International Journal Dental and Medical Sciences Research
Volume 5, Issue 2, Mar - Apr 2023 pp 589-592 www.ijdmsrjournal.com ISSN: 2582-6018

Role of Optical Coherence Tomography (OCT) in Early Detection of Subclinical Cystoid Macular Edema after Nd-YAG Laser Capsulotomy

Aarij Zaffar Khan[1]tahleel Mohd Jeelani[2] Prof. Junaid S Wani[3]
1.post graduate ms ophthalmology gmc srinagar
2.senior resident md anaesthesiology gmc baramulla
3.professor ms ophthalmology gmc srinagar

Date of Submission: 28-03-2023 Date of Acceptance: 05-04-2023

ABSTRACT
Purpose: To determine role of optical coherence tomography (OCT) in early detection of subclinical cystoid macular edema (CME) after Nd-YAG laser capsulotomy in patients with posterior capsular opacification (PCO).
Study Design: Descriptive case-series.
Place and Duration of Study: Department of Ophthalmology GMC Srinagar over a period of 2 years.
Methods: A total of 72 eyes with unilateral or bilateral visually significant PCO following uncomplicated cataract surgery with posterior chamber intraocular lens implantation were included in the study. Patients with corneal opacities, glaucoma, retinopathy, maculopathy, optic neuropathy, complicated cataract surgery, previous ocular surgery other than cataract surgery and High refractive errors were excluded from the study. Best-corrected visual acuity (BCVA), Slit lamp examination, posterior segment examination and macular thickness was measured using spectral domain (TOPCON 3D OCT) optical coherence tomography before laser and at 1 week and at 1 month after laser.
Results: Mean age was 55.76 ± 5.28 with confidence interval of 55.02 – 56.49 years. Forty were males and 32 were females. Subclinical cystoid macular edema (CME) was found in 10 (14%) patients. Out of the patients who had CME, 3 were in age group of 40-55 years and seven were in age group of 56-70 years. P value was found to be significant i.e. (P = 0.039).
Conclusion: Optical coherence tomography OCT is a non invasive and useful tool for early detection and management of subclinical cystoid macular edema after Nd-YAG laser capsulotomy in patients having posterior capsular opacification (PCO).
Key Words: Cystoid Macular Edema, Nd-YAG laser, Posterior Capsular Opacification. Optical Coherence Tomography (OCT)

I. INTRODUCTION

Cystoid macular edema (CME) is one of the main causes of poor visual outcome following uncomplicated cataract surgery. The incidence of postoperative CME following cataract surgery is 0.6–2.6% which is diagnosed by the presence of macular cysts and/or decreased visualacuity.[1] CME affects both genders equally and has no racial predominance.

It is caused by various groups of diseases including ocular inflammatory diseases (uveitis, scleritis,), retinal vascular diseases (retinal vein occlusion, diabetic retinopathy) and retinal dystrophies(retinitis pigmentosa). It can also occur post-operatively (after cataract surgery, YAG laser capsulotomy, laser photocoagulation) and after certain drugs administration (topical 2% adrenaline, topical latanoprost).[2,3]

Nd:YAG laser capsulotomy is an out-patientdepartment procedure with few complications which can occur like lens pitting, IOP rise, retinal detachment and cystoid macular edema.[4] The exact cause of CME is not known and its pathogenesis is thought to be due to multiple factors. Macular edema may be due to damage to the blood aqueous barrier which is caused by inflammatory mediators released due to movement and damage of the vitreous gel.[5] As a result, transudates accumulate in the outer plexiform layer and inner nuclear layers resulting in cystoid spaces at macula called CME.[5-6] When fovealedema and retinal thickening is more than 300 um it is clinically visualized by slit lamp bio-microscope by using green light to delineate the cystoid spaces. Retinal imaging like Fundus Fluorescein Angiography (FFA) and Optical Coherence Tomography (OCT) are used to detect subclinical macular edema less than 300 um.[7] Different incidences have been reported by different studies from 0.85% to 9.6% of cystoid macular edema after

International Journal Dental and Medical Sciences Research
Volume 5, Issue 2, Mar - Apr 2023 pp 589-592 www.ijdmsrjournal.com ISSN: 2582-6018

Nd:YAG laser capsulotomy.[8,9] For monitoring macular thickness OCT is a useful tool in patients undergoing Nd:YAG laser capsulotomy.[10,11] Now-a-days Nd:Yag laser capsulotomy is a frequently performed procedure in OPD for PCO patients. Cystoid macular edema is the most common cause of decreased vision in patients following capsulotomy. Once CME becomes chronic, there is permanent damage to the macular architecture that results in loss of quality of vision. The rationale of our study was to make an early diagnosis of CME by doing early OCT, and treat CME early to prevent permanent damage to macula.

