

Five Years Results of Nd-Yag Laser Posterior Capsulotomy Rates in Patients with Senile Cataracts who Undergone Implantation of Monoblock Hydrophobic Acrylic Intraocular Lenses

Yaşlılığa Bağlı Kataraktın Tedavisinde Tek Parçalı Hidrofobik Akrilik Göz İçi Lens İmplant Edilen Hastalarda 5 Yıllık Nd-Yag Lazer Posterior Kapsülotomi Sonuçları*

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ABSTRACT

Purpose: To present 5 years Nd-Yag laser posterior capsulotomy rates in patients with senile cataracts who undergone implantation of monoblock hydrophobic acrylic intraocular lenses (IOL).

Material and Methods: Four hundred and forty-nine eyes of 419 cataract patients (over 50 years old) who had phacoemulsification and monoblock hydrophobic acrylic IOL (Zaracom F260, Zaracom Lenses, Sivas, Turkey) implantation between January 2006 and March 2007 were evaluated retrospectively. Visual acuity, position and centralization of the lens and the frequency of Nd-Yag laser were examined in those undergoing Nd-Yag capsulotomy.

Results: The mean preoperative best corrected visual acuity (BCVA) was 0.29±0.22. Upon testing of the vision with the Snellen chart, the final mean BCVA was 0.89±0.08. All the lenses were centralized. 93.4% of the patients having Zaracom F260 did not undergo laser Nd-Yag capsulotomy during the 5 years term following the surgery.

Conclusion: Patients with senile cataracts who undergone implantation of Zaracom F260 foldable hydrophobic acrylic intraocular lenses have a very low Nd-Yag laser posterior capsulotomy rate in long term.

Key Words: Nd-Yag laser posterior capsulotomy, foldable hydrophobic acrylic intraocular lens.

ÖZ

Amaç: Yaşlılığa bağlı katarakt nedeniyle tek parçalı hidrofobik akrilik göz içi lens implante edilen hastalarda 5 yıllık Neodymium yag lazer posterior kapsülotomi oranlarının gösterilmesi.

Gereç ve Yöntem: Katarakt nedeniyle Ocak 2006-Mart 2007 tarihleri arasında fakoemülsifikasyon cerrahisi geçiren ve tek parça hidrofobik akrilik göz içi lensi (Zaracom F260, Zaracom Lensleri, Sivas, Türkiye) implante edilen 419 hastanın (50 yaş üzeri) 449 gözü retrospektif olarak değerlendirildi. Görme keskinliği, Nd-Yag lazer oranı ve bu hastalarda lensin santralizasyonu ve pozisyonu değerlendirildi.

Bulgular: Preoperatif ortalama en iyi düzeltilmiş görme keskinliği (EDGK) 0.29±0.22 idi. Snellen eşeline göre son vizitte ortalama EDGK 0.89±0.08 idi. Tüm lensler santralizeydi. Cerrahi sonrası 5 yıllık süreçte Zaracom F260 lensi olan hastaların %93.4'ünde Nd-Yag lazer gereksinimi olmadı.

Sonuç: Yaşlılığa bağlı kataraktı olan ve Zaracom F260 katlanabilir hidrofobik akrilik göz içi lensi implante edilen hastalarda uzun dönemde oldukça düşük Nd-Yag lazer posterior kapsülotomi oranı görülmüştür.

Anahtar Kelimeler: Nd-Yag lazer posterior kapsülotomi, katlanabilir hidrofobik akrilik göz içi lensi.

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INTRODUCTION

Despite advanced intraocular lens (IOL) design and modern surgical techniques, posterior capsule opacification (PCO) is the most frequent long-term complication after cataract surgery.^{1,2} Lens epithelial cells (LECs) left behind in capsular bag after any type of extracapsular cataract surgery are the main causes of PCO development.³ Many risk factors such as low age, exfoliation syndrome and retinitis pigmentosa have been reported to be associated with PCO development.⁴⁻⁶ In patients with PCO, decreased visual acuity and contrast sensitivity are the main post-treatment symptoms.⁷

At present, the only curative treatment of PCO is Nd-Yag laser capsulotomy.⁸ Although this procedure is effective, there are rare but significant complications including cystoid macular oedema, retinal detachment, intraocular lens damage and transient intraocular pressure elevation.^{9,10} Modern surgical techniques and advances in intraocular lens materials and designs have reduced the PCO rate, but it is still a significant problem.

