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Optical Coherence Tomography Measurement of Macular Thickness after Neodymium-Doped Yttrium Aluminium Garnet Laser Capsulotomy in Non-Diabetic and Diabetic type 2 Patients at Suez Canal University Hospitals

Mohamed Said Aggag * **,Osama Mahmoud Elbassiouny, Moataz Abdel-Hay Sallam**
Department of Ophthalmology, Faculty of Medicine, Suez Canal University
***Corresponding author:** Mohamed Said Aggag, **Mobile:** +201060077881, **E-mail:** mohammadsaid533@gmail.com

ABSTRACT

Background: Neodymium-doped Yttrium Aluminum Garnet (Nd:YAG) laser capsulotomy effectively treats posterior capsular opacification, restoring vision by creating a central opening.

Aim: This study aimed to enhance visual outcomes in patients undergoing Nd:YAG capsulotomy by assessing potential complications and risks in both healthy and diabetic groups.

Patients and methods: A cohort study was designed to collect all pseudophakic patients with posterior capsule opacification attending the Outpatient Clinic of the Ophthalmology Department, Suez Canal University Hospitals, Ismalia Governorate. The included sample population was assessed and scheduled for macular thickness measurement by Optical Coherence Tomography (OCT) prior to and following treatment with Nd:YAG capsulotomy between October 2018 and November 2019**.**

Results: Best-corrected visual acuity (BCVA) significantly enhanced ($P < 0.001$) post-capsulotomy in both groups. Intraocular pressure (IOP) increased ($P<0.001$) at day 1 and week 1, then gradually declined by weeks 4 and 12, with insignificant variance ($P>0.05$) from pre-capsulotomy levels confirming a temporary rise requiring close monitoring in the first week, especially for high-risk patients. Central macular thickness (CMT) increased ($P<0.001$) at day 1 and week 1, then decreased by week 4 but remained higher than pre-capsulotomy ($P<0.05$) and lower than week 1 ($P<0.001$). By month 3, CMT returned to baseline ($P>0.05$) but was still significantly different from earlier time.

Conclusion: Nd:YAG laser capsulotomy enhanced visual acuity with temporary intraocular pressure and CMT increases, returning to baseline by week 12. It is safe with no lasting adverse effects.

Keywords: Nd:YAG, BCVA, IOP, CMT.

INTRODUCTION

Posterior capsular opacification (PCO) or 2ry cataract remains the greatest prevalent long-term complication following uncomplicated cataract operation [(1)]. Worldwide published PCO rates are parameters according to differences in surgical methods, intraocular lens material or design, pharmacological interventions, and implantation of additional devices. However, a study in 2014, declared that 5.2% and 11.9% were the three-year and five-year cumulative incidences of PCO, respectively [(2)]**.**

Neodymium-doped yttrium aluminum garnet laser capsulotomy is the only efficacious therapy for posterior capsular opacification, which includes clearing the visual axis by generating a central opening in the opacified posterior capsule. It enhances visual acuity in all patients if various ocular pathologies haven't influenced [(3)]**.** Though this technique is safe [(4)], quick, and easy, it may carry complications involving retinal detachment, an increase in intraocular pressure, corneal edema, intraocular lens (IOL) subluxation, iris hemorrhage, cystoid macular edema, damage to the IOL, and exacerbation of localized endophthalmitis [(5)]**.**

Macular edema is a result of damage and movement in the vitreous cavity and release of inflammatory mediators owing to the impairment of the blood-aqueous barrier, following Nd:YAG laser capsulotomy. Also, the severity and period of elevated macular thickness are less when a total energy level < 80 mJ is utilized [(6)]**.**

In Egypt, where 20.5% of diabetic patients have diabetic retinopathy and are at high risk to develop diabetic maculopathy [(7)]**,** we need to assess the impact of Nd:YAG laser capsulotomy on macular integrity in diabetic patients who have a 15.3% incidence rate of Nd:YAG capsulotomy after the 3rd year of phacoemulsification and in non-diabetic patients who have a 21.3% incidence rate of Nd:YAG capsulotomy by the 3rd year of phacoemulsification [(8)]**.**

The goal of this investigation was to improve the visual result among cases with opacified posterior capsules undergoing Nd:YAG capsulotomy through studying the complications and risks that may threaten the sight of both healthy and diabetic groups.

