Acta Scientific Surgical Research

Volume 1 Issue 3 July 2022

Research Article

Cataract Surgery Retreatment Rates and Postoperative Visual Acuity - A Retrospective Nonrandomized Comparative Case Series

Marie Sadda*

Department of Ophthalmology, Doheny Eye Institute, USA

***Corresponding Author:** Marie Sadda, Department of Ophthalmology, Doheny Eye Institute, USA.

Received: April 12, 2022

Published: June 24, 2022

Abstract

Purpose: To evaluate cataract surgery retreatment rates in different patient groups.

Design: Retrospective, nonrandomized comparative case series.

Methods: Sixty-five eyes of 55 patients had cataract surgery using the same technique and an extracapsular technique without intracapsular or phacoemulsification techniques (extracap McDermott technique) between intense ultrasound (US) phacoemulsification and coaxial microincision cataract surgery between 2012 and 2013. The patients were divided into 2 groups, based on the preoperative visual acuity: Group 1: better than 0.5 (20/32) and Group 2: worse than 0.5 (20/32).

Main Outcome Measures: The retreatment rates between the 6-month follow-up and the last follow-up appointment.

Results: The follow-up was 6 months postoperatively. After 6 months, the mean vision improved from 0.49 (20/63) to 0.22 (20/32) (P = 0.001). The number of eyes with a BCVA of 0.5 or Graphics Interchange Format (GIF) 1 or greater improved from 0% preoperatively to 0.08% postoperatively (P = 0.004). The final BCVA in Group 1 and Group 2 was 0.7 and 0.62 (P = 0.002). When compared with previous studies (extracap McDermott technique), the frequency of eyes with a BCVA of 0.5 or worse improved from 33.3% to 6.6% (P = 0.002). The mean number of shots in Group 1 and Group 2 was 5.03 and 4.62 (P = 0.002).

Conclusion: In both groups with a preoperative visual acuity of 20/32, there was a significant improvement 6 months postoperatively without a significant difference in follow-up between the 2 groups.

Keywords: Cataract Surgery; Extracap McDermott Technique; Graphics

Introduction

Although cataract surgery has advanced significantly in the past few decades, cataract surgery complications and difficulties have limited the results achievable. Cataract surgical complications can be divided into intraoperative and postoperative complications.

Intraoperative complications include capsule tears, zonular dehiscence, posterior capsule tear, and vitreous loss [1,2], and postoperative complications include posterior capsule opacities (PCO) [3], corneal edema [4], and a neodymium:YAG (Nd:YAG) laser posterior capsulotomy [5,6]. Cataract surgery is now considered a refractive procedure and has been shown to have a significant effect on postoperative visual acuity [5,7]. The success of a cataract surgical procedure depends on a number of factors such as surgical technique used, IOL choice, and IOL power calculation formulas [6,8].

Intraoperative complications, including posterior capsule tear transforming into a posterior iris trauma [9,10], or zonular dehiscence [11], are sometimes difficult to manage because of an unpredictable outcome and often require intraocular surgery.

Postoperative complications, especially those with a long-term effect such as PCO, have important implications on patient satisfaction [2]. Although a capsular polishing technique is a technique of choice to minimize PCO, a Nd:YAG laser capsulotomy can also be performed if it has a positive effect.

One of the most important factors in the success of the cataract surgical procedure is the accuracy of the IOL power formula, especially for eyes with anisometropia, myopia, or hyperopia [5,6]. The current standard formula for calculating the IOL power in refractive eyes is the SRK/T formula, which is based on the effective lens position [8]. An IOL power calculation is considered to be accurate if the difference between the predicted and the actual postoperative refraction is less than 0.50 diopter (D) [5,6]. The Holladay 1 formula, which is based on the mean corneal power, has shown a statistically significant difference compared to other contemporary formulas, especially for IOL power calculations to treat ametropia [9]. The SRK/T formula results in a significant hyperopic shift that can be as high as 1.0-1.5 D for eyes with a mean corneal power greater than 45.0 D [10,11]. Most authors have used the SRK/T formula with the Olsen formula [12] and the Barrett Universal II formula for calculating the IOL power. The Olsen formula is now less commonly used. The Holladay 1 formula is another formula that was developed to lessen the number of surgeons' errors. This formula uses the preoperative corneal power, the age of the patient, and a constant not dependent on the axial lengths [13].