Zaracom F260 lens (Anatolia Medicine Technologies Co., Sivas, Turkey) is the first Turkish origin CE certified single piece foldable hydrophobic acrylic intraocular lens. It has a 6 mm optic diameter and approximately 900 μ central thickness. Overall length is 12.5 mm. Its refractive index is 1.51. Its angle of water contact is 92°. Its photo polymerization manufacturing technique is different from the other traditional foldable hydrophobic acrylic intraocular lenses manufactured by lathe cutting. This is a cast-molding technique that there is no need for polishing after the polymerization. So that, the cross-links on surface of the IOL are not damaged. It is known that cast-molded contact lenses are associated with apparently 'stickier' surfaces. For this reasons, the surface properties of Zaracom F260 lenses can be more stable from the other foldable hydrophobic acrylic intraocular lenses.¹¹ In the present study, our aim was to present 5 years Nd-Yag laser posterior capsulotomy rate in patients with senile cataracts who undergone implantation of Zaracom F260 lenses which were proved to be safe and easy to implant with a good capsular and uveal biocompatibility by us previously.

MATERIALS AND METHODS

This retrospective clinical study included patients undergoing phacoemulsification and IOL implantation at the Department of Ophthalmology, Cumhuriyet University between January 2006 and March 2007. During the said period, Zaracom F260 (Anatolia Medicine Technologies Co., Sivas, Turkey) IOL type was used commonly at the clinic.

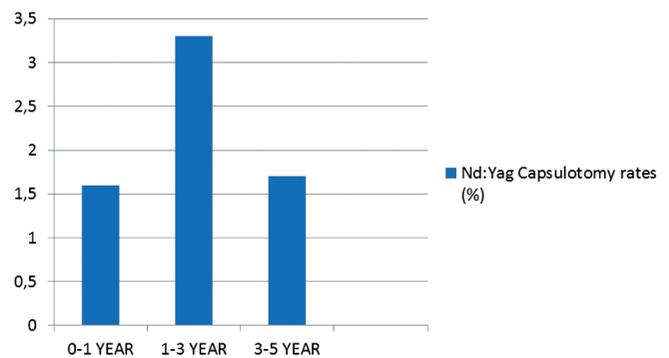


Figure: The distribution of the Nd-Yag capsulotomy rates according to years.

The study included 449 eyes of 419 cataract patients over 50 years old. All the patients had undergone an uncomplicated cataract surgery with phacoemulsification followed by an IOL implantation. All the surgical procedures were performed by the same experienced cataract surgeon (M.I.T.). All the patients received topical anaesthesia and were operated using the same technique. A 3.2-3.5 mm long temporal clear corneal incision was made. After continuous curvilinear capsulorhexis (CCC), hydrodissection and hydrodelineation were carried out and phacoemulsification was performed using a bimanual technique with Oertli Orbit machine. The cortex was aspirated and the capsular bag was filled with sodium hyaluronate 3% (EndogelQ). The IOL was implanted in the capsular bag. The capsulorhexis had a diameter of approximately 4.5 to 5.0 mm and was centrally positioned on the optic, overlying the optic of the lens.

The following data were extracted and transferred to an Excel database: age and gender, ocular history, dates of cataract surgeries and where applicable date of capsulotomy. Patients were examined on the first day and six months, one year and five years after the surgery. Visual acuities (VA) measured with Snellen's letter chart at a 5 m distance before and after cataract surgery in clinical practice and where applicable/retrievable before and after capsulotomy were recorded. In final visit visual acuity of patients who undergone Nd-Yag capsulotomy was measured before capsulotomy was performed. The presence of PCO was determined by dilated slit-lamp examination. After sufficient pupil dilatation, position of IOL was examined using TOPCON SL7E (Itabashiku, Tokyo, Japan) slit lamp. In this study Nd-Yag capsulotomy was performed when visual acuity of an eye lost 2 or more decimal lines or when the patient complained about blurred vision.

Inclusion criteria were successful surgery of a complete CCC and IOL fixation in the capsular bag while exclusion criteria were having a systemic and ophthalmic history (pseudoexfoliation syndrome, glaucoma, history of uveitis, ocular trauma, diabetes, retinitis pigmentosa or ocular conditions possible to be associated with increased PCO) and intra-operative complications.

All the patients were informed of risks and benefits prior to operation. The ethical committees approved all the protocols and gave a written informed consent in accordance with the institutional guidelines and the Declaration of Helsinki.

Statistical Analysis: Statistical evaluation was done using frequency analysis with Statistical Package for Social Sciences (SPSS) 14.0 for Windows.

RESULTS

The mean (standard deviation) age of the patients was 72.12 (SD 8.67) years, with a range of 50 to 95 years. There were 212 men and 207 women. The mean postoperative follow-up time was 64.11±6.32 months. The mean preoperative best corrected visual acuity (BCVA) was 0.29±0.22. The final mean BCVA was 0.89±0.08 with Snellen chart. Thirty of 449 (6.6%) eyes that received required Nd-Yag capsulotomy. Nd-Yag capsulotomy was performed in 0-1 years in 7 patients (1.6%), in 1-3 years in 15 patients (3.3%) and in 3-5 years in 8 patients (1.7%). The distribution of the Nd-Yag capsulotomy rates according to years is shown in graphic. In terms of PCO development, there was no difference between men and women. The percentage of patients having Zaracomm F260 and not undergoing laser Nd-Yag capsulotomy during the 5 years terms following the surgery was %93.4. All the lenses were centralized. We did not see any glistening in the lenses.