PATIENTS AND METHODS

A cohort study was designed to collect all pseudophakic patients with posterior capsule opacification attending the Outpatient Clinic of the Ophthalmology Department, Suez Canal University Hospitals, Ismalia Governorate. The included sample population was assessed and scheduled for macular thickness measurement by Optical Coherence

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Tomography pre- and post-treatment with Nd:YAG capsulotomy between October 2018 and November 2019. **Inclusion criteria:** Both female and male cases aged above 40 years are eligible. Type 2 diabetic patients with a healthy retina and PCO after uncomplicated phacoemulsification with posterior chamber intraocular lens (IOL) implantation. Additionally, there must be a minimum period of 6 months among cataract surgery and Nd: YAG capsulotomy.

Exclusion criteria: Patients with type 1 diabetes (insulin-dependent), those on medications affecting macular function (e.g., chloroquine, interferon), or with a history of intraocular surgery (Except cataract surgery). Inherited macular diseases, ocular inflammation (e.g., uveitis), and retinal diseases such as hypertensive retinopathy, glaucoma, myopic fundus degeneration, and retinal vascular occlusions. Cases with ocular media opacities (e.g., vitreous hemorrhage, corneal opacity), those with PCO treated outside the study, or glass IOLs (Which can shatter with the YAG laser). Additionally, abnormal OCT scans or scans with a signal strength below 6.

Sample size: The sample size has been estimated using the **Dawson & Trapp** [9] formula, considering data from **Karahan *et al*.** [10]**.** With a standard deviation of 0.16 µm, mean values of 0.61 µm (before treatment) and 0.21 µm (control), and Z-values for 95% confidence and 80% power, the required size was 18 per group. Adding a 10% drop-out rate, the final total was 20 eyes, divided into diabetic (10 eyes) and non-diabetic (10 eyes) groups.

Assessment and methodology: The study included history taking, collecting personal data, and patient complaints (Onset, course, duration). Ophthalmic examination assessed BCVA (Landolt's chart), refraction (Topcon RM-8000B, Japan), ocular motility, pupil, anterior segment (Slit lamp biomicroscopy), and intraocular pressure (Goldmann tonometer). Dilated pupil evaluation has been performed using tropicamide 1% and phenylephrine 2.5%, with direct and indirect ophthalmoscopy assessing the vitreous, macula, optic nerve, and retina, and PCO grading via slit lamp. Investigations included macular assessment and central thickness measurement using SS-OCT (DRI OCT-Topcon, Japan).

Neodymium-Doped Yttrium Aluminium Garnet (Nd:YAG) Capsulotomy Treatment: All capsulotomies were performed in a single session using the Ophthalmic Nd:YAG laser (NIDEK® laser microscope). Pre-capsulotomy preparation included full mydriasis, topical anesthesia (Benoxinate hydrochloride 0.4%), and a capsulotomy contact lens (Volk, USA) with lubricating gel. Laser settings were adjusted based on PCO density, with power ranging from 0.7 mJ to 2.5 mJ, using the lowest effective energy. The laser offset was set 125 µm to 250 µm posteriorly to prevent IOL pits. Patients were properly aligned and educated about possible light flashes or sounds. The capsulotomy size was maintained between 3.9 mm and 4.5 mm, starting outside the visual axis and expanding eccentrically as needed, keeping within the IOL's optical diameter (≈6.00 mm). Post-capsulotomy treatment included Fluorometholone 0.1% (FML®) twice daily for 3 days, then once daily for another 3 days, and brimonidine tartrate 0.2% twice per day for one week.

Follow up: Patients underwent a full examination on the second postoperative day to detect any complications. Both groups were assessed on day one, week one, week four, and week twelve postoperatively for average central macular thickness measurement (3.0 mm) using OCT. OCT images were obtained using swept-source optical coherence tomography (SS-OCT) (DRI OCT-Topcon, Japan) with spectral domain methodology. The macular map scan was performed utilizing the Topcon Triton Plus (Ver. 10.13) ETDRS program, utilizing the Macula Map Radial (3.0 mm – 1024 x 12) from ILM to RPE (µm).

Ethical consideration: The research was permitted by The Ethics Committee, Faculty of Medicine, Suez Canal University and following the Helsinki Declaration (2004). Informed written consents were obtained, ensuring data confidentiality and the right to withdraw at any time. Patients incurred no costs, were informed of all results, received appropriate care, and had direct contact with the researcher.