The main objective of this study was to determine the role of optical coherence tomography (OCT) in early detection of cystoids macular edema (CME) after Nd-YAG laser capsulotomy in patients with posterior capsular opacification (PCO).

II. METHODS

It was a descriptive case series study done at the department of Ophthalmology GMC Srinagar over a period of two years from 2020 to 2022. Sample size was calculated by using WHO sample size calculator by taking frequency of CME i.e. P = (10%), margin of error (d) = 6%, Confidence Interval = 95%. The estimated sample size was 72 eyes. Nonprobability consecutive sampling technique was used. Inclusion criteria comprised of patients with unilateral or bilateral visually significant PCO following uncomplicated cataract surgery with posterior chamber intraocular lens implantation. All those PCO cases in which there was reasonable fundal view on non-contact lens fundoscopy.

It was made sure that the time-period after cataract surgery was not less than 6 months. Age range was between 40 and 70 years. Either sex were included. Patients with corneal opacities, glaucoma, retinopathy, maculopathy, optic neuropathy, diabetes mellitus, complicated cataract surgery, previous ocular surgery other than cataract surgery and patients with high refractive errors greater than -6.0 or +6.0 diopters were excluded from the study. Consent was taken from the recruited patients. All patients had a complete ocular examination before and one month after Nd:YAG laser capsulotomy. Best-corrected visual acuity (BCVA), Slit lamp examination, posterior segment examination and macular thickness was measured using spectral domain (TOPCON 3D OCT) optical coherence tomography before laser and at 1 week and at 1 month after laser. Tropicamide 1% was administered for dilation of pupil before the procedure. After capsulotomy, prednisolone acetate 1% four times daily for 5 days was prescribed. Data was analyzed using SPSS version 20. Mean and standard deviations were calculated for age and visual acuity (VA). Frequencies and percentages were calculated for gender, side of eyes and outcome variable that is CME (yes/no). Effect modifier were controlled through age, gender and side of eyes to see the effect of these on outcome variable. Chi-square test was used with $P \leq 0.05$ taken as significant.

III. RESULTS

In this study 72 eyes of 72 patients were included to assess the cystoid macular edema (CME), among the patients who underwent Nd-YAG laser capsulotomy for Posterior Capsular Opacification (PCO). Mean age was 58.23 ± 8.46 years with C.I (56.24 – 60.21) years.

Out of 72 patients 12 had visual acuity between 6/6 – 6/9, 29 had 6/12 – 6/18 and 31 had 6/24 – 6/60 as shown in **Table 1.**

Table 1:

Visual Acuity	Frequency	Percentage (%)
6/6 – 6/9	12	17
6/12 – 6/18	29	40
6/24 – 6/60	31	43

Out of 72 patients 40 (56%) were male and 32 (44%) were females. Thirty-five (49%) had right and 37 (51%) had left eye affected. eyes Cystoid macular edema (CME) was seen in 10 (14%) while 62 (86%) eyes were normal. Out of 10 patients who had CME, three were in age group of 40 — 55 years and seven were in age group of 56 – 70 years. P value was found to be significanti.e. (P = 0.039). Regarding gender p value was not significant i.e. (P = 0.519). Status of visual acuity is shown in table 1.

IV. DISCUSSION

Most common late complication after cataract surgery is posterior capsular opacification (PCO). Definitive treatment option for PCO patients is Nd-YAG laser capsulotomy. Parajuli et al in his study found gross increase in macular thickness after Nd:YAG laser capsulotomy which did not need any treatment.[12] Other studies have reported Retinal detachment and macular edema as complications after Nd-YAG laser capsulotomy.[13] The possible mechanism could be liquefaction of the vitreous and disruption of the anterior hyaloid face. Ari et al found gross increase in macular thickness after Nd-YAG capsulotomy which was significantly high in patients who received higher

energy.[14]Karahan et al found significant central macular thickness after Nd:YAGcapsulotomy after 7 days which reduced to pre YAG levels after one month irrespective of the capsulotomy size.[15] Raza reported CME in 3% of 550 patients treated with Nd:YAG laser capsulotomy for pseudophakic and aphakic PCO.[16] In our study 10 patients developed subclinical CME at 1st week follow-up which was detected on OCT and after 1 to 3 months, it improved significantly. There are other studies as well which have shown no statistically significant changes in retinal, and optical nerve fiber layer thicknesses after YAG capsulotomy.[17,18] Although slight thickness changes in these structures were observed, particularly during the first days. Another author found that foveal thickness did not change in the first year after Nd:YAG laser capsulotomy, as determined by OCT.[19] Increase in Sub-foveal choroidal thickness after YAG capsulotomy was also reported in a Japanese study.[20] Limitations of this study include not considering the visual status of the patient with regard to macular thickening. Laser shots and power was also not taken into account.

