

CASE REPORT

A case of posterior capsular opacification with significant change in spherical equivalent after Neodymium: YAG laser capsulotomy

MOHSEN GOHARI¹, MARYAM SAATCHI²

¹Assistant Professor of Ophthalmology, Ophthalmology department, Geriatric Ophthalmology Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

²Ophthalmology resident, Ophthalmology department, Geriatric Ophthalmology Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

ABSTRACT

To report a case of posterior capsular opacification with significant changes in spherical equivalent after Neodymium: YAG laser capsulotomy. A 38-year-old female patient presented to our department with blurred vision of the right eye. She had undergone an uncomplicated cataract surgery using phacoemulsification about five years ago, with foldable IOL implantation in the bag being performed. She was diagnosed with posterior capsular opacification and Nd: YAG laser posterior capsulotomy was performed for her. After one month there were significant changes in her spherical equivalent. The Neodymium: YAG laser is an effective procedure in opening opaque posterior capsule and it might cause significant spherical equivalent correction in some patients.

Key words: posterior capsular opacification, Nd: YAG laser, spherical equivalent

INTRODUCTION

Posterior capsular opacification (PCO) is the most common complication of cataract surgery and it is estimated that visually significant PCO occurs in more than 25 % of patients in the first 5 years after cataract surgery.¹ The Neodymium: YAG laser is an effective device for opening the opaque posterior capsule², which was first described by Aron-Rossa.³ and Fankhauser.⁴ It significantly improves visual function (visual acuity, contrast sensitivity and glare disabilities) as compared with pre-laser values.⁵⁻⁸ The most common complication of Nd: YAG laser posterior capsulotomy is transient elevation in intraocular pressure. Other complications include retinal cystoid macular edema, glaucoma, intra-ocular lens damage, iritis, endophthalmitis and retinal detachment.⁹

Previous studies have reported no significant changes in spherical equivalent after Neodymium: YAG laser posterior capsulotomy.¹⁰⁻¹² Only one previous study has reported a decrease in the magnitude of refractive astigmatism and residual astigmatism after laser posterior capsulotomy.¹³

We report a case of posterior capsular opacification with hyperopia and lenticular astigmatism, who showed significant change in SE one month after the utilization of Neodymium: YAG laser capsulotomy to treat her PCO.

CASE REPORT

A 38-year-old female patient presented to our department with blurred vision of the right eye. The patient had undergone an uncomplicated cataract surgery of both eyes using phacoemulsification about five years ago, with foldable intraocular lens (IOL) implantation in the bag being performed. The routine eye examination was performed for her. The refraction was measured using an auto-kerato-refractometer (Topcon KR8900, Itabashi-ku, Tokyo, Japan). Visual acuity (VA) was measured using a Snellen chart. Her uncorrected visual acuity was 20/100 OD and 20/40 OS. Her refractive error was +9.25 - 1.75 × 94 OD and +1.00 - 2.50 × 5 OS. Her corrected visual acuity was 20/100 OD and 20/20 OS and her keratometry was 42.25 × 5 - 45.25 × 95 OD and 43.00 × 3 - 45.50 × 93 OS. In slit lamp examination she was diagnosed with PCO on the right eye and other examinations were normal. The PCO was relatively severe so she underwent Nd: YAG posterior capsulotomy on the right eye.

The pupil was dilated with tropicamide 1% and topical anesthesia was performed with tetracaine 0.5%

Correspondence:

Maryam Saatchi
Ophthalmology resident,
Ophthalmology department,
Geriatric Ophthalmology Research Center,
Shahid Sadoughi University of Medical Sciences, Yazd, Iran
E-mail: maryam.saatchi88@gmail.com

Table 1, Comparison of eye parameters before and after the Neodymium: YAG laser capsulotomy

Right eye	Before Capsulotomy	After Capsulotomy
Refraction	+9.25 - 1.75 × 94	+0.25 - 3.00 × 3
Spherical Equivalent	+ 8.37	-1.25
Uncorrected Visual Acuity	20/100	20/50
Corrected Visual Acuity	20/100	20/25
Keratometry	42.25 × 5 – 45.25 × 95	42.25 × 5 – 45.75 × 95
Refractive Astigmatism	- 1.75 × 94	- 3.00 × 3
Corneal Astigmatism	-3.00 × 5	- 3.50 × 5
Lenticular Astigmatism	+ 4.75 × 5	+ 0.50 × 5

drops. The capsulotomy was performed using a capsulotomy lens by EllexSuper Q YAG Laser system. We recorded laser parameters as: energy of 2mJ per pulse, pulse duration of 4ns and a total of 28 laser pulses.

One month after the laser procedure she was examined again. Her uncorrected visual acuity was 20/50 OD and 20/40 OS. Her refractive error was +0.25 - 3.00 × 3OD and +1.00-2.50 × 5 OS. Her corrected visual acuity was 20/25 OD and 20/20 OS. Her keratometry was 42.25 × 5 – 45.75 × 95 OD and 43.00 × 3 – 45.50 × 93 OS and other examinations were normal.

We detected that the spherical equivalent and lenticular astigmatism decreased significantly along changes in visual function after Neodymium: YAG laser capsulotomy.

