Al-Azhar International Medical Journal

Volume 3 | Issue 8 Article 24

8-1-2022

Effect of Anterior Chamber Depth on the Development of Post YAG LASER Capsulotomy Macular Edema

Islam Mohamed
Department of Ophthalmology, Al Azhar University, Faculty of Medicine for boys, Cairo, Egypt,
esl86245@gmail.com

Mohamed Farag
Department of Ophthalmology, Faculty of Medicine for boys, Al-Azhar University, Cairo, Egypt,
moh_hassanin@hotmail.com

Mohamed Ead
Department of Ophthalmology, Faculty of Medicine for boys, Al-Azhar University, Cairo, Egypt.,
eslamgamalzagloul@gmail.com

How to Cite This Article

Mohamed, Islam; Farag, Mohamed; and Ead, Mohamed (2022) "Effect of Anterior Chamber Depth on the Development of Post YAG LASER Capsulotomy Macular Edema," *Al-Azhar International Medical Journal*: Vol. 3: Iss. 8, Article 24.
DOI: https://doi.org/10.21608/aimj.2022.122918.1858

OPEN AIMJ ORIGINAL ARTICLE

Ophthalmology

Effect of Anterior Chamber Depth on the Development of Post YAG LASER Capsulotomy Macular Edema

Islam Gamal Mohamed Abdelkawy [1]*M.B.B.Ch; Mohamed Zakaria Eid [1]MD and Mohamed Hassanein Farag [1]MD.

**Corresponding Author:*
Islam Gamal Mohamed Abdelkawy
eslamgamalzagloul@gmail.com

Received *for publication March 04, 2022;* ***Accepted*** *August 31, 2022;* ***Published online*** *Audust 31,2022.*

doi: *10.21608/aimj.2022.122918.1858*

Citation: *Islam G. , Mohamed Z. and Mohamed H. Effect of Anterior Chamber Depth on the Development of Post YAG LASER Capsulotomy Macular Edema. AIMJ. 2022; Vol.3-Issue8 : 145-150.*

[1]Ophthalmology Department, Faculty of Medicine, Al-Azhar University, Cairo , Egypt.

ABSTRACT

Background: The most common long-term phacoemulsification cataract surgery complication is the opacification of the posterior capsule (PCO). This condition can lead to decreased vision, an impaired ability to distinguish between light and dark and the development of monocular diplopia as the result of posterior capsule opacification.
Aim of The Work: To evaluate correlation between anterior chamber depth using Anterior segment OCT and assess macular thickness after YAG-LASER capsulotomy using macular OCT.
Patients and Methods: The study included twenty eyes of twenty patients who had uncomplicated phacoemulsification and developed posterior capsular opacification Group(1), and 20 eyes of 20 patients who had successful phacoemulsification without complications and without PCO Group (2) were the control. They were from the Sayed Galal Hospital Ophthalmology outpatient clinic from June to December 2021 at Al-Azhar University's Faculty of Medicine.
Results: The current showed that best corrected visual acuity, spherical error, and spherical equivalent improved after YAG-Laser capsulotomy and vision markedly improved at the last follow-up period with statistically highly considerable variation between the two periods ($p<0.001$), while the axial length decreased during the follow-up period with statistically different value between the two periods ($p<0.05$).
Conclusion: The blood-aqueous barrier is damaged by YAG-LASER capsulotomy, releasing VEGFs and other inflammatory mediators. The anterior chamber depth was altered by inflammatory macular edema from Nd:YAG laser capsulotomy. Prophylactic therapy may not be needed.

