

## INTRA-OCULAR PRESSURE CHANGES FOLLOWING NEODYMIUM-DOPED YTTRIUM ALUMINIUM GARNET (Nd:YAG) LASER CAPSULOTOMY

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### ABSTRACT

**Background:** Posterior capsule opacification (PCO) is common complication of cataract surgery, neodymium:yttrium aluminum-garnet (Nd:YAG) laser capsulotomy is standard treatment. Although, it is non-invasive, it carries risk of complications.

**AIM:** to study intra-ocular pressure changes (IOP) and its correlation with energy, shot numbers, size and visual outcomes of capsulotomy; and finding the commonest type of opacification.

**Method:** This cross-sectional study was conducted in Duhok Eye Hospital from April 2018 to April 2019; 100 patient participants were examined for visual acuity, IOP measurement, and slit lamp examination.

**Results:** 60 males and 40 females (67%) were from 60 to 79 years, 53 right and 47 left eyes. The mean visual acuity and refraction were found to be higher one week post capsulotomy compared to pre capsulotomy, P value being less than 0.001. Most of female's jobs were housewives (37.0%), while males' jobs were ranged from (48.0%) retired (8.0%) workers to (7.0%) office workers. A higher mean in IOP was found two hours post-capsulotomy, P value being 0.025 when it was compared with IOP pre-capsulotomy and IOP one week post capsulotomy. A positive relation between shot numbers and increase IOP two hours post capsulotomy was recorded, P value 0.049.

**Conclusions:** The commonest type of PCO was membranous. 59.0% of patient's ha the best corrected visual acuity of 6/6-6/12. IOP rise the was most frequent complication that reached a maximum two hours post capsulotomy, it was associated with shots number. and was normalized within a week.

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**Keywords:** IOP, Nd:YAG, PCO, Refraction

A cataract is the most frequent cause of visual impairment. As a consequence, cataract surgery is the most frequently performed surgery worldwide<sup>1</sup>. Cataract is clouding of human crystalline lens. It often develops slowly and can affect one or both eyes. With the general aging the dominance of visual loss as a result cataracts increases each year<sup>2</sup>. Cataract surgery is also called lens replacement surgery where the surgeon

removes the natural lens that has developed an opacification and replaces it with an artificial intraocular lens. The lens is located within a thin membrane called the capsule. The anterior capsule must be opened to remove the lens and insert the artificial lens. The posterior capsule remains intact to support the new one<sup>3</sup>. the outer cells of the old lens fibers remain and grow on the capsule to form posterior capsular opacification that causes haziness

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and obscuring the view or scattering the light that is perceived by patients as glare which results in blurred vision, decreased vision, and decreased contrast sensitivity. While the symptoms are very similar to cataracts, there is no chance of an actual cataract to reform after cataract surgery<sup>4</sup>. Posterior capsular opacification is the most common late complication of cataract operation. The appearance of continuous curvilinear capsulorrhexis has been accompanied in some patients by anterior capsule contraction and fibrosis. These cells proliferate in three patterns which they are: Soemmering ring, Elschnig pearls, and Membranous. Fortunately, Nd:YAG laser posterior capsulotomy is the treatment of choice of posterior capsular opacification<sup>5</sup>. Nd:YAG Laser Posterior Capsulotomy (The neodymium: yttrium-aluminum-garnet) laser is a solidstate laser that has a wavelength of 1064 nm that can disrupt ocular tissues by achieving optical breakdown with a short, high-power pulse, results in ionization, or plasma formation in the ocular tissue that causes acoustic and shock waves that disrupt the tissue. Only surgical cutting or polishing of the posterior capsule can manage opacification of the posterior capsule following cataract surgery before the invention of the Nd:YAG laser<sup>6</sup>. The power must be set from one to three mJ and it has three forms: Q-switched, mode locked, or both. The laser that produces a series of single pulses that each last 12-20 nanoseconds is called A Q-switched laser, compared to a mode-locked laser that produces a train of pulses each last 25-30 picoseconds. These settings help release higher power<sup>7</sup>. It is better to focus Nd:YAG laser slightly posterior to the lens to avoid pitting the lens. The laser is actually invisible, a helium-neon laser is

