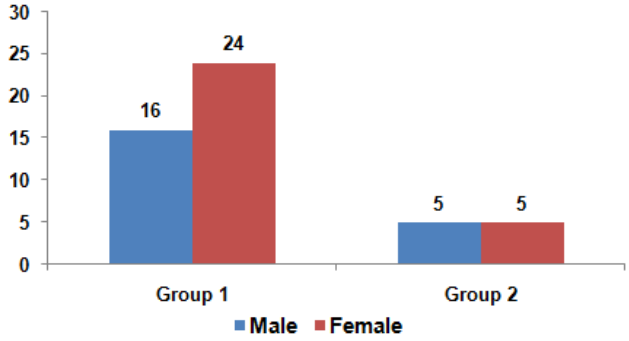

Figure No. 1: Gender wise distribution of patients

DISCUSSION

Visual acuity improvement is the primary aim of Nd:YAG laser therapy. Smaller capsulotomy apertures reduce visual acuity due to diffraction and cause light travelling through the unopened section of the capsule to be dispersed, resulting in glare and a decrease in contrast sensitivity in the eye. In scotopic condition, the capsulotomy opening should be equivalent to or bigger than the pupil size.[14] Capsotomy opening, on the other hand, should be big enough to provide adequate vision of the peripheral fundus, especially in individuals with retinal pathology. Three research studies published employed various approaches to look at the impact of Nd:YAG laser therapy on the morphology of anterior

chamber angle and found no statistically significant change in anterior chamber angle before and after Nd:YAG laser therapy.[15,16] Nd:YAG capsulotomy generated a rearward migration of the intra-ocular lens, which led in anterior chamber deepening, according to Findl and colleagues.[17] Another study reported no significant variation in anterior chamber depth.[18]

After Nd:YAG capsulotomy, two studies found a substantial reduction in mean anterior chamber depth.[19,20] In our study, in group 1 the mean anterior chamber depth before laser was 3.93±0.52 mm while it was 3.97±0.33 mm after laser therapy while in group 2, the mean anterior chamber depth before laser was 3.66±0.21 mm while it was 3.85±0.11 mm after laser therapy. Comparable results were reported by another study. Statistically, the difference was non-significant in anterior chamber depth before and after laser therapy in both the group ($p<0.05$). In accordance with our study, another study also reported similar results.[20]

In group 1 the mean refraction before laser was -0.43±0.81 diopters while it was -0.50±0.86 diopters after laser therapy while in group 2, the mean refraction before laser was -0.80±0.91 diopters while it was -0.71±0.66 diopters after laser therapy. Statistically, the difference was non-significant in refraction before and after laser therapy in both the group ($p<0.05$). In accordance with our study, another study also reported similar results.[20] Despite the fact that Nd:YAG laser capsulotomy has been shown to be effective and safe, the technique has the ability to modify the intra-ocular lens location. A hyperopic shift might theoretically be caused by posterior intra-ocular lens movement. According to several investigations, the decrease in refraction following Nd:YAG laser capsulotomy was not significant statistically.[15,16,21] On the other hand, there have been conflicting views on the relationship between refraction and capsulotomy size. A previous study also reported no significant variation of refraction with change in size of capsulotomy as reported by another study.[11,22] Another study found, on the other hand, an increased risk of hyperopia in individuals who had a capsulotomy size greater than 3.9 mm.[12]

In our study floaters and glare was higher in patients of group 1 as compared to group. In accordance to our study, another study also reported similar results.[11]

CONCLUSION

Size of Nd:YAG capsulotomy has statistically no significant influence on refraction, anterior chamber depth and patients symptoms. Better improvement in visual function and less complication can be achieved by capsulotomy with an opening of 3.5 mm. Our study recommends another study based on large sample size.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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