DISCUSSION

PCO is a common complication of cataract surgery and causes impaired visual function.¹ Neodymium: YAG laser significantly improves visual acuity, contrast sensitivity and glare in patients with PCO.⁵⁻⁸ Many previous studies have shown no significant changes in spherical equivalent after laser posterior capsulotomy. Ozkur *et al.*¹⁰ in 2009 studied 26 eyes (23 patients) with PCO three months to 36 months (mean 15 months) after uncomplicated phacoemulsification surgery and in the bag implantation of loop haptic intraocular lens. There were no significant difference between the mean spherical equivalent refraction before laser capsulotomy and post-laser on the first day ($p = 0.206$), first month ($p = 0.248$) and the third month ($p = 0.483$). Thornval *et al.*¹¹ in 1995 studied 52 patients 23 months (range 4 to 47 months) after extra capsular cataract extraction (ECCE) with implantation of one-piece, all poly(methyl methacrylate) posterior chamber IOLs. Five weeks after YAG capsulotomy patients were examined again. There were no statistically significant changes in spherical equivalent refraction between before and after treatment. Vrijman, *et al.*¹² in 2012 studied seventy-five pseudophakic eyes from 50 patients who underwent implantation of multifocal IOLs and received Nd:

YAG laser capsulotomy 3 to 43 months after the surgery. The study showed that Nd: YAG laser capsulotomy in patients with multifocal pseudophakia mostly resulted in unchanged refraction. The results showed a clinically relevant change in subjective refraction after Nd: YAG laser capsulotomy in approximately 7% of patients, but the magnitude and direction of these changes could not be predicted. Hu, Chao-Yu, *et al.*¹³ in 2000 studied fifty-three eyes of 46 patients with PCO. Patients had cataract extraction (22 eyes, extra capsular extraction; 31 eyes, phacoemulsification) and in-the-bag implantation of a loop-haptic intraocular lens (IOL) from 1 month to 18 years before the study (mean 39 months). The posterior capsulotomies were performed and refraction was measured before and 30 minutes, 1 week, and 1 and 3 months after the procedure. The SE did not change significantly ($P = 0.109$). However, the magnitudes of refractive astigmatism and residual astigmatism were significantly lower by 1 week and stabilized thereafter.

We reported a case of a 38-year-old female complaining of blurred vision with PCO. The refraction showed high hyperopia as well as corneal and lenticular astigmatism. After capsulotomy hyperopia and lenticular astigmatism disappeared, corneal astigmatism remained and there was a significant change in SE. Further studies on PCO patients regarding the changes in refraction after capsulotomy are recommended.

CONCLUSION

The Neodymium: YAG laser is an effective procedure in opening opaque posterior capsule and it might cause significant spherical equivalent correction in some patients.

CONFLICT OF INTEREST

None.

REFERENCES

- Karahan E, Er D, Kaynak S. An overview of Nd: YAG laser capsulotomy. *Med Hypothesis Discov Innov Ophthalmol.* 2014;3(2):45.
- Stark WJ, Worthen D, Holladay JT, Murray G. Neodymium: YAG lasers: an FDA report. *Ophthalmology.* 1985;92(2):209-12.
- Aron-Rosa D, Aron JJ, Griesemann M, Thyzel R. Use of the neodymium-YAG laser to open the posterior capsule after lens implant surgery: a preliminary report. *J Am Intraocul Implant Soc.* 1980;6(4):352-4.
- Fankhauser F, Roussel P, Steffen J, Van Der Zypen E, Chrenkova A. Clinical studies on the efficiency of high power laser radiation upon some structures of the anterior segment of the eye. *Int Ophthalmol.* 1981;3(3):129-39.
- Wasserman EL, Axt JC, Sheets JH. Neodymium: YAG laser posterior capsulotomy. *J Am Intraocul Implant Soc.* 1985;11(3):245-8.
- Sunderraj P, Villada JR, Joyce PW, Watson A. Glare testing in pseudophakes with posterior capsule opacification. *Eye (Lond).* 1992;6(4):411-3.

7. Magno BV, Datiles MB, Lasa MS, Fajardo MR, Caruso RC, Kaiser-Kupfer MI. Evaluation of visual function following neodymium: YAG laser posterior capsulotomy. *Ophthalmology*. 1997;104(8):1287-93.
8. Tan JC, Spalton DJ, Arden GB. The effect of neodymium: YAG capsulotomy on contrast sensitivity and the evaluation of methods for its assessment. *Ophthalmology*. 1999;106(4):703-9.
9. Burq MA, Taqui AM. Frequency of retinal detachment and other complications after neodymium: Yag laser capsulotomy. *J Pak Med Assoc*. . 2008;58(10):550.
10. Ozkurt YB, Sengör T, Evciman T, Haboğlu M. Refraction, intraocular pressure and anterior chamber depth changes after Nd: YAG laser treatment for posterior capsular opacification in pseudophakic eyes. *Clin-ExpOptom*. 2009;92(5):412-5.
11. Thornval P, Naeser K. Refraction and anterior chamber depth before and after neodymium: YAG laser treatment for posterior capsule opacification in pseudophakic eyes: a prospective study. *J Cataract Refract Surg*. 1995;21(4):457-60.12.
12. Vrijman V, van der Linden JW, Nieuwendaal CP, van der Meulen IJ, Mourits MP, Lapid-Gortzak R. Effect of Nd:YAG laser capsulotomy on refraction in multifocal apodized diffractivepseudophakia. *J Refract Surg*. 2012;28(8):545-50.
13. Hu CY, Woung LC, Wang MC, Jian JH. Influence of laser posterior capsulotomy on anterior chamber depth, refraction, and intraocular pressure. *J Cataract Refract Surg*. 2000;26(8):1183-9.