use as a focusing device. Nd:YAG laser capsulotomy is a safe, fast, painless, noninvasive, effective treatment and can be performed as an outpatient treatment<sup>6</sup>. The common complications documented post YAG are raised intraocular pressure, intra-ocular lens pitting, cystoid macular edema, retinal detachment, IOL displacement, hyphaema, uveitis, chronic endophthalmitis, and corneal burns<sup>8</sup>. Raised intra-ocular pressure is the most frequent complication, this variation in intra-ocular pressure needs to be identified in our locality and prescribing prophylactic anti-glaucoma drugs post YAG is a common practice<sup>9</sup>. The cause of increasing intra-ocular pressure is due to reduced trabecular outflow facility because of blockage of trabecular meshwork by the capsular debris, vitreous particles floating in the anterior chamber, depending on the size of capsulotomy. So, the present study is to clarify the visual outcome, and intra-ocular pressure changes as one of the complications following the Nd:YAG laser capsulotomy<sup>9</sup>. As posterior capsular opacification is a frequent late complication of cataract surgery seen nearly every day in ophthalmological department and o research has been conducted on Nd:YAG laser in Duhok to correlate the energy used and the number of shots delivered for the laser to the intraocular pressure changes recorded post-procedure. For all these reasons it is wise to conduct such a study.

### **AIMS**

The aims of this study are the IOP changes in patients who underwent Nd:YAG laser capsulotomy, effect of energy, number of shots, and size of capsulotomy on post procedural IOP changes. Also, the visual outcome following capsulotomy, and the

most common type of posterior capsular opacification.

**Patients and Methods.** This cross-sectional study was conducted in Nd:YAG laser room in Duhok Eye Hospital between from April 2018 and April 2019. The study included 100 individual patients with PCO of different ages, genders, and jobs.

Preparation of the patient agreement was taken after description of steps of examination pre Nd:YAG laser.

A questionnaire form was filled for each patient.

The visual acuity by Snellen chart, refraction examination by auto refractometer, and IOP measurement pre capsulotomy by Goldmann Applanation Tonometer were performed on each patient.

Direct ophthalmoscopic visualization of PCO<sup>10</sup>.

Patients were examined by a HAAG-STREIT slit lamp for checking the type of cataract surgery in, lens position, and PCO type.

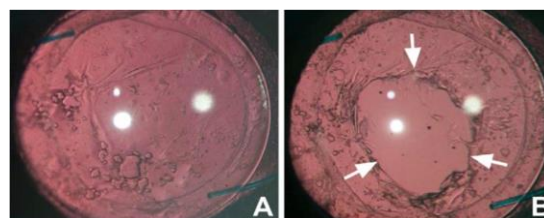
Fundoscopy was done. Optical coherence tomography and fundus fluorescein angiography were used in suspected cases of cystoid macular edema.

**Exclusion criteria**

Complicated surgeries, the presence of other diseases, like diabetes mellitus, hypertension, Glaucoma & Ocular hypertension, optic atrophy, high myopia, uveitis, macular edema, ophthalmic diseases, individuals undergone other ophthalmic surgeries prior to Nd:YAG laser, and patients who could not maintain an upright position during the procedure and trauma.

**Technique of Nd:YAG laser capsulotomy**  
Topical anesthesia was not required unless Abraham contact lens was used. Adjustments of chair, chin rest,

and footrest were done for optimal comfort. Room was darkened optimally<sup>11</sup>. No need for dilatation of pupil, unless pupil was miotic. Dilatation by instillation of Tropicamide eye drop 1% was required for surgeons under training<sup>10</sup>. Tropicamide 1% produce short acting mydriasis and cycloplegia within 20 minutes, allowing better examination of the lens, capsule, and fundus<sup>12</sup>. Clearing of the visual axis by creating a central opening in the opacified posterior capsule with focusing the laser pulse of ZEISS VISULAS YAG III device, with energy of few millijoules, duration of a few nanoseconds, just behind the posterior capsule for the initial application and then moving subsequent applications anteriorly until the desired puncture was achieved<sup>13</sup>. The energy power, number of shots, and size of capsulotomy were all recorded<sup>14</sup>.