Keywords: *Anterior Chamber Depth; Macular Edema; YAG LASER.*

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*
Authorship: *All authors have a substantial contribution to the article.*

INTRODUCTION

Remaining lens epithelial cells growth and migration, epithelial mesenchymal transition, collagen deposition, and lens fiber formation are the primary causes of posterior capsular opacification. [1]

By producing a central aperture in the opaque posterior capsule, Nd: YAG laser capsulotomy has become the gold standard therapy for pseudophakia eyes with visibly significant PCO. [2]

When using the Nd:YAG laser, a series of focused ablations are made in the posterior capsule, which results in an aperture through which light may pass. Despite the fact that Nd:YAG laser posterior capsulotomy is safe and effective, the reported vision-related complications include cystoid macular edema (CME), retinal detachment [3], damage to the IOL, iris hemorrhage, corneal edema, IOL subluxation, macular hole and exacerbation of localized endophthalmitis. [4]

Nd: YAG laser posterior capsulotomy is known to cause temporary elevations in intraocular pressure (IOP); however, this is not permanent. [5] IOP rises following Nd: YAG capsulotomy due to diminished outflow capacity caused by capsular debris and vitreous particles floating in the anterior chamber blocking the trabecular meshwork's flow. [6] According to certain studies, IOP rise is more likely to occur at greater laser energies and higher laser pulse counts. A substantial increase in IOP might put the eyesight at risk. [7]

Intraocular pressure may be increased by the Nd:YAG laser capsulotomy treatment if debris is deposited in the trabecular meshwork, trabeculitis develops as a result of the radiating "shock waves," neurovascular processes are activated, and angle-closure pupillary block occurs. [8]

It is possible that the location of the IOL implant in the eye will change during this treatment, which may impair the patient's visual acuity. The patient's eyesight may need to be further refracted. As a result of disruption to the blood-aqueous barrier, macular

edema is caused by movement and injury inside the vitreous cavity, as well as the release of inflammatory mediators therefrom. [9, 10]

It's known to cause retinal tears and detachments, with rates ranging from 0% to 3.6%. 11. Retinal tear and detachment following the laser's rupture of the anterior vitreous hyaloid is hypothesized by some to be the result of this process. [11]

Reproducible and exact measurements of macular thickness may be made using optical coherence tomography. Symmetric or only one part of the retina may be affected by the edema. Starting off as a single lesion, it frequently evolves to a more widespread form. [12]

The aim of the Work was to evaluate correlation between anterior chamber depth (ACD) using Anterior segment OCT (AC-OCT) and assess macular thickness after YAG LASER capsulotomy using macular OCT.

PATIENTS AND METHODS

This prospective, cross-sectional study involved 20 eyes of 20 patients underwent uncomplicated phacoemulsification and developed posterior capsular opacification (PCO). They are collected from the Ophthalmology outpatient clinic of Sayed Galal Hospital. The study was performed in the Faculty of Medicine, Al-Azhar University at the period of six months from June 2021 to December 2021.

A cross-sectional controlled study in which AC-OCT was performed to detect the ACD then doing Macular OCT to detect macular thickness before YAG Laser Capsulotomy then doing YAG Laser Capsulotomy and follow up the patients with Macular OCT at first and third month to detect macular thickness changes after YAG and correlates these changes with AC depth of these patients.

Twenty eyes of 20 patients who undergone successful phacoemulsification without complications and developed posterior capsule opacification represented the target population of this study beside 20 eyes of 20 patients who undergone successful phacoemulsification without complications and without PCO. They all matched our inclusion criteria.

Inclusion criteria of the Patients: Adult subjects: Age ranged between 40 to 70 years, both sexes included, patients underwent uncomplicated Phacoemulsification, subjects had no extraocular or intraocular diseases, not very dense PCO allowing posterior segment imaging, normal healthy subjects, i.e., non-diabetic, cooperative patients for the procedure, normal clear cornea and able to perform a confirmed consent.

Exclusion criteria: Low age patients < 40 years, patients with complicated phacoemulsification, patients presenting with dense PCO affecting posterior segment imaging, patients with active ocular disease such as corneal ulcer, corneal opacities, viral or bacterial infection, patients with history of previous retinal surgery, patients with corneal opacities, corneal degenerations and corneal dystrophies, congenital ocular disease as staphyloma, keratoconus, microcornea, and megalocornea, glaucomatous patients or with elevated intraocular pressure, history of ocular trauma or chronic inflammation, patients with posterior segment disorders as diabetic retinopathy, age related macular degenerations, systemic vascular diseases, patients on medications affecting macula, patients with autoimmune diseases.

