



ND: YAG LASER CAPSULOTOMY: A DOOR TO COMPLICATIONS

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ABSTRACT

BACKGROUND: The use of neodymium-doped yttrium aluminium garnet (Nd: YAG) laser procedure for posterior capsulotomy has been gradually replacing the surgical capsulotomy as it is less invasive, and can be performed as an outpatient procedure.

AIM: to evaluate the complications of Nd: YAG laser capsulotomy.

Patients and method: A total of 200 pseudophakic patients with best corrected visual acuity (BCVA) symptomatically decreased as a result of opacified posterior capsule undergoing Nd-YAG Laser posterior capsulotomy were included. A detailed history was taken and complete ocular examination was performed. A consultant ophthalmologist performed all YAG laser capsulotomies. Follow up was done on 1st 3rd 7th and 4th day.

RESULT: A total of 200 patients were included in the study out of which 116 were males (58%) and 84 were females (42%). The patients were divided into 2 categories according to their age as less than 60 years and more than 60 years. About one-third of the patients were elderly (28%)

One or more complications were noted after YAG laser capsulotomy in 130 eyes.

Maximum number of patient had post laser IOP spike; 52 patients (26%) followed by aqueous flare; 38 patients (19%). IOL pitting was seen in 25 patients (12.5%). 12 patients (6%) suffered from cystoid macular oedema. Serious complications such as retinal detachment and endophthalmitis were seen in 2(1%) and 1(0.5%) only.

CONCLUSION: Nd: YAG laser capsulotomy is not free of complications, the most common being transient rise of IOP

KEYWORDS : Nd: YAG, best corrected visual acuity, posterior capsule opacification

INTRODUCTION:

Cataract surgery is the most commonly performed ocular surgery. Posterior capsule opacification (PCO) is one of the most common late complications of cataract surgery¹

PCO results from migration and proliferation of residual lens epithelial cells in the capsular bag after cataract surgery, to produce Elschnig's pearls or fibroblastic transformation causing capsular fibrosis.²

It also decreases the field of view during therapeutic and diagnostic procedures.³

Globally, incidence of posterior capsular opacification (PCO) varies in different studies from 7 to 31% for 2 years after the surgery⁴. The central part of posterior capsule is opened either surgically or with laser which is considered as the standard treatment. Nd: YAG laser posterior capsulotomy (LPC) is a convenient and non-invasive procedure that has restricted the need for surgical intervention.⁵

The Nd: YAG laser is solid type of laser, causes disruption of tissues by ionization mode of action. It has 1064nm wave length, with infrared radiation.⁶

A number of complications can occur after YAG laser capsulotomy such as elevation of intraocular pressure, rupture of anterior vitreous face, damage to intra ocular lens, hyphema, acute iritis, and cystoid macular oedema (CMO).^{7,8} Unusual complications include corneal endothelial damage,⁹ macular hole,¹⁰ vitreous hemorrhage,⁷ retinal detachment,¹² macular hemorrhage,¹³ and endophthalmitis.¹⁴

Patients and methods:

A total of 200 pseudophakic patients with best corrected visual acuity (BCVA) symptomatically decreased as a result of opacified posterior capsule undergoing Nd-YAG LPC were included.

The patients were included if they agreed to participate into the study. The patients were excluded if active ocular infection /inflammatory disorder, any corneal pathology or opacification preventing reliable applanation tonometry, history of/ or evidence of any posterior segment pathology, patient of

traumatic cataract, patients on long term topical/ systemic steroids, and/or patient on long term topical or systemic anti-inflammatory drugs.

After a thorough history, all patients were evaluated clinically. After recording VA (Snellen's), slit lamp examination, fundoscopy, and applanation tonometry (Goldman's) were carried out. The type and extent of PCO were carefully noted after pupil dilation.

The Helium-Neon laser beam was used for accurate aiming and focusing of the invisible therapeutic beam. The parameters of laser system were adjusted accordingly to the needs of patients depending upon the type and extent of PCO. As capsulotomy was done for the optical purpose, its size was restricted to 2-3 mm in diameter. Post laser evaluation was carried out including slit lamp examination and intraocular pressure (IOP) examination. Topical was advised four times daily. If IOP was found raised, then topical brimonidine was advised.