**Figure 1. An eye with posterior capsular opacification before and after Nd:YAG laser capsulotomy<sup>15</sup>.**



**Figure 2: Nd:YAG laser device<sup>16</sup>.**

## INTRA-OCULAR PRESSURE CHANGES FOLLOWING

The IOP was measured immediately and two hours post Nd:YAG laser by Goldmann Applanation Tonometer, steroids eye drop that is used to treat or prevent short term inflammatory conditions and anti glaucoma eye drop for decreasing IOP were prescribed . One week later the lasered eye was checked again by IOP measuring and visual acuity with refraction examination. Macular edema and cup disc ratio were checked by stratus optical coherence tomography instrument.

### STATISTICAL ANALYSIS

Data were entered into Excel 2016 and then converted and analyzed using SPSS 24. Data were described using frequency and frequency percent tables for categorical data and mean, standard deviation, standard error and 95% confidence interval for scale data. A score for visual acuity and refraction was made for the purpose of this study, ranging from 0.5 for counting fingers at 0.5 meter, to 16 for 6/6. Data were analyzed using the paired t-test for variables with two categories and analysis of variance (ANOVA) for variables with more than two categories with Bonferroni intergroup comparison. P value < 0.05 was considered statistically significant.

### RESULTS

100 patients visited DEH who were enrolled in this study. The characteristics of the studied groups are shown in Table 1.

**Table 1. Characteristics of the patients**

	Characteristics	NO.	%
Age (years)	20 - 39	5	5.0
	40 - 59	22	22.0
	60 - 79	67	67.0
	80 - 99	6	6.0
gender	Male	60	
	female	40	

	Characteristics	NO.	%
occupation	Retired	48	48.0
	Housewife/no job	37	37.0
	Worker	8	8.0
	Office worker	7	7.0
OD or OS	OD	53	53.0
	OS	47	47.0
Cataract operation 100	ECCE	43	43.0
	PHACO	57	57.0
Time between operation and YAG	< 5 years	70	70.0
	5 - 10 years	21	21.0
	>10 years	9	9.0
PCO type	Membranous	55	55.0
	Elschnig pearls	43	43.0
	Soemmering ring	2	2.0
<b>total</b>		<b>100</b>	<b>100.0</b>

\*OD: right eye

\*OS: left eye

\*PCO: posterior capsular opacification

**Table 2. Comparison of IOP measurements at different time points pre and post-Nd:YAG laser capsulotomy (n = 100)**  
**Descriptive statistics**

	Total patients	Mean IOP	SE	95% Confidence interval
Pre-YAG		14.71	0.32	14.07 to 15.35
Immediately post-YAG		14.99	0.34	14.31 to 15.67
Two hours later		15.97	0.45	15.08 to 16.86
One week later		14.43	0.346	13.75 to 15.12

Analysis of Variance (ANOVA) overall P = 0.001. No significant differences in the mean of IOP pre YAG, immediately post YAG, and one week post YAG had been found. The significantly higher mean was only found in the IOP two hours post-YAG 15.97 with statistically significant P value being 0.025

and 0.002 when it was compared with IOP pre YAG laser and IOP one week post

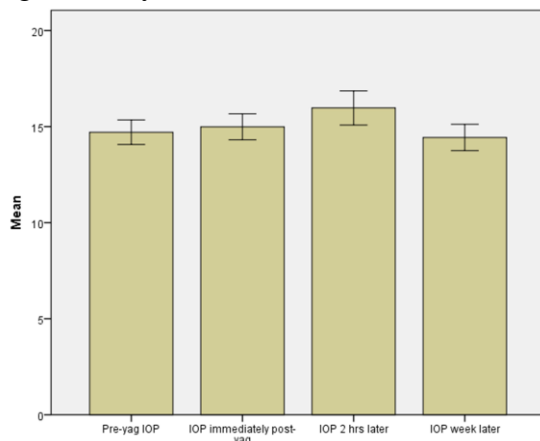
YAG respectively.

#### Pairwise comparisons

IOP measurement	Measurement to compare With	Mean Difference	IOP immediately	SE P value
Pre-YAG	IOP immediately post-YAG	-0.28	0.34	1.000
	IOP 2 hours later	-1.26	0.43	0.025
	IOP one week later	0.27	0.36	1.000
post-YAG	IOP 2 hours later	-0.98	0.39	0.083
	IOP one week later	0.56	0.36	0.768
Two hours later	IOP one week later	1.54	0.42	0.002

SE, standard error ( $= SD/\sqrt{n}$ ).

