

The Effect of Total Power of Nd:YAG Laser on Intra-Ocular Pressure and Anterior Chamber Reaction after YAG Laser Capsulotomy

Effect of Total Power of Nd:YAG Laser on Intra-Ocular Pressure

Syed Abdullah Mazhar¹, Nesr Farooq², Khurram Nafees³, Sehar Zahid⁴, Bushra Mazhar⁵ and Nazish Mazhar Ali⁵

ABSTRACT

Objective: To assess the effect of total power of Nd:YAG laser on intra-ocular pressure and anterior chamber reaction after YAG Laser capsulotomy.

Study Design: Prospective study

Place and Duration of Study: This study was conducted at the Department of Ophthalmology, Shalimar Medical & Dental College Lahore from October 2020 to September 2021.

Materials and Methods: Pre and post laser, the intraocular pressure and anterior chamber reactivity were documented. The patients were treated with laser after undergoing a pre-laser evaluation.

Results: The mean preoperative IOP was 13.38 ± 2.38 mmHg while postoperative was 18.40 ± 5.97 mmHg. Fifty one (87.93%) patients, none of the anterior chamber reaction was observed while faint and moderate reaction was observed in 7 (12.07%) and one (1.72%) patient respectively.

Conclusion: Nd:YAG laser capsulotomy is an efficient treatment method because of its non-invasiveness and no need for hospitalization. The most common complication observed was postoperative increase in IOP following Nd:YAG laser capsulotomy.

Key Words: Nd:YAG laser; Intra-ocular pressure; Anterior chamber reaction; YAG Laser capsulotomy

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INTRODUCTION

Reduced glare, vision and some other manifestations of posterior capsular opacification (PCO) are similar to those of an original cataract. Capsular bag opacification may be caused by cells from three different sources.⁽¹⁾ Cuboidal epithelial cells, in the anterior capsule, cuboidal epithelial cells do not migrate; instead, they

exhibit fibrous metaplasia and multiply in situ.⁽²⁾ Equatorial lens cells, mitotic activity is elevated in the cells of the equatorial lens bow. Because these cells migrate, they give birth to bladder cells as they expand along the posterior capsule.⁽³⁾ Finally, the equatorial lens bow's remnant cortical fibers get loosened and float freely inside the bag. They may stay isolated inside the visual axis or move centrally within it. PCO may take several forms, including Elsching's pearls, posterior capsular wrinkling, and fibrosis. The center region of the posterior capsule is either surgically opened or treated with the YAG laser, which is the conventional therapy. Endophthalmitis may be a serious side effect of surgical capsulotomy.¹ The treatment of significant visual posterior capsular opacification (PCO) in pseudophakic eyes using Nd:YAG laser capsulotomy is a successful and gold standard procedure.²

For posterior capsulotomy in PCO patients, several Nd:YAG laser methods have been developed. The cruciate method and circular procedures are the two most often utilized posterior capsulotomy techniques nowadays.³ An increase in intraocular pressure, a rupture of the anterior vitreous face and damage to the lens, hyphema, acute inflammation, and cystoid macular edema are all possible risks of the procedure

¹. Department of Ophthalmology, Fatima Memorial Hospital, Lahore.

². Department of Ophthalmology, Shalimar Medical & Dental College, Lahore.

³. Department of Ophthalmology, Al Ehsan Eye Hospital, Lahore.

⁴. Department of Pediatrics, Rashid Latif Medical College, Lahore.

⁵. Government College University, Lahore.

Correspondence: Dr. Syed Abdullah Mazhar, Assistant Professor of Ophthalmology, Fatima Memorial Hospital Lahore.

Contact No: 0333-4158909

Email: abdullah_mazhar@hotmail.com

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performed with the YAG laser.⁴ The most common consequence of Nd:YAG laser posterior capsulotomy is elevated intraocular pressure (IOP), however this is generally a temporary problem.⁵

Increased incidence of elevated IOP has been linked to increased laser energy and pulses in the treatment. This increase in IOP might be severe, putting your eyesight at risk.⁶ According to the literature no such study have been conducted in Pakistan therefore this study was conducted to determine the effect of total power of Nd:YAG laser on intra-ocular pressure and anterior chamber reaction after YAG Laser capsulotomy.

MATERIALS AND METHODS

This prospective study was carried out at the Ophthalmology Department, Shalimar Medical and Dental College from 1st October 2020 to 30th September 2021 and 58 patients were enrolled. A consent form was signed from all the included patients. The inclusion criteria for our study was older patients with PCO impairing visual acuity, cataract surgery history of three months, and had two or more lines of decreased best corrected vision, while the exclusion criteria was patients under the age of 15, patients with simple extracapsular cataract extraction, dislocated IOLs, IOL implants in traumatic cataracts, patients undergoing a combined procedure (Trabeculectomy with PC IOL), patients with diabetic retinopathy or any other retinal disease. Pre and post laser, the intraocular pressure and anterior chamber reactivity were recorded documented on a predesigned Performa. The patients were treated with laser after undergoing a pre-laser evaluation. With 1.5 to 5mJ per pulse, a Nd:YAG laser was utilized to produce a 2-3mm hole in the posterior capsule. The energy and pulses were progressively increased in accordance with the capsule thickness until an opening was obtained. Following the capsulotomy, patients were given 0.1 percent diclofenic sodium eye drops three times a day for one week, as well as antiglaucoma medication as required. After one month, patients were evaluated for intraocular pressure, anterior chamber reaction, and probable consequences. The data was entered and analyzed through SPSS-23.