Methodology: Complete assessment was done for each patient including:

Full history taking: Personal history: name, age, gender, residence and occupation, past history: history of previous medications and history of previous ocular surgery and present history: Any patient's complaint, onset of the vision diminution, duration since surgery and progression of vision diminution.

Preoperative assessment: Uncorrected and best corrected visual acuity assessment using Snellen's chart: unaided and best corrected, converted to decimal values, manifest refraction using the autorefractometer, slit lamp biomicroscopy to examine the anterior segment of the eye to exclude any corneal or lens abnormalities as corneal opacities, corneal dystrophy, corneal degeneration and degree of opacification, intraocular pressure measurement by Air puff tonometer(TOPCON), fundus examination: using slit lamp and 90D lens to exclude any posterior segment disorder, OCT of the macula: Image processing and segmented en-face OCT images using TOPCON TRITON PLUS and AC-OCT: for determination of anterior chamber depth.

Postoperative assessment: Visual acuity, slit lamp biomicroscopy, fundus examination, macular OCT imaging and AC-OCT.

Patients were scanned using a prototype OCTA device. The prototype is a swept-source OCT system with a wavelength of 1050 nm and a scan rate of 400 kHz. [13]

Fig. 1: Topcon Triton plus OCT

Procedure Steps: YAG laser offset adjusted to 10 degrees to avoid damaging or pitting the intraocular lens implant, laser power started from 0.4 mj and was increased by 0.1 mj increments until clinical

objective of micro-puncture posterior capsulotomy was achieved, small punctures 4-8 shots in each quadrant for a total of 16-32 punctures in whole circumference were done and size of each puncture was attempted to be as small as clinically possible.

Fig. 2: Microruptor 6 Nd: YAG laser.

Follow up: Complete evaluation of the patients especially measurement of the macular OCT and ACD was determined preoperatively and at the first week, first month and then at third month after YAG capsulotomy to find the relation between macular changes and ACD.

Ethical considerations: The study was conducted after approval of the protocol by the Local Research Committee and the Studies Committee as well as the Research Ethics Committee. An informed written consent was obtained from all patients.

Statistical Data Analysis: The statistical software SPSS version 20.0 was used to examine the data (SPSS Inc., Chicago, IL, USA). The Kolmogorov–Smirnov test was used to determine if the variables had a normal distribution. The mean standard error (SE) was used to divide the subjects into two groups: those with PCO (group #1) and those without (group #2). Multiple analyses of variance (ANOVA) with the Bonferroni correction were used to examine the differences between the two groups (post hoc comparisons). The correlation coefficient (r) between central macular thickness and SE and ACD was calculated using linear regression. For the research variables, Pearson correlation coefficients were also used.

RESULTS

	Group (1)		Group (2)		Significance	
Gender	**No.**	**%**	**No.**	**%**	**χ^2**	**P**
Males	14	70.0	12	60.0	0.102	0.749
Females	6	30.0	8	40.0	0.164	0.870
Age (years)	**Min**	**Max**	**Min**	**Max**	**t**	**P**
Range	48	70	40	62		
Mean ± SD	65.1 ± 5.36		64.8 ± 6.42		0.158	0.284

χ2 = Chi square, t: paired t-test, SD: standard deviation.
Both groups were matched in age and sex with p value >0.05.