Regarding Figure 3, the mean of IOP two hours post Nd:YAG laser was found to be significantly different from the others.



**Figure 3. A bar chart of IOP measured at different times before and after Nd:YAG capsulotomy. The top of each bar represents the mean with the 95% confidence interval.**

**Table 3. Correlation between IOP change (difference) two hours post-YAG compared to pre-YAG IOP, and amount of energy used, number of shots used and size of capsulotomy**

	Energy (mJ)	No. of shots	Size of capsulotomy (mm)
r with IOP change 2 hours post-YAG	0.009	0.32	-0.008
P value	0.933	0.049	0.939
No.	100	100	100

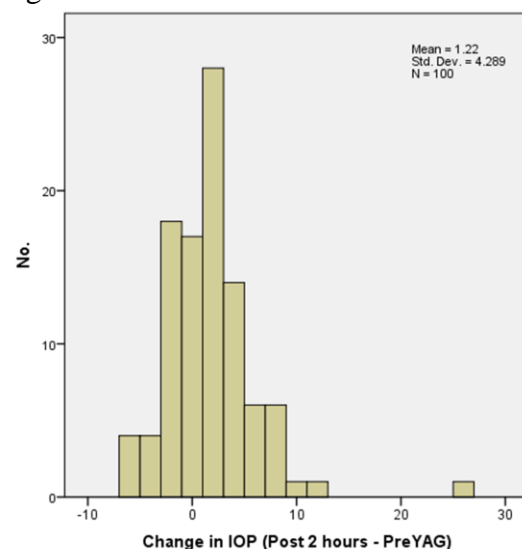
#### No. of shots

	No.	Mini.	Maxi.	Mean	SD
No. of shots	100	5	60	31.6	14.02

r, Pearson's correlation coefficient.

A negative correlation was found between the energy used and the size of capsulotomy with IOP change two hours post Nd: YAG laser. However, a positive correlation between the number of shots delivered and IOP change two hours post-YAG was found with a statistically significant p value being 0.049.

The change in IOP two hours post YAG laser compared to pre YAG IOP was found to be higher in the study as shown in Figure 4.



**Figure 4. A histogram of change in IOP 2 hours post-YAG, compared to pre-YAG score**

## INTRA-OCULAR PRESSURE CHANGES FOLLOWING

Table 4. A comparison of visual acuity and refraction (VA+R) scores pre and post- Nd:YAG laser capsulotomy (n = 100)

	Minimum*	Maximum**	Mean	SD	P value
Pre-YAG VA+R	0.5	15.0	9.1	4.5	< 0.001
VA+R week later	3.0	16.0	13.5	2.4	

\* Scores of 0.5 and 3 represent counting fingers at 0.5 and 3 meters, respectively.

\*\* Scores of 15 and 16 represent 6/9 and 6/6, respectively.

SE, standard error.

The mean of VA+R was found to be higher for IOP one week post YAG 13.5 compared to that of pre YAG laser 9.1 while the P value being less than 0.001, which was revealed a statistically significant improvement of vision post YAG laser.

For the VA+R examination one week post-YAG, it reflected a remarkable improvement of vision. Few patients showed no change in visual acuity one week post YAG laser compared to pre-YAG.

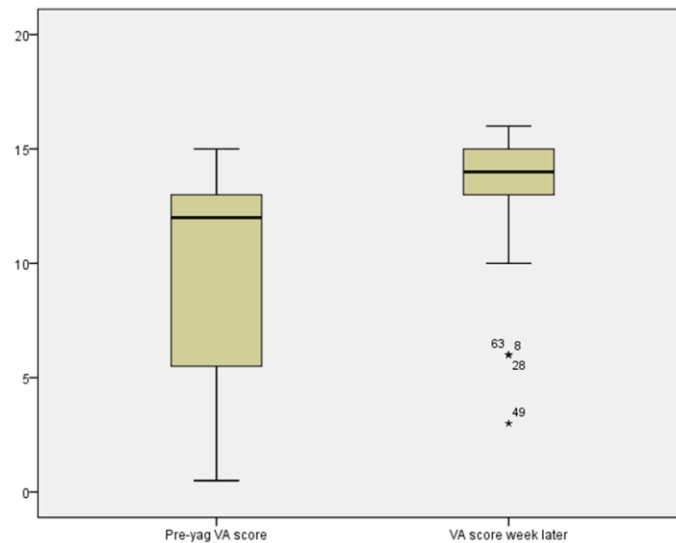


Figure 5. A box plot of visual acuity (VA) and refraction score, measured before and after Nd: YAG capsulotomy.