Statistical analysis

Data were coded, entered, and analyzed utilizing SPSS version 16. Qualitative data were shown as frequencies and percentages, whereas quantitative data were summarized as mean ± SD. Chi-square (X^2) tested qualitative variable relationships, the independent T-test compared 2 groups, and ANOVA analyzed repeated measures. Wilcoxon test assessed pre- and post-intervention differences, and Pearson correlation measured associations. P-value > 0.05 was insignificant, P-value ≤ 0.05 was significant, and P-value < 0.001 was highly significant.

RESULTS

The demographic study illustrated insignificant variances ($p > 0.05$) among the examined groups according to age and gender. Also, 60% of the diabetic group were males and 70% of the healthy group were males (Table 1).

Table (1): Age and sex distributions among the studied cases (n=40)

Variants	Diabetic group (number=20)		Healthy group (number=20)		t-test	p-value
Age:					0.2	0.7
Mean ±SD	52.8±5.07		53.3±4.4			
Min-Max	43-60		45-59			
Gender: Male	**N**	**%**	**N**	**%**	**X2***	**p-value**
	12	60.0	14	70.0	0.4	0.5
Female	8	40.0	6	30.0		
***X2: Chi square test**						

Pre-capsulotomy comparison of BCVA (among the studied groups (n=40)) showed that the preoperative mean of BCVA in the diabetic group was 0.13 ± 0.04 and in the healthy group was 0.11 ± 0.04 with insignificant variance (p-value > 0.05) among the two examined groups. Pre-capsulotomy comparison of intraocular pressure between the studied groups (n=40) demonstrated that there were insignificant variances (p-value>0.05) among the examined groups according to pre-capsulotomy IOP (Table 2).

Table (2): Pre-Capsulotomy comparative analysis of (BCVA) and (IOP)

Pre-capsulotomy BCVA	Diabetic group (number=20)	Healthy group (number=20)	t-test	p-value
Mean ± Stander Deviation	0.13 ± 0.04	0.11 ± 0.04		
Min-Max	0.08 - 0.25	0.06 - 0.25	1.09	0.2
Mean ± SD (Min-Max)	13.8 ± 1.2 (12-16)	14.3 ± 1.9 (11-17)	1.07	0.2

Pre-capsulotomy comparison of central macular thickness (CMT) between the studied groups (n=40) demonstrated that there were insignificant variances (p>0.05) among the examined groups (Table 3).

Table (3): Pre-Capsulotomy comparative analysis of Central Macular Thickness (CMT)

Pre-Capsulotomy CMT (µm)	Diabetic group (n=20)	Healthy group (n=20)	t-test	pvalue
Mean ± SD Min-Max	232 ± 17.9 200-250	229.8±18.09 200-250	0.3	0.9

The comparison between the studied groups according to LASER treatment (Initial power, number of shots, total energy, and duration) (n=40) demonstrated that there were insignificant variances (p-value>0.05) among the examined groups according to initial power, number of shots, total energy, and duration of LASER treatment (Table 4).

Table (4): comparative analysis among the examined groups regarding LASER treatment

Nd: YAG LASER	Diabetic group (n=20)	Healthy group (n=20)	t-test	p-value
Initial power: Mean ± SD	2.3 ± 0.2	2.4 ± 0.1	0.17	0.8
Min-Max	2-2.5	2-2.5		
Number of shots:				
Mean ± SD	35.6 ±5.6	36.4±5.6	0.4	0.6
Min-Max	27-47	31-49		
Total energy (mJ):				
Mean ± SD	84.06±1.27	85.79±7.78	0.5	0.6
Min-Max	65-103	78-103.4		
Duration: Mean ±SD	11.75±1.25	12.2±2.09	0.8	0.4
Min-Max	10-14	9-15		

Pre- and post-capsulotomy comparison between best-corrected visual acuity (BCVA) results among the studied groups (n=40) showed that there were high statistically significant variances (p<0.001) among the before and after operation mean of BCVA in both groups, which showed improvement post-operative Compared to Preoperative (Table 5).