Table 1: Patients characteristics of the two studied groups

This study involved 20 eyes of 20 patients underwent uncomplicated phacoemulsification and developed PCO (group 1): they were 14 males (70%) and 6 females (30%) and another 20 eyes of 20 control subjects underwent uncomplicated phacoemulsification and did not have PCO, they were 12 males (60%) and 8 females (40%). The ages of group (1) ranged from 48 to 70 years with mean ± SD of 61.1 ± 5.36 years and the ages of the control group (2) was ranged from 40 to 62 years with mean of 55.3 ± 6.42 years. Table (1)

Groups	**Group (1)**	**Group (2)**	**Significance**	
Item	Mean ± SD	Mean ± SD	**t**	**P**
IOP (mmHg)	16.0 ± 3.85	14.8 ± 3.24	0.288	0.102
▪ **Mean ±SD**	14.5 – 23.3	11 – 22		
▪ **Range**				
BCVA (decimal)	0.35 ± 0.26	0.80 ± 0.01	0.762	0.003*
▪ **Mean ±SD**	0.10 – 0.55	0.72 – 1.2		
▪ **Range**				
Spherical error (D)	-2.6 ± 4.42	-0.10 ± 0.05	3.951	0.000*
▪ **Mean ±SD**	-0.5 – -9.3	-0.5 – 1.0		
▪ **Range**				
Spherical equivalent (D)	-4.45 ± 4.15	-0.50 ± 0.11	1.657	0.000*
▪ **Mean ±SD**	-0.68 – -6.0	-0.1 – 1.0		
▪ **Range**				
AL (mm)	24.25 ± 1.04	22.15 ± 0.97	0.508	0.012*
▪ **Mean ±SD**	21.5 – 26.2	20.6 – 25.3		
▪ **Range**				
CMT (µm)	229.4 ± 26.4	235.6 ± 24.7	0.496	0.031*
▪ **Mean ±SD**	186.9 – 324.1	205.4 – 382.5		
▪ **Range**				

*P <0.05 = significant, D: diopter, IOP: intraocular pressure, BCVA: best corrected visual acuity, AL: axial length, ACD: anterior chamber depth, CMT: central macular thickness, SD: standard deviation.
Table (2): Characteristics of studied eyes in both groups at presentation

IOP was statistically insignificant (P >0.05), while BCVA, spherical error, spherical equivalent, axial length and CMT showed statistically considerable variation (P <0.05) in comparison between the two studied groups. Table (2)

AC parameters	Group (1)	Group (2)	Significance	
			t	P
ACD (mm)	4.38 ± 0.82	3.91 ± 0.76	0.577	0.009*
▪ **Mean ±SD**	3.72 – 4.71	3.61 – 4.62		
▪ **Range**				
AC volume (mm^3)	178.0 ± 18.5	169.7 ± 17.6	0.345	0.049*
▪ **Mean ±SD**	164.5 – 196.2	163.2 – 189.7		
▪ **Range**				
AC angle (°C)	54.8 ± 4.89	50.1 ± 5.16	0.445	0.019*
▪ **Mean ±SD**	47.2 – 58.8	46.3 – 56.7		
▪ **Range**				

CMT: Central macular thickness. P <0.05 = statistically significant.

Table 3: Anterior chamber parameters of the two studied groups at presentation

Comparison between high myope and emmetrope showed considerable reduction in retinal thickness and central macular thickness in high myopes group compared to emmetropic control eyes, it was represented in detail in comparison between each retinal quadrant. Table (3)

Period	BCVA	SE (D)	SEq (D)	AL (mm)
	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD
Pretreatment	0.35 ± 0.26	-2.6 ± 4.42	-4.45 ± 4.15	24.25 ± 1.04
1 week PLC	0.79 ± 0.19	-1.92 ± 0.95	-2.02 ± 0.75	22.4 ± 34.1
1 month PLC	0.85 ± 0.08	-1.73 ± 0.86	-1.86 ± 0.64	22.8 ± 32.4
3 months PLC	0.90 ± 0.05	-1.72 ± 0.75	-1.84 ± 0.55	22.9 ± 28.8
F-test#	14.317	9.012	12.167	6.164
P value	0.0000*	0.0001*	0.0000*	0.0112*

#: F-test for comparison between pre-Laser and last follow-up period. *P <0.001 = highly significant. BCVA: best corrected visual acuity, SE: spherical error, SEq: spherical equivalent, AL: axial length. PLC: post-YAG Laser capsulotomy.