Table 5. Relation between change in IOP two hours post-YAG compared to pre-YAG IOP, and demographic and clinical factors

Change in IOP 2-hours post-YAG		No.	mean	SD	P value
Age (years)	20 – 39	5	1.2	1.3	0.983
	40 – 59	22	1.5	6.1	
	60 -79	67	1.1	3.4	
	80 - 99	6	1.5	7.3	
Sex	Male	60	1.2	4.9	0.843
	Female	40	1.3	3.1	
Occupation	Retired Housewife/ no job	48	1.2	5.3	0.986
	Worker Officer/ office worker	37	1.4	3.2	
		8	0.9	2.4	
		7	1.0	3.8	



Change in IOP 2-hours post-YAG		No.	mean	SD	P value
OD or OS	OD	53	1.4	3.4	0.734
	OS	47	1.1	5.1	
Cataract operation	ECCE PHACO	43	1.0	3.7	0.625
		57	1.4	4.7	
Time between operation and YAG	< 5 years	70	1.3	4.5	0.335
	5 - < 10 years	21	0.3	3.1	
	>10 years	9	2.8	5.0	
PCO type	Membranous Elschnig pearls	55	1.2	3.4	0.753
	Sommering ring	43	1.2	5.3	
		2	3.5	0.7	
<b>Total</b>		<b>100</b>	<b>1.2</b>	<b>4.3</b>	

SE, standard error

No significant differences in the mean of the subgroups of age, gender, occupation, the involved eye, type of operation, and the period between operation and YAG was found with the change in IOP two hours post-YAG laser. For the PCO type, the most common type was membranous one which was shown in 55 patients of

100 patients in the study but the higher mean was for Sommering ring 3.5 compared to others and the p value here was 0.753

Figure 6 shows a significant improvement in the visual acuity and refraction post YAG compared to pre YAG laser capsulotomy.

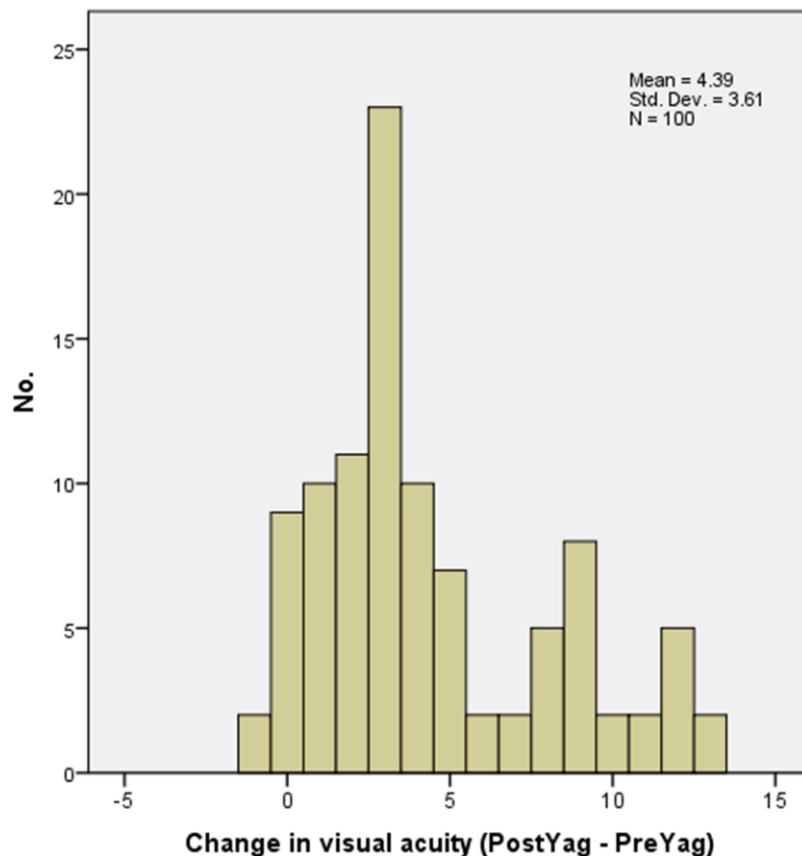


Figure 6. A histogram of change in visual acuity and refraction (VA+R) score post-YAG, compared to pre-YAG score.