Table (5): Pre- and post-capsulotomy comparison between BCVA

BCVA	Pre capsulotomy	Post capsulotomy	paired t-test	p-value
Diabetic group(n=20):				
Mean ±SD	0.13 ±0.04	0.73 ±0.23	13.1	<0.001**
Min-Max	0.08 - 0.25	0.32 - 1		
Healthy group (n=20):				
Mean ±SD	0.11 ±0.04	0.62 ±0.21	10.7	<0.001**
Min-Max	0.06 - 0.25	0.32 - 1		
****highly significant (P<0.001)**				

Intraocular pressure (IOP) significantly increased (p<0.001) on the first day and after one week post-Neodymium-doped Yttrium Aluminium Garnet (Nd:YAG) laser capsulotomy but gradually declined at four and twelve weeks, with no significant variance (p > 0.05) from pre-capsulotomy values. The early rise in intraocular pressure was statistically significant (p<0.001) compared to later measurements, confirming that the increase was temporary. Close monitoring in the first week is essential, especially for patients at risk of ocular hypertension or glaucoma (Table 6).

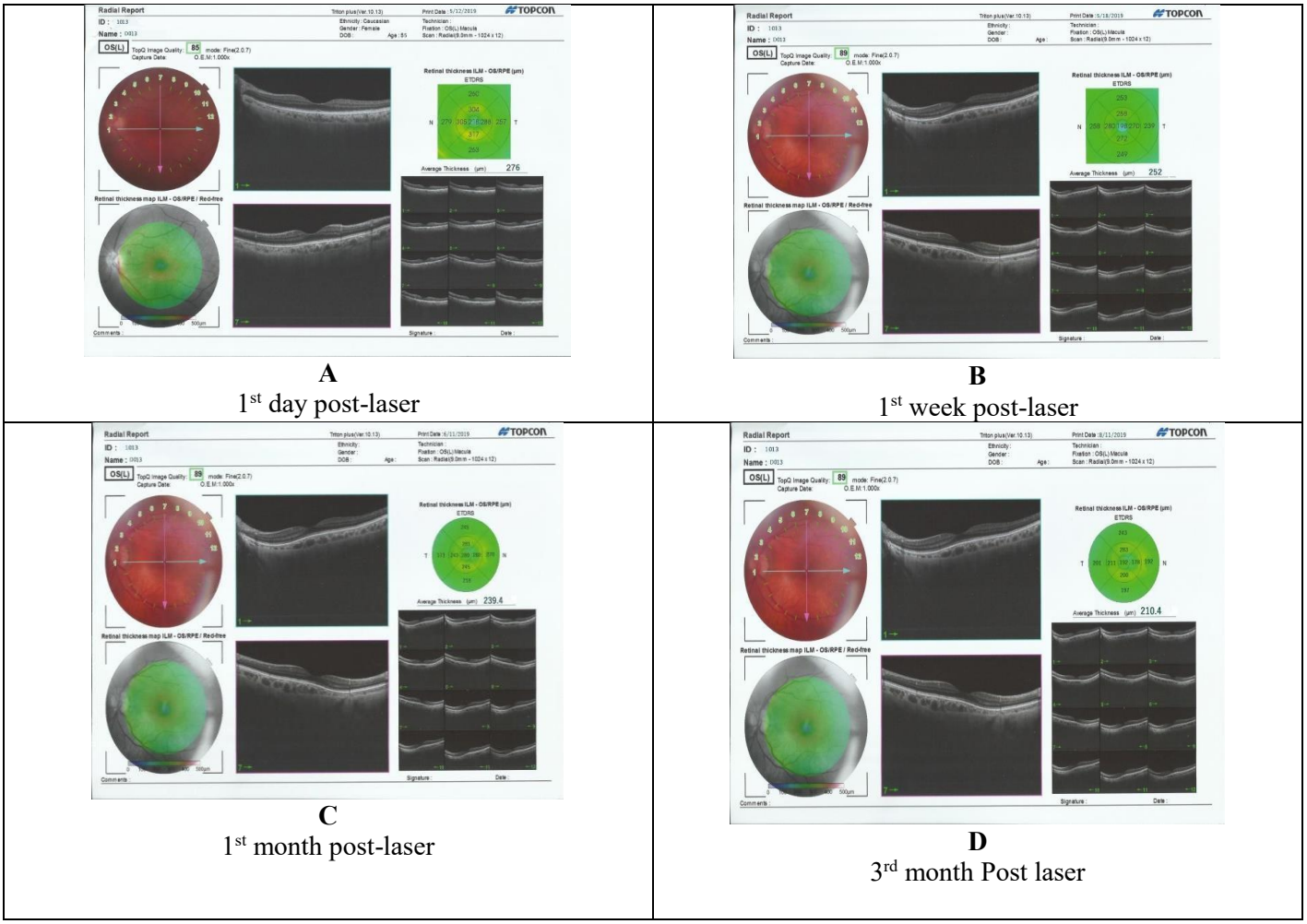
Table (6): Pre- and post-capsulotomy comparison of intraocular pressure