Table 4: Comparison between different parameters before and after the procedure in patients with PCO, group (1)

The best corrected visual acuity, spherical error, and spherical equivalent improved after YAG-Laser capsulotomy and vision markedly improved at the last follow-up period (3 months) with statistically highly considerable variation between the two periods (p <0.001), while the axial length decreased during the follow-up period with statistically different value between the two periods (p <0.05). Table (4)

Period	ACD (mm)		Macular thickness (µm)	
	Range	Mean ±SD	Range	Mean ±SD
Pretreatment	3.72 – 4.71	4.38 ± 0.82	186.9 – 324.1	229.4 ± 26.4
1 week PLC	3.70 – 4.52	4.02 ± 0.79	282.3 – 397.4	352.2 ± 34.1
1 month PLC	3.68 – 4.44	3.93 ± 0.78	255.5 ± 364.1	311.3 ± 32.4
3 months PLC	3.66 – 4.15	3.91 ± 0.75	211.9 ± 338.6	285.6 ± 28.8
F-test#	9.778		2.386	
P value	0.0001*		0.001*	

#: F-test for comparison between pre-Laser and last follow-up period. P <0.001 = highly significant. ACD: anterior chamber depth, PLC: post-YAG Laser capsulotomy.

Table 5: Comparison between anterior chamber depth and macular thickness before and after the procedure in patients with PCO, group (1)

Anterior chamber depth decreased gradually from pre-laser value to the last follow-up period (3 months) with statistically highly considerable variation between the two periods (p <0.001), while the central macular thickness is markedly elevated after laser, then decreased gradually till the end of the follow-up period with statistically highly significant value between the two periods (p <0.001). Table (5)

DISCUSSION

PCO can induce a decrease in visual acuity, sensitivity to contrast, and uniocular diplopia. [14]

The advent of the Nd: YAG laser coincided with the switch from intracapsular to extracapsular cataract surgery, as well as the advent of phacoemulsification. The use of Nd: YAG lasers in the treatment of posterior capsule opacification has revolutionized the field. Only surgical cutting or polishing had previously been feasible. [14]

Two years following cataract surgery, the reported PCO incidence is 20.7 percentage; five years later, the reported PCO incidence is 28.5 percent. After phacoemulsification cataract surgery, vision loss is most caused by PCO [(3)]. PCO is typically treated with a Nd:YAG laser capsulotomy. [15]

The study involved 20 eyes of 20 patients underwent uncomplicated phacoemulsification and developed PCO (group 1): they were 14 males (70%) and 6 females (30%) and another 20 eyes of 20 control subjects underwent uncomplicated phacoemulsification and did not have PCO, they were 12 males (60%) and 8 females (40%), represent the control group (2). The ages of group (1) ranged from 48 to 70 years with mean ± SD of 61.1 ± 5.36 years and the ages of the control group (2) was ranged from 40 to 62 years with mean of 55.3 ± 6.42 years. This is illustrated in the next table.

This was similar to Parajuli et al., [3] study as they had 44 males more than 29 females, however they had slightly more number than ours with the similar age range (32–82 years) and mean (62.72±11.14 years).

The current showed that best corrected visual acuity, spherical error, and spherical equivalent improved

after YAG-Laser capsulotomy and vision markedly improved at the last follow-up period (3 months) with statistically highly considerable variation between the two periods ($p < 0.001$), while the axial length decreased during the follow-up period with statistically different value between the two periods ($p < 0.05$).

According to several studies, a capsulotomy can enhance vision in 94% of instances, according to Aron-Rosa et al., [16]. Also, in a study by Weiblinger, [17] total visual acuity increased in 83–94% and reduced in 3.5–6 %. In our study, all the patients who received Nd: YAG laser capsulotomy had a considerable improvement in their vision.