## INTRA-OCULAR PRESSURE CHANGES FOLLOWING

**Table 6. Relation between change in VA+R post-YAG one week post-YAG, and demographic and clinical factors**

		Change in VA+R			
			Mean	SD	Pvalue
Age (years)	20 – 39	5	6.6	3.2	0.053
	40 – 59	22	2.7	1.7	
	60 -79	67	4.7	3.9	
	80 - 99	6	5.0	3.5	
Sex	Male	60	4.0	3.3	0.207
	Female	40	5.0	4.0	
Occupation	Retired Housewife/ no job Worker office worker	48	4.2	3.5	0.454
		37	5.0	4.0	
		8	2.9	2.2	
		7	4.4	3.0	
OD or OS	OD	53	4.1	3.4	0.468
	OS	47	4.7	3.9	
Cataract operation	ECCE PHACO	43	4.4	3.8	0.944
		57	4.4	3.5	
Time between operation and YAG	< 5 years5 - <10years >10 years	70	4.5	3.5	0.629
		21	4.5	3.8	
		9	3.3	4.5	
PCO type	Membranous Elschnig pearls Sommering ring	55	3.7	3.6	0.113
		43	5.3	3.5	
		2	3.5	3.5	
Total		100	4.4	3.6	

Starting with age, the higher mean 6.6 was for patients from 20-39years followed by the mean of patients from 80-99 years which was 5.0. The P value was 0.053. Age groups have a little bit closer p value 0.053 but still not significant. P value was statistically not significant for all variables in Table 6.

### DISCUSSION

Posterior capsular opacification is a major complication of cataract surgery. Using Nd:YAG laser has simplified the treatment of it and has a great advantage that it is entirely non-invasive<sup>3</sup>. In this study, 90 of 100 patients had a significant improvement

in the best corrected visual acuity (BCVA) one week after Nd:YAG laser posterior capsulotomy in otherwise healthy pseudophakic eyes with PCO. Improvement in visual acuity at least one or more lines noticed since the first day after Nd:YAG laser and became better at the end of the first week similar to the study of <sup>17</sup> compared to pre-YAG laser except few patients who still had the same visual acuity one week after laser capsulotomy with no any complications developed, only complaining from floaters. This normally resolves on its own, mostly because of the bits of debris formed from



the opening made in the capsule, so it is better here to wait for at least two or few weeks before checking refraction and visual acuity. This will give the eye time to settle fully and floaters to disappear<sup>18</sup>. We had also analyzed the correlation between the best corrected visual acuity and YAG laser finding that the size of capsulotomy, energy level or number of shots did not significantly affect the BCVA and refraction<sup>19</sup>. The most common age group was 67% for 60-79 years, 22% for 40 -59, 5% for 20-39, and 6% for 80-99 years. Visual acuity (VA) was improved after Nd:YAG laser capsulotomy. In this study, VA improved to 6/6 in ten cases, 6/9 in 37 cases, 6/12 in 12 cases, 6/18 in 20 cases, 6/24 in eight cases, 6/36 in nine cases, and 6/60 in three cases. Counting fingers (CF) three meters in one case. that might be related either to corneal astigmatism or to the type of cataract surgery that had been performed, a large number of the cases could not be improved to 6/6.20. Complications after Nd:YAG Laser Capsulotomy in this study, a rise in IOP was only transient. One patient presented with raised IOP (26 mm Hg) at the end of the first week post-YAG despite using prophylactic anti-glaucoma and anti-inflammatory eye drops (perimetry, and disc cupping were checked and were within normal), IOP was settled through the second week and return to normal level mostly. It was highlighted in the study that the increase in the IOP was found to be significantly related to the IOP measurement two hours after the capsulotomy without any treatment, whereas the difference between baseline and final IOP at the end of the first week was not significant with the use of prophylactic anti-glaucoma.<sup>9</sup>