IOP	Preoperative	1st Day		1st One Week	Three Month	Months	pvalue^
Diabetic group (n=20):							
Mean ±SD	13.8±1.2	16.9±1.5		16.3±1.2	14±1.16	13.7±1.3	**<0.001**
Min-max	12-16	15-19	14-18		12-16	11-16	
		P1:<0.001		P2:<0.001	P3:0.1	P4:0.1	
Healthy group (n=20):							
Mean ±SD	14.3±1.9	17.85±1.5		16.9±1.4	14.74±1.4	14.5±1.9	**<0.001**
Min-max	11-17	15-20		14-19	13-18	11-17	
		P1:<0.001		P2:0.1	P3:0.1	P4:0.1	
^: repeated measures ANOVA with Post hoc **P1: Pre/1d, P2: Pre/1w, P3: Pre/1m, P4: Pre/3m**							

Central macular thickness (CMT) increased significantly (P<0.001) at day 1 and week 1 post-capsulotomy. By week 4, CMT decreased but remained higher than pre-capsulotomy (P<0.05) and lower than week 1 (P<0.001) **. At 3 months, CMT returned to pre-capsulotomy levels (P>0.05) but remained significantly different from earlier time points (Table 7).

Table (7): Pre and post-capsulotomy comparison between results of CMT of both

CMT(µm)	Preoperative	1st day	one week			Four weeks	Twelve weeks	p-value^
Diabetic group(n=20): Mean±SD Min-max	232±17.9 200-250	280.9 ±15.1	272.4±14.6 251.2-294.6	223.2-252.1	204.1-251.9	239.7±7.6	232.4±16.6	**<0.001***
			P2:<0.001	P3:0.03	P4:0.8			
Healthy group(n=20): Mean ±SD Min-max	229.8±18.0 200-250	278.9 ±16.8	270.2±14.3 248.6-299.5	222.8-253.1	201.3-252.1	238.9±9.9	231.6±18.3	**<0.001***
			P2:0.001	P3:0.01	P4:0.5			
^: repeated measures ANOVA with Post hoc P1: Pre/1d, P2: Pre/1w, P3: Pre/1m, P4:Pre/3m								



A
1st day post-laser

B
1st week post-laser

C
1st month post-laser

D
3rd month Post laser

Figure (1): OCT-scans of CMT (3mm) at different follow up times.

DISCUSSION

In our current research, the mean age for the diabetic group was 52.8 ± 5.07 years, with 60% of subjects being males (12 of 20), and the healthy group mean age was 53.3 ± 4.4 years, with 70% being males (14 of 20). There were insignificant variances in age and sex among both groups. **A Elgohary *et al.*** [8] examined the risk factors and frequency of Nd:YAG capsulotomy following phacoemulsification. A multivariate Cox regression analysis illustrated that, over the monitoring duration, male gender (Hazard Ratio = 1.63; 95% Confidence Interval = 1.04–2.57; P-value = 0.03) was an additional risk factor.

Pre-capsulotomy comparison of best corrected visual acuity among the studied groups (n=40) showed that the preoperative mean of BCVA in the diabetic group was 0.13 ± 0.04 and in the healthy group was 0.11 ± 0.04 with insignificant variance (p-value > 0.05) among the 2 studied groups. Pre-capsulotomy comparison of intraocular pressure between the studied groups (n=40) demonstrated that there were insignificant variances (p-value>0.05) among the studied groups regarding pre-capsulotomy IOP. Pre-capsulotomy comparison of central macular thickness (CMT) amongst the studied groups (n=40) showed that there were insignificant variances (p > 0.05) between the examined groups.