DISCUSSION

The present study examined the incidence of Nd-Yag laser capsulotomy for visually disturbing PCO during the first 5 years terms following phacoemulsification cataract surgery. Of the 449 eyes operated, 30 had capsulotomy. In our setting the Nd-Yag laser capsulotomy rate in patients who undergone implantation of Zaracomm F260 (foldable hydrophobic acrylic intraocular lens) was 6.6%.

Several factors have been shown to influence PCO formation. Surgical techniques used may cause PCO development. Meticulous cortical clean up, posterior capsule polishing, continuous curvilinear capsulorhexis and lens placement in the capsular bag are among these techniques.^{8,12} Smith et al. showed significantly less PCO in those IOLs with complete 360 degrees of anterior capsule overlap when compared

with those with incomplete overlap.¹³ In our study, all the surgeries were performed by the same surgeon using similar techniques. Acrylic lens size may influence the rate of PCO. Zaracomm F260 has a diameter of 12.5 mm and differs with this feature from the most similar lens on the market which has a 13 mm diameter. In a recent study of us, we determined that tension caused by lens implantation forms a permanent cavity between optic-haptic junction of the IOL and posterior capsule that is affecting the IOL adhesion. In that study we saw that, when the diameter of IOL is decreased, the cavity between optic-haptic junction of the IOL and the posterior capsule is decreased and IOL is adhering to posterior capsule better when the diameter is 12.5 mm.

Comparison of hydrophobic and hydrophilic materials has shown that PCO is observed more frequently in hydrophobic acrylic lenses than in hydrophilic acrylic lenses.^{14,15} Kugelberg et al.,¹⁶ compared posterior capsule opacification of hydrophobic acrylic and hydrophilic acrylic intraocular lenses and found that there was significantly less posterior capsule opacification in hydrophobic acrylic IOL in 2 years. Moreover, capsulotomy rate was found to be 10% in patients having hydrophobic IOL implant while the said rate was 42% in those having hydrophilic IOL. In a previous study we found Nd: YAG capsulotomy rate was 0.7% with hydrophobic acrylic IOL (Zaracomm Ultraflex, Zaracomm Lenses, Sivas, Turkey) after 2 years from the surgery.¹⁷ In a study where PCO development was compared in patients having heparin-surface-modified (HSM) hydrophilic acrylic intraocular lenses and hydrophobic acrylic IOL, Kang et al. found no significant difference between the said study groups.¹⁸ This gives rise to the thought that heparin has a protective role to some extent in PCO development.

The incidence of PCO is significantly influenced by the type and shape of the IOL utilised.^{19,20} Many clinical and experimental studies have shown that a sharp optic edge can prevent invasion of lens epithelial cells into the retrolental space, which leads to less PCO.²¹⁻²³ In study conducted to compare PCO rates of three piece and single piece acrylic lenses, Mian et al. reported Nd-Yag capsulotomy rate as 3.6% in those having three piece lenses and 7.5% in those having single piece lenses at the end of two years. Moreover, they found that Nd-Yag capsulotomy incidence was higher in the group having single piece acrylic lenses.¹² Similarly, in our study where we used single piece foldable hydrophobic acrylic intraocular lens, Nd-Yag capsulotomy rate in patients who undergone implantation of these lenses were found to be 6.6% at the end of 5 years.

Low age is accepted as a significant risk factor for developing PCO. In a young patient with atopic cataracts, Hara reported that endocapsular equator ring prevented posterior capsular opacification effectively.²⁴ We have reported the rate of developing PCO one year after surgery as %4.4 in patients who undergone implantation of F260 Zaracom lenses. In that study patient age was varied from 24 to 95 and patients who had PCO was under 50 years of age.¹¹ In the present study, the mean age of the patients was 72.12 years, with a range of 50 to 95 years. The reason of finding a low PCO rate in the present study was probably related with the high mean age of patients.

The limitations of the present study were the retrospective design and using of Nd-Yag capsulotomy as an indirect measure of PCO. In this study Nd-Yag capsulotomy was performed when visual acuity of an eye lost 2 or more decimal lines or when the patient complained about blurred vision. This may have affected Nd-Yag laser capsulotomy rate established in the study.

In conclusion, patients with senile cataracts who received Zaracom F260 foldable hydrophobic acrylic intraocular lenses has a very low Nd-Yag laser posterior capsulotomy rate in long term, which suggests that these lenses can be an alternative choice for cataract patients requiring lens replacement. Further clinical and experimental studies are needed to decrease or minimise PCO during cataract operation.

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