There is a statistically significant correlation between IOP spike and number of shots delivered; the more number of shots delivered the higher difference of IOP (two hours post-YAG from that of pre-YAG) <sup>9</sup> and reverse the finding of <sup>21</sup> who had found that the IOP rise was significantly associated with the amount of total energy used. We did not find direct correlation between IOP spike and energy levels or the size of capsulotomy as patients in the study were exposed to a low energy level between 1.1-4 mJ<sup>22</sup> and reverse the finding of the study of <sup>23</sup> who reported the increase in intra-ocular pressure was more pronounced when the size of posterior capsulotomy was larger. The predominant type of PCO was the membraneous type<sup>21</sup>, but this differed from the finding of the study of <sup>9</sup> who reported Elschinig's pearls as the most common type of PCO in pseudophakic eyes.

## CONCLUSIONS

The most frequent type of PCO was of membraneous. The majority of patients showed a significant improvement in visual acuity after laser capsulotomy. IOP rise is considered the most frequent complication that reached its maximum at two hours post laser, and normalized within seven days after the procedure. IOP rise post laser capsulotomy was significantly associated with a number of shots. The present study describes Nd:YAG laser capsulotomy as a noninvasive, procedure of restoring vision in patients with posterior capsular opacification with minimal and transient complications. All pseudophakic patients undergoing Nd:YAG laser capsulotomy need IOP monitoring and topical IOP lowering drops that prevent spike of IOP which may occur.

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## پوخته

**پېنښه‌کې و نارمانج:** تاريبوونا پښتې يا چاقان بهرېه‌يږ ترين ئالوزى يين نشته‌رگه‌ريا ئاڤا چاقانه راکرنا تيفکلي ب ليزرى ب ئاميرى YAG:Nd وکو چاره‌سهرىيا ستاندارد بو تاريبوونا پښتې يا چاقان ده‌ته نياسين. هه‌رچنده کو capsulotomy laser YAG:Nd چاره‌سهرىيکا به‌ترسى ده‌يته نياسين، لى هندهک ئالوزيان دروست دکه‌ت. نارمانجا ئه‌مقې ځه‌کوليني ديارکرنا ئالوزى يين چاقان پښتې نشته‌رگه‌ريا نافېريه. هه‌روسا په‌يوه‌ندى و کارتيکرنا نشته‌رگه‌ريى و ژماره‌يا ليدانان لسه‌ر گوهارتنين چاقان ده‌ينه ديارکرنا.

**شيوه:** ئه‌مق ځه‌کولينه ل نه‌خوشخانه‌يا ده‌وک يا چاقان هاته ئه‌نجامدان. نه‌خوشين کو پيدى ب نشته‌رگه‌ري ب capsulotomy laser YAG: Nd هه‌بون هاته تومارکرنا دناڤا ځه‌کوليني دا.

چاقين نه‌خوشان ب تافیکرنين تايه‌ت وکو تافیکرنا بينينا تيژ، تافیکرنا شکانى روناھى، پايه په‌ستويا ناڤ چاقى، تافیکرنا ب فرمکرنا گلوپا کون هاته ئه‌نجامدان.

**نه‌نجام:** ژ ۱۰۰ نه‌خوشين کو بو نه‌خوشخانه‌يى هاتن، ۶۰ ژ نه‌وان نير و ۴۰ مې بوون. پرانيى گروپى ته‌مه‌نى نه‌خوشان دناڤه‌را ۶۰ هه‌تا ۷۹ سالى بوون (۶۷) ۵۳% چاقين راست و ۴۷ چاقين چه‌پ. پترينا نه‌خوشين مې دايکين به‌رمالان بوون، لى پترينا کاري نه‌خوشين نير پيکدهات ژ خانه‌نشيني (۴۸,۰%) هه‌تا کريکار (۸,۰%) و کارمه‌ند (۷,۰%) په‌يوه‌ندى دناڤه‌را ژماره‌يا ليدانان و زيده‌بوونا IOP پښتې ده‌ربازبوونا دوو ده‌مژميران ژ نشته‌رگه‌ريى هاته ديتن.