Cataract surgery to capsulotomy took 3.26 ± 1.74 years in Group I whereas it took 2.46 ± 1.37 years in Group II, according to the research by Parajuli et al, [3]. The time span was between four months and eight years. CME was averted by avoiding capsulotomy within the first three months following cataract surgery.

Our study showed that IOP was statistically insignificant ($P > 0.05$), while BCVA, spherical error, spherical equivalent, axial length and CMT showed statistically considerable variation ($P < 0.05$) in comparison between the two studied groups.

One hundred and one eyes were studied by Holweger and Marefat, [18] who found no significant elevation in IOP following the capsulotomy, hence regular IOP monitoring at the 1–3-hour and 1-day post-capsulotomy intervals were not necessary. This was similar to our results.

In contrast to our study, increased intraocular pressure (IOP) has been described as the most prevalent side effect after Nd: YAG laser posterior capsulotomy. When Antiglaucoma or anti-inflammatory prophylaxis was not used, the majority of patients experienced an increase in IOP of at least 10 mm Hg after Nd: Laser capsulotomy with a Nd: YAG laser. [19]

A rise in IOP was observed in 15–30% of individuals despite the preventative therapy, according to many investigations [(21, 22).] However, Ozkurt et al. [20] found no considerable reduction in IOP following Nd:Yag capsulotomy. There were two groups in Ari et al., [21] study: those who used 80 mJ or less and those who used 80 mJ or more. Both groups saw a substantial rise in IOP at one week postoperatively; however, the IOP in Group I returned to preoperative values after one month. When compared to preoperative levels, it was still considerably higher in Group II three months after surgery.

Karahan et al. [22] discovered a considerable increase in central macular thickness, which returned to preoperative values at 4 weeks, regardless of the extent of the capsulotomy. For pseudophakic and aphakic PCO, Raza, [23] found CME in 3% of 550 patients who underwent Nd: YAG laser capsulotomy.

In 0.08% to 3.6% of eyes, Nd:YAG laser posterior capsulotomy might be complicated by retinal detachment. a cumulative risk of retinal detachment after cataract surgery of 1.6% to 1.9% in patients who got laser capsulotomy, compared to a risk of 0.8% to 1% in those who received cataract surgery alone, was found through a review of Medicare records. If the same or a fellow eye had had cataract surgery, the capsulotomy and the retinal detachment procedure, this study was unable to distinguish which occurred first. After a laser capsulotomy, retinal detachment can occur right away or up to a year later. Retinal fractures occurred in 2.1% of patients in the first month following posterior capsulotomy. A history of retinal detachment in the other eye is a risk factor for Nd: YAG laser posterior capsulotomy, as is younger age and male gender.

The rate of retinal detachment following laser capsulotomy has been reported in two studies in simple phacoemulsification and PC IOL implantation of 0 to 0.4 percent over 1 to 8 years. In one of these studies, no retinal detachments occurred in eyes with axial lengths less 24.0 mm. Retinal detachment after Nd-YAG laser capsulotomy in eyes without a posterior capsule tear during cataract surgery was shown to have no elevated risk according to one study. [24]

Comparison between high myope and emmetrope showed considerable reduction in retinal thickness and central macular thickness in high myopes group compared to emmetropic control eyes.

Myopes and hypermetropes have different sized capsular bags. The rate of PCO in myopes and non-myopes has been found to be indistinguishable in various studies [(28)]. Patients with PCO who have myopic eyes are at greater risk of developing retinal detachment following Nd: YAG surgery. The development of PCO and the resulting retinal problems may be minimized using the current procedure. In spite of this, the technique's usefulness should be evaluated in light of the possibility of PCO development and the availability of Nd: YAG capsulotomy. [25]

After Nd: YAG posterior capsulotomy was performed, Ramachandra and Kuriakose, [26] found better vision and a substantial improvement in refraction, leading them to infer that a new spectacle correction was required.

The present study showed that anterior chamber depth decreased gradually from pre-laser value to the last follow-up period (3 months) with statistically highly considerable variation between the two periods ($p < 0.001$), while the central macular thickness is markedly elevated after laser, then decreased gradually till the end of the follow-up period with statistically highly significant value between the two periods ($p < 0.001$).