V. CONCLUSION

Optical coherence tomography OCT is a non invasive and useful tool for early detection and management of cystoid macular edema after Nd: Yag Laser Capsulotomy in patients having Posterior Capsular Opacification (PCO).

Conflict of Interest: Authors declared no conflict of interest

REFERENCES

[1]. **Apple DJ, Solomon KD, Tetz MR.** Posterior capsule opacification. SurvOphthalmol. 1992; **37 (2):** 73–116.

[2]. **Bertelmann E, Kojetinsky C.** Posterior capsule opacification and anterior capsule opacification.CurrOpinOphthalmol. 2001; **12 (1):** 35-40.

[3]. **Schaumberg DA, Dana MR, Christen WG, Glynn RJ.** A systematic overview of the incidence of posterior capsule opacification. Ophthalmology, 1998; **105 (7):** 1213–1221.

[4]. **Novotny GE, Pau H.**Myofibroblast-like cells in human anterior capsular cataract. Virchows Arch APatholAnatHistopathol. 1984; **404 (4):** 393–401.

[5]. **McDonnell PJ, Zarbin MA, Green WR.** Posterior capsule opacification in pseudophakic eyes.

[6]. Ophthalmology, 1983; **90 (12):** 1548–1553.

[7]. **Cobo LM, Ohsawa E, Chandler D.** Pathogenesis of capsular opacification after extracapsular cataract extraction: An animal model. Ophthalmology, 1984; **91 (7):** 857–863.

[8]. **Wormstone IM.** Posterior capsule opacification: a cell biological perspective. Exp Eye Res. 2002; **74 (3):** 337– 347.

[9]. **Meacock WR, Spalton DJ, Stanford MR.** Role of cytokines in the pathogenesis of posterior capsule opacification. Br J Ophthalmol. 2000; **84 (3):** 332–336.

[10]. **Saika S, Ohmi S, Kanagawa R.** Lens epithelial cell outgrowth and matrix formation on intraocular lenses in rabbit eyes. J Cataract Refract Surg 1996; **22 (Suppl. 1):** 835–840.

[11]. **Lee EH, Seomun Y, Hwang KH.** Over expression of the transforming growth factor-beta-inducible gene betaig-h3 in anterior polar cataracts. Invest Ophthalmol Vis Sci. 2000; **41 (7):** 1840–1845.

[12]. **Lee EH, Joo CK.** Role of transforming growth factorbeta in transdifferentiation and fibrosis of lens epithelial cells. Invest Ophthalmol Vis Sci. 1999; **40 (9):** 2025–2032.

[13]. **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. ClinOphthalmol. 2019; **13:** 945952.

[14]. **Wesolosky JD, Tennant M, Rudnisky CJ.** Rate of retinal tear and detachment after neodymium: YAG capsulotomy. J Cataract Refract Surg. 2017; **43 (7):** 923–928.

[15]. **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.

[16]. **Karahan E, Tuncer I, Zengin MO.** The effect of ND:YAG laser posterior capsulotomy size on refraction, intraocular pressure, and macular thickness. J Ophthalmol. 2014; **2014:** 846385.

[17]. **Raza A.** Complications after Nd: YAG posterior capsulotomy. J Rawalpindi Med Coll. 2007; **11:** 27–29.

[18]. **İsa Y, Emine P, Yudum Y, Sümeyra Y, Nurettin B, Melek DY, et al.** Optic

coherence tomography measurement of choroidal and retinal thicknesses after uncomplicated YAG laser capsulotomy. Arq. Bras.
[19]. Oftalmol. 2015; **78 (6):** 344-347.
[20]. **Wróblewska-Czajka E, Wylegała E, Tarnawska D, Nowińska A, Dobrowolski D.** Assessment of retinal thickness obtain by optical coherence tomography after Nd: YAG capsulotomy. KlinOczna. 2012; **114 (3):** 194-197.
[21]. **Altiparmak UE, Ersoz I, Hazirolan D, Koklu B, Kasim R, Duman S.** The impact of Nd:YAGcapsulotomy on foveal thickness measurement by optical coherence tomography. Ophthalmic Surg Lasers Imaging, 2010; **41 (1):** 67-71.
[22]. **Fujiwara A, Shiragami C, Shirakata Y, Manabe S, Izumibata S, Shiraga F.** Enhanced depth imaging spectral-domain optical coherence tomography of subfoveal choroidal thickness in normal Japanese eyes.
[23]. Japan J Ophthalmol. 2012; **56 (3):** 230-235.