In our current study**,** as regards Nd:YAG laser parameters, there was insignificant variance (p-value > 0.05) among the examined groups according to initial power, number of shots, total energy, and duration. In the diabetic group, the initial power mean was 2.3 ± 0.2 mJ, the mean number of shots was 35.6 ± 5.6 shots, the total energy mean was 84.06 ± 1.27 mJ, and the duration mean was 11.75 ± 1.25 minutes. In the healthy group, the initial power mean was 2.4 ± 0.1 mJ, the mean number of shots was 36.4 ± 5.6 shots, the total energy mean was 85.79 ± 7.78 mJ, and the duration mean was 12.2 ± 2.09 minutes. **Ari *et al.*** [6] and **Jones *et al.*** [11] documented that cases subjected to lower amounts of laser energy may benefit from fewer complications of RD, IOP rise, and perhaps less CME.

In our current investigation, before and after Nd:YAG laser capsulotomy, visual results in terms of BCVA have increased and illustrated that the preoperative mean of BCVA in the diabetic group was 0.13 ± 0.04 and in the healthy group was 0.11 ± 0.04 with a non-significant variance (p-value > 0.05) among the 2 studied groups. The BCVA following Nd:YAG laser capsulotomy showed marked improvement with a postoperative mean of BCVA in the diabetic group of 0.73 ± 0.23 and in the healthy group of 0.62 ± 0.21 with insignificant variance (p-value > 0.05) among the two examined groups. since 1985, when **Stark *et al.*** [12] analyzed the data submitted from four Nd:YAG laser manufacturers to the FDA on over 17,000 patients and indicated that the technique is effective and safe for cutting opaque posterior lens capsules, and vision improved in 84% of cases.

In our current study regarding the mean pre-capsulotomy IOP, the diabetic group was 13.8 ± 1.2 mmHg and the healthy group was 14.3 ± 1.9 mmHg, with insignificant variances (p- > 0.05) among the examined groups. While on the 1st day and one week post-capsulotomy, the mean IOP values illustrated a highly statistically significant (p-value < 0.001) increase in both groups; the diabetic group was 16.9 ± 1.5, 16.3 ± 1.2 mmHg, and the healthy group was 17.85 ± 1.5, 16.9 ± 1.4 mmHg at 1st day and one week post-capsulotomy, respectively. The IOP values declined at four and twelve weeks post-capsulotomy in both groups; the diabetic group was 14±1.16, 13.7±1.3, and the healthy group was 14.74 ±1.4, 14.5 ±1.9 at four and twelve weeks post-capsulotomy, respectively, with no significant variance (p-value>0.05) when the results of four weeks compared to that of twelve weeks. Changes at four and twelve weeks post-capsulotomy were not significant (p-value > 0.05) when they were compared to the pre-capsulotomy values but were highly statistically significant (< 0.001) when compared to the results of 1st day and one week. **Stark *et al.*** [12] reported a clinically significant rise in IOP 2 to 4 hours following treatment by Nd:YAG laser. **Minello *et al.*** [13] also stated an IOP rise in 15% to 30% of patients' post-capsulotomy in their studies. Also, **Zeyen *et al.*** [14], who reported that glaucoma cases have a higher IOP jump compared to non-glaucoma patients. **Lin *et al.*** [15] found that the increase in intraocular pressure was more pronounced in cases with glaucoma who had a higher increase in intraocular pressure within an hour of capsulotomy.

Pre-capsulotomy and was highly significantly lower than the values of one week. At twelve weeks, CMT declined nearly to the pre-capsulotomy values with insignificant variance in two groups (CMT in the diabetic group was 232.4 ± 16.6 µm and in the healthy group was 231.6 ± 18.3 µm), but there was statistically significant variance when compared to the results of 1st day, one week, and one month. A comparison between the 2 groups according to central macular thickness didn't reveal any statistically significant variance on the first day, one week, four weeks, or twelve weeks postoperatively. Although, studies comparing the effect of Nd:YAG laser capsulotomy on central macular thickness of diabetic and non-diabetic patients are limited, **Yılmaz U *et al.*** [16] examined the changes in macular thickness in non-diabetic and diabetic cases following ND: YAG laser capsulotomy of 88 pseudophakic eyes of 88 patients subdivided into 4 subgroups: Group 1 was diabetic (22 eyes) and group 2 was non-diabetic (22 eyes), and both groups were receiving the same postoperative medications (0.1% Fluorometholon, FML®) as our