After a Nd:YAG capsulotomy, no significant change in SE was found by Chua et al. [27] ACD and SE did not alter following Nd: YAG capsulotomy, as Ozkurt et al. [20] found. Yilmaz et al., [28] found no considerable reduction in refractive error following Nd: YAG capsulotomy.

Finally, we reported in the present study a correlation between anterior chamber depth and central macular thickness. There is a strong positive correlation between them ($r = 0.5208$, $p < 0.001$).

Both groups had a statistically considerable elevation in macular thickness after one hour in the investigation by Parajuli et al. [3] At one month, the mean macular thickness in Group I had returned to preoperative values. At 1-month follow-up, the macular thickness in Group II had fallen dramatically

from the 1-hour level, although it was remained larger than the preoperative value. However, no considerable elevation in macular thickness or CME necessitated therapy in any of the instances.

CONCLUSION

With increasing total energy used in Nd:YAG laser treatment, the anterior chamber depth may alter the thickness of the macular edema that is usually generated after the procedure, which can vary in severity and length depending on the total energy utilized. Regular preventive therapy may not be required in this case. Nd: YAG laser posterior capsulotomy dramatically improves BCVA in pseudophakic eyes with PCO that are otherwise healthy.

Conflict of interest : none

REFERENCES

1. Meacock WR, Spalton DJ, Stanford MR. Role of cytokines in the pathogenesis of posterior capsule opacification. *Br J Ophthalmol*. 2000; 84 (3): 332- 6.
2. Bhatnagar A, Saxena AK, Fahim S. The Effects of Different Techniques and Energy Used in Nd: YAG Laser Posterior Capsulotomy on Intraocular Pressure: A Prospective Study. *Austin J Clin Ophthalmol*. 2017; 4(1): 1-6.
3. Parajuli A, Joshi P, Subedi P, Pradhan C. Effect of Nd:YAG laser posterior capsulotomy on intraocular pressure, refraction, anterior chamber depth, and macular thickness. *Clin Ophthalmol*. 2019; 13: 945-52.
4. Aslam TM, Patton N. Methods of assessment of patients for Nd:YAG laser capsulotomy that correlate with final visual improvement. *BMC Ophthalmol*. 2004; 4:13.
5. Muhammad W, Ghafoor A, Shams UB. Frequency of Raised Intraocular Pressure (IOP) After Nd: YAG Laser Posterior Capsulotomy. *PJMHS*. 2016; 10(1): 247-9.
6. Pratima S, Amit KM. Safety and efficacy of Nd:YAG laser capsulotomy in management of posterior capsular opacification. *Int J Adv Med*. 2019; 6 (1): 76-80.
7. Kumar J, Vijay P, Preeti C. Role of Nd: YAG Laser in the Management of Posterior Capsular Opacification. *IOSR Journal of Dental and Medical Sciences*. 2017; 16 (12): 14-20.
8. Khambhiphant B, Liumsirijarern C, Saehout P. The effect of Nd:YAG laser treatment of posterior capsule opacification on anterior chamber depth and refraction in pseudophakic eyes. *Clin Ophthalmol*. 2015; 9: 557-61.
9. Lee MS, Lass JH. Rapid response of cystoid macular edema related to Nd: YAG laser capsulotomy to 0.5% ketorolac. *Ophthalmic Surg Lasers Imaging*. 2004; 35(2):162–4.
10. Khalil AM, Mohamed SA, Hanafy AM. Effect of Neodymium-YAG Laser Posterior Capsulotomy on Intraocular Pressure. *The Egyptian Journal of Hospital Medicine (EJHM)*. 2019; 76(7): 4506-13.