RESULTS:

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Sex distribution:

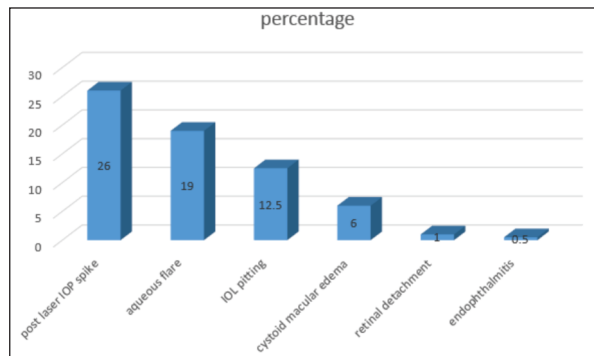
	Frequency (n)	Percentage (%)
Male	116	58
Female	84	42

Age distribution:

years	Frequency (n)	Percentage (%)
< 60	56	28
> 60	144	72

Complications:

	Frequency (n)	Percentage (%)
Post laser IOP spike	52	26
Aqueous flare	38	19
IOL pitting	25	12.5
Cystoid macular oedema	12	6
Retinal detachment	2	1
Endophthalmitis	1	0.5

**DISCUSSION:**

Nd: YAG laser is the most effective procedure for the treatment of PCO. It breaks the capsule following the pressure wave created by infrared light of 1064 nm which is amplified and focused so that electrons are ripped away from nuclei to form energy plasma and corresponding shock wave.¹⁵

YAG laser capsulotomy is the treatment of choice for posterior capsular opacification. It is usually a safe procedure but it may sometime cause complications.^{12,7-14}

Post laser IOP spike is recognized as the most common, although usually transient, complication following Nd: YAG laser capsulotomy. Slomovic et al¹⁶ found the IOP spike occurred on the second postoperative hour in 35% eyes. This is similar to our study where we found increased IOP in 26% patients, but the rise was mostly in the range of 23-29 mm Hg. Richter et al.¹⁷ reported that the IOP typically begins to rise immediately after the laser capsulotomy, peaks at 3-4 h, decreases but may remain elevated at 24 h, and usually returns to baseline at 1-week. Rarely, the IOP may remain persistently elevated, causing visual field loss or requiring glaucoma surgery or both.

Gardner¹⁸ reported postoperative uveitis in 13% of subjects. This is in concordance with the present study where aqueous flare is present in 19% (n=38) patients. Inflammation is produced by liberation of large amounts of lens cortex into anterior chamber. These patients may benefit from perioperative treatment with topical anti-inflammatory agents. Many patients with early postoperative aqueous cells and flare appear to have persistent suspended capsular debris without a significant inflammatory component and can best be managed with observation and monitoring of intraocular pressure.

In our study, IOL pitting was seen in 25 eyes (12.5%). In one study IOL damage was seen in 19.2% cases after YAG laser capsulotomy.¹² Khan MY et al found IOL pitting in 22.4% cases¹⁹ while in another study it was seen in 3.33% cases.²⁰ Although IOL pitting is one of the common complications of YAG laser capsulotomy, it is usually asymptomatic and doesn't adversely affect the visual functions.

In our study, 12 eyes (6%) were found to have cystoid macular oedema. The development of CME after Nd: YAG laser

posterior capsulotomy has been demonstrated in many studies. The incidence of CME according to Winslow et al.²¹, was 0.55% and they attributed this occurrence to vitreous instability secondary to Hyaluronic acid and prostaglandin diffusion through the compromised posterior capsule. It is hypothesized that UV-A light may generate free radicals, facilitating prostaglandin production and including inflammation and ultimately cystoid macular oedema.

Incidence of RD after Nd: YAG laser capsulotomy in various studies is:

Aron Rosa, Aron (1984) – 0.1%, Stark & associates (1985) – 0.5%, Steinert & associates (1991) – 1.23%

In our study, there were 2 (1%) cases of retinal detachment recorded. Two proposed mechanisms producing RD comprise inadvertent production of peripheral retinal break and retinal traction caused by vitreous displacement. A RD may occur early after laser capsulotomy or more than a year later. Myopia, a history of RD in other eye, younger age and male sex are risk factors for RD following Nd: YAG laser posterior capsulotomy.²²

Rare complication such as endophthalmitis were less common in our study. These complications were less common in other studies as well.

CONCLUSION:

Nd: YAG laser capsulotomy is a safe and effective method to treat PCO. It is also effective in improving best corrected visual acuity among these patients. It is non-invasive and avoids all the complications associated with surgical capsulotomy and local anaesthesia. However, Nd: YAG laser capsulotomy also carries risks like aqueous flares, iritis, IOL pitting, retinal detachment and endophthalmitis.

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