RESULTS

There were 24 (41.38%) male and 34 (58.62%) female patients. Mean age of the patients was 61.67±10.31 years. Only one (1.72%) patient was in the age group 18-40, 26 (44.83%) in 41-60 and 31 (53.45%) in age group 61-80 years. All the patients received treatment in the unilateral eyes. Right eye was treated in 37 (63.79%) patients while left eye was treated in 21 (36.21%) patients. The mean preoperative IOP was 13.38±2.38 mmHg while postoperative mean IOP was 18.40±5.97 mmHg. We observed that with the increase of YAG power the IOP also increases. None of the anterior chamber reaction was observed in 50 (86.20%)

patients while faint and moderate anterior chamber reaction was observed in 7 (12.07%) and one (1.73%) patient respectively. The mean YAG power used in our study was 4.94±1.07 mJ while the total mean power used was 68.61±27.28 mJ. The mean of total number of shots was 13.97±4.47 (Table 1).

Table No.1: Demographic information of the patients (n=58)

Variable	No.	%
Gender		
Male	24	41.38
Female	34	58.62
Age (years)		
18-40	1	
41-60	26	
61-80	31	
Anterior chamber reaction		
None	50	86.20
Faint	7	12.07
Moderate	1	1.73
Marked	-	-
Intense	-	-
Laterality		
Right eye	37	63.79
Left eye	21	36.21
IOP (mmHg)		
Preoperative	13.38±2.38	
Postoperative	18.40±5.97	

DISCUSSION

After cataract surgery, the reported incidence of PCO is 20.7 percent after two years and 28.5 percent after five years.⁷ After extracapsular cataract surgery, PCO is the most common cause of decreased visual acuity.⁸ The conventional therapy for PCO is a Nd:YAG laser capsulotomy.⁹ 94% of individuals treated with capsulotomy by Aron-Rosa et al¹⁰ observed an immediate improvement in visual acuity. Overall visual acuity improved in 83–94% of cases and declined in 3.5–6% of cases, according to a previous study.¹¹ A previous study reported that there were 105 female and 95 male in their study.¹² Another study also reported female predominance. They reported 57% female and 43% male in their study.¹³ In accordance with the previous studies, our study also reported female predominance. There were 24 (41.38%) male and 34 (58.62%) female patients in our study.

Though effective, Nd:YAGcapsulotomy may cause problems such as an increase in intraocular pressure (IOP), damage of lens, refractive changes, macular edema, retinal detachment and retinal rupture.¹⁴ Increased IOP is the most prevalent side effect of Nd:YAG laser posterior capsulotomy. Following Nd:YAG laser capsulotomy, 59–67% of patients had an IOP increase of at least 10 mmHg in the absence of antiglaucoma or anti-inflammatory prophylaxis.¹⁵ In

various investigations, higher IOP was recorded in 15–30% of individuals despite preventative therapy.^{16,17} In accordance with the previous studies, our study also shows an increase in postoperative IOP. In our study, the mean preoperative IOP was 13.38 ± 2.38 mmHg while postoperative mean IOP was 18.40 ± 5.97 mmHg. None of the anterior chamber reaction was observed in 50 (86.20%) patients while faint and moderate anterior chamber reaction was observed in 7 (12.07%) and one (1.73%) patient respectively. In accordance to our study, another study did not observe any serious anterior chamber reaction.¹⁸

According to Kumar et al¹³ the laser energy used for capsulotomy has a direct relationship with the density of posterior capsular opacification. The cumulative total energy needed to achieve an appropriate capsulotomy varied between 20 and 232 mJ. The mean YAG power used in our study was 4.94 ± 1.07 mJ while the total mean power used was 68.61 ± 27.28 mJ. A previous study concluded that the majority of patients needed less than 200 mJ for capsulotomy, and that those who needed over than 200 mJ had a higher risk of increased intraocular pressure.¹⁹

CONCLUSION

Nd:YAG laser capsulotomy is an efficient treatment method because of its non-invasiveness and no need for hospitalization. The most common complication observed was postoperative increase in IOP following Nd:YAG laser capsulotomy. In order to avoid a transitory increase in intraocular pressure, it is recommended to employ the smallest number of laser shots and the minimum amount of total power.

Author's Contribution:

Concept & Design of Study: Syed Abdullah Mazhar
Drafting: Nesr Farooq,

Khurram Nafees

Data Analysis: Sehar Zahid, Bushra Mazhar,

Nazish Mazhar Ali

Revisiting Critically: Syed Abdullah Mazhar,
Nesr Farooq

Final Approval of version: Syed Abdullah Mazhar

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

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