11. Wesolosky JD, Tennant M, Rudnisky CJ. Rate of retinal tear and detachment after neodymium: YAG capsulotomy. *J Cataract Refract Surg*. 2017; 43(7): 923–8.
12. Davidson MG, Morgan DK, McGahan MC. Effect of surgical technique on in vitro posterior capsule opacification. *J Cataract Refract Surg*. 2019; 26(10): 1550-4.
13. Choi W, Waheed NK, Moult EM, Adhi M, Lee B, De Carlo T, Jayaraman V, Baumal CR, Duker JS, Fujimoto JG. Ultrahigh Speed OCT Angiography of Retinal and Choriocapillaris Alterations in Diabetic Patients with and without Retinopathy Using Swept Source Optical Coherence Tomography. *Retina*. 2017; 37(1): 11-21.
14. Cevher S, Koçluk Y, Çetinkaya S, Ünal F, Çubuk M. Short-term effect of Nd: YAG laser capsulotomy on refraction, central macular thickness and retinal nerve fiber layer thickness. *Revista Brasileira de Oftalmologia*. 2017; 76: 186-9.
15. Pandey SK, Apple DJ, Werner L, Maloof AJ, Milverton EJ. Posterior capsule opacification: a review of the aetiopathogenesis, experimental and clinical studies and factors for prevention. *Indian J Ophthalmol*. 2004; 52(2): 99–112.
16. Aron-Rosa DS, Aron JJ, Cohn HC. Use of a pulsed picosecond Nd: YAG laser in 6,664 cases. *Am Intra-Ocul Implant Soc J*. 1984; 10(1): 35–9.
17. Weiblinger RP. Review of the clinical literature on the use of the Nd: YAG laser for posterior capsulotomy. *J Cataract Refract Surg*. 1986; 12(2): 162–70.
18. Holweger RR, Marefat B. Intraocular pressure change after neodymium: YAG capsulotomy. *J Cataract Refract Surg*. 1997; 23(1): 115–21.
19. Arya SK, Sonika KS, Kumar S, Kang M, Sood S. Malignant glaucoma as a complication of Nd: YAG laser posterior capsulotomy. *Ophthalmic Surg Lasers Imaging*. 2004; 35(3): 248–50.
20. Ozkurt YB, Sengor T, Evciman T, Haboglu M. Refraction, intraocular pressure and anterior chamber depth changes after Nd:YAG laser treatment for posterior capsular opacification in pseudophakic eyes. *Clin Exp Optom*. 2009; 92(5): 412-5.
21. Ari S, Cingü AK, Sahin A, Çinar Y, Çaça I. The effects of Nd: YAG laser posterior capsulotomy on macular thickness, intraocular pressure, and visual acuity. *Ophthalmic Surg Lasers Imaging Retina*. 2012; 43(5): 395–400.
22. Karahan E, Er D, Kaynak S. An Overview of Nd:YAG Laser Capsulotomy. Med Hypothesis Discov Innov Ophthalmol. 2014;3(2):45-50.
23. Raza A. Complications after Nd: YAG posterior capsulotomy. *J Rawalpindi Med Coll*. 2007; 11: 27-9.
24. Liu X, Wang Q, Zhao J. Acute retinal detachment after Nd: YAG treatment for vitreous floaters and posterior capsule opacification: a case report. *BMC Ophthalmol*. 2020; 20(1): 157.
25. Joshi RS, Chavan SA. Rotation versus non-rotation of intraocular lens for prevention of posterior capsular opacification. *Indian J Ophthalmol*. 2019; 67(9): 1428-32.
26. Ramachandra S, Kuriakose F. Study of early refractive changes following Nd: YAG capsulotomy for posterior capsule opacification in pseudophakia. *Indian J Clin Exp Ophthalmol*. 2016; 2(3): 221–6.
27. Chua CN, Gibson A, Kazakos DC. Refractive changes following Nd:YAG capsulotomy. *Eye*. 2001; 15(3): 304–5.
28. Yilmaz S, Ozdil MA, Bozkir N, Maden A. The effect of Nd: YAG laser capsulotomy size on refraction and visual acuity. *J Refract Surg*. 2006; 22(7): 719–21.