current study. They found that a significant elevation in macular thickness may be found following Nd:YAG laser capsulotomy in both subgroups during the 1st week and the 1st and 3rd months ($p < 0.001$), with no variance at the 6th month (p-value > 0.05) after laser and no difference between the 1 and 2 subgroups. For interest, when they added topical 0.5% Ketorlac (Acular®) to the post-operative medications in group 3 diabetic (22eyes) patients and group 4 non-diabetic (22eyes) patients, they found no significant change to the CMT during the follow up periods. **Giocanti-Aurégan A *et al*. [17]** also examined the effect of Nd:YAG laser capsulotomy on foveal thickness of thirty pseudophakic eyes of twenty-six cases. The mean foveal thickness was 209 ± 26 μm prior to capsulotomy, 213 ± 23 μm, 204 ± 19 μm, and 213 ± 23 μm one week, one month, and three months, respectively, following capsulotomy. They found that the foveal thickness didn't significantly change by the third month following laser treatment, and no complications occurred.

E. Karahan *et al*. [10] also examined the effect of Nd:YAG laser capsulotomy size on central macular thickness. They found that the mean of CMT increased significantly ($p < 0.001$) in their study groups at one week and returned to the pre-capsulotomy measurements at four and twelve weeks post-capsulotomy. In the group of small capsulotomy size (3.43 ± 0.34 mm), the pre-procedural CMT was (247.5 ± 31.3 μm). After one week of capsulotomy, CMT was increased to 262.8 ± 27.2 μm, then declined at four and twelve weeks to 247.3 ± 36.8 μm, 246.0 ± 29.6 μm, respectively. In the group of large capsulotomy size (4.56 ± 0.47 mm), the pre-procedural CMT was 244.5 ± 37.2 μm. After one week of capsulotomy, CMT was increased to 259.9 ± 24.9 μm, then at four and twelve weeks after capsulotomy, CMT decreased to 246.7 ± 32.5 μm, 242.9 ± 28.7 μm respectively.

Finally, macular thickening and intraocular pressure rise following Nd:YAG capsulotomy seem to be unavoidable, while **Ari *et al*. [6]** underlined that Nd:YAG capsulotomy complications, especially IOP rise and rise in macular thickness, are less when a total energy level < 80 mJ is utilized, as the same total energy limits are done in our current study.

Points of strength: Our study highlighted posterior capsular opacification (PCO) as the most common complication after cataract surgery, affecting visual function and diabetic retinopathy surveillance in Egypt, where 20.5% of diabetics are at risk of diabetic maculopathy. We reviewed Nd:YAG laser capsulotomy, the gold standard PCO treatment, with 15.3% and 21.3% incidence rates in diabetic and non-diabetic patients by year three post-phacoemulsification. Alternative treatments for failed capsulotomy, including surgical and microincision vitrectomy, were discussed. Using advanced OCT and precise IOP and vision assessment, we closely monitored CMT, IOP, and VA preoperatively and at 1 day, 1 week, 4 weeks, and 12 weeks in both diabetic and healthy patients.

LIMITATIONS

Our study had some limitations, including a short follow-up period (3 months), requiring further research on long-term changes (6 months to 1 year). The sample size (10 eyes per group) was insufficient for strong statistical analysis, and a larger sample representing all Suez Canal Governorates is needed. The study was limited to type 2 diabetics with normal OCT scans, excluding type 1 diabetics and those with borderline macular thickness. There was also a lack of prior studies on Nd:YAG laser effects on diabetic macular thickness compared to healthy individuals. Additionally, budget constraints limited OCT scans for all patients.

CONCLUSION

Neodymium-doped Yttrium Aluminum Garnet (Nd:YAG) laser capsulotomy effectively improved visual acuity (VA) in both diabetic and non-diabetic patients without long-term deterioration. Central macular thickness (CMT) and intraocular pressure (IOP) increased temporarily after the procedure but returned to baseline by week 12, with no significant differences between groups. The procedure was safe with no lasting adverse effects.

RECOMMENDATION

Nd:YAG laser capsulotomy improves visual acuity but carries some risks, though fewer than surgical decision. Intraocular pressure (IOP) peaks in week 1, requiring Apraclonidine or Brinzolamide-brimonidine for glaucoma patients. Central macular thickness (CMT) increases temporarily, benefiting from Ketorolac (Acular®) and Fluorometholone (FML®). Lower laser energy may reduce complications. No risks were found for type 2 diabetics with normal OCT scans, but further research is needed for type 1 diabetics and borderline CMT cases

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Competing interests: None.

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