**ده‌ر نه‌نجام:** به‌رېه‌يږ ترين جوړه‌يا تاريبوونا پښتې يا چاقان جوړه‌يا په‌رديه‌ي بوو. باشتريوون ل ديتن ل پرانييا نه‌خوشان په‌يدا بوون و (۵۹,۰%) نه‌خوشان خودان باشتريين بينينا تيژ ل ۶/۶ – ۱۲/۶. پايه په‌ستويا ناڤ چاقى بشيوه‌يکى به‌رچاق ل پترينا ئالوزيان پښتې دوو ده‌مژميران ژ نه‌شته‌رگه‌ريص بلند بوو. پايه په‌ستويا ناڤ چاقى پښتې هه‌فت روژان ب ئاستى سروشتى هه‌دگه‌ريت. بلندبوونا پايه په‌ستويا ناڤ چاقى پښتې نشته‌رگه‌ريى په‌يوه‌ندى دگهل ژماره‌يا ليدانان هه‌بوو.

## الخلاصة

### تغيرات الضغط داخل العين بعد غارنيت من الألومنيوم المصنوع من اليتيريوم (ND: YAG) كبسولة الليزر

**الخلفية والأهداف:** تعتبر الغشاوة على كبسولة العدسة الخلفية الموجودة خلف العدسة الاصطناعية التي تم ادراجها في العملية من اشهر المضاعفات المتأخرة التي قد تحصل بعد عملية ازالة العدسة العكرة، وتسمى ايضا ساد العين الثانوي. تشكل هذه الغشاوة عائقا لمرور الضوء الى الشبكية الموجودة في الجزء الخلفي من العين مما يؤدي الى تشويش الرؤية ، ولكي تعود الرؤية لوضعها الطبيعي يقوم طبيب العيون بإزالتها بال YAG:Nd ليزر ويتم فتح مجال الرؤية، يعتبر العلاج بال YAG:Nd ليزر آمن جدا مع امكانية حدوث بعض المضاعفات .

#### أهداف البحث:

- ١- دراسة تغييرات ارتفاع ضغط العين بعد اجراء الليزر.
- ٢- ايجاد نوع الغشاوة الخلفية للكبسول الأكثر شيوعا.
- ٣- دراسة امكانية وجود ارتباط بين عدد الضربات المستخدمة خلال إجراء الـ YAG:Nd ليزر، قوة الضربة المستخدمة وحجم الفتحة في كبسولة العدسة الخلفية مع تغييرات ضغط العين بعد إجراء الليزر.
- ٤- دراسة تغييرات درجة الرؤية الناتجة بعد إجراء الـ YAG:Nd ليزر.

**المرضى وطريقة العمل:** العينة اخذت من وحدة الليزر في مستشفى دهوك للعيون في مدينة دهوك . أجري الـ YAG ليزر على ٥٣ عين اليمنى و ٤٧ عين يسرى . من بين ١٠٠ مريض ٦٠ ذكور و ٤٠ اناث، عدد المرضى الذين تتراوح اعمارهم بين ٦٠-٧٩ سنة كان الأكبر. النسبة الأكبر من الإناث هن من ربات البيوت ٣٧% أما النسبة الأكبر من الذكور فهم من المتقاعدين ٤٨% يليهم العمال ٨% ثم الموظفين ٧%.

**النتائج:** ارتفاع ضغط العين مرتبط بعدد ضربات الليزر المستخدمة. وجد ايضا" ان غالبية المرضى لديهم غشاوة في كبسولة العدسة الخلفية من النوع الغشائي الليفي وقد لوحظ تحسن كبير في درجة الرؤية بعد إجراء الـ YAG ليزر .

**الاستنتاجات:** وجد ان اكثر المضاعفات الناتجة عن الليزر هي ارتفاع ضغط العين الذي يصل لأعلى مستوياته بحدود الساعتين بعد اجراء الليزر ثم يعود الى مداه الطبيعي في غضون ساعات او أيام قليلة. ارتفاع ضغط العين مرتبط ارتباطا "وثيقا" بعدد ضربات الليزر المستخدمة. وجود تحسن كبير في درجة الرؤية الناتجة بعد إجراء الـ YAG ليزر. وجد ايضا" ان غالبية المرضى لديهم غشاوة في كبسولة العدسة الخلفية من النوع الغشائي الليفي.