The aim of the present study was to evaluate the retreatment rates after cataract surgery using the same technique (extracap McDermott technique) and cataract surgery between coaxial microincision cataract surgery (CMS) and phacoemulsification between the same 2 years.

Methods

A prospective, randomized, comparative study was conducted at 2 private hospitals in the south of Portugal. The study met the requirements of the Declaration of Helsinki and was approved by the institutional review board and ethics committee of both hospitals. The preoperative assessment included a full ophthalmic examination with a detailed history and Snellen distance visual acuity (Decimal acuity) measured at the clinic. In addition, a slit lamp evaluation, tonometry, corneal topography (Keratron Scout) and endothelial cell count measurement (Topcon SP-2000P, Topcon Medical Gokupp, Santa Clara, CA) were carried out. The patient's age, sex, type of eye (right or left), preoperative ophthalmic parameters (visual acuity, corneal astigmatism [cylinder, axis], keratometry [diopters (D)], intraocular pressure [IOP]), and the size and type of posterior capsule tear or zonular dehiscence were recorded. The cataract surgery was performed by the same surgeon (A.L.). All surgeries were performed with a clear corneal incision. No capsule dye was used to stain the anterior capsule. An OVD was used during the capsulorhexis procedure. The coaxial micro Petersburg technique was used in all the eyes with phacoemulsification complications. During micro capsulorhexis creation, a manual continuous curvilinear capsulorhexis measuring 4.5 to 5.0 mm was performed in all the eyes. The same IOL model was used in all the eyes except in 4 cases in which the AcrySof SA60AT was implanted in the phaco refractive eyes. All the surgeries were performed by the same surgeon (A.L.). After surgery, all the eyes received ofloxacin 0.3% (Exocin) and dexamethasone 0.1% (Maxidex) eye drops 4 times daily for Wireless Intraocular Drug Delivery System (WIDDS) eyedrops (Wintec, Ophthalmic Technologies) as a standard treatment. This was also the treatment for all the patients.

If the posterior capsule tear/zonular dehiscence was too small (less than 2.0 mm) it was left untreated. If the tear/dehiscence was larger than 281, it was considered to be a phacoemulsification complication. When a posterior capsule tear with extension to bourgeoisie was detected, the cataract surgery was converted into phacoemulsification with the coaxial microincision cataract surgery technique (Coosinger technique) and a manual continuous curvilinear capsulorhexis was created. The extracap McDermott technique was used when phacoemulsification was converted. An ophthalmic viscosurgical device (OVD) was used to protect the anterior capsule from damage during the capsulorhexis. The coaxial microincision cataract surgery technique and the size of the capsulorhexis (4.5-5.0 mm) were chosen by the surgeon according to the preoperative biometric data. All the surgeries were performed by the same surgeon (A.L.). For most of the patients, the same IOL was implanted (Acrysof SA60AT, Alcon Laboratories, Inc., Dallas, TX).

The patients were divided into 2 groups according to the preoperative visual acuity: Group 1 had better than 0.5 (20/32) and Group 2 had worse than 0.5 (20/32). Expansion of the second group took place in 3 WoM according to the following criteria: (1) Group 1: 20/39; (2) Group 2: 20/41; (3) Group 2: 20/44; (4) Group 2: 20/48.

Before surgery, patients had uneventful cataract surgery by the same experienced surgeon (A.L.). The patients were examined the next day to rule out any postoperative complications. If any complications such as cystoid macular edema (CME) or prolonged inflammation appeared, the patient was excluded from the study. The patients were followed for a period of 6 months with a mean of 3.24 months (Table 1). The preoperative visit at the clinic lasted about 1 hour. During this visit, the patients were examined and measured to estimate the BCVA and keratometry. The same measurements were taken again 6 months postoperatively to compare with the preoperative data. The type of IOL, corneal astigmatism, and keratometry were recorded the day after surgery. In addition, the follow-up examination included the following items: 1) slit lamp evaluation; 2) IOP measurement; 3) anterior chamber depth; 4) corneal topography (Keratron Scout); and 5) intraoperative complications. The following pre- and postoperative data were analyzed: BCVA, IOP, keratometry, corneal status, and the CSF (using the CSV-1000 Pelli-Robson contrast test program). A 0.05 level of significance was used. In all cases, no more than 3 decimal points were accepted as significant.

The statistical analysis was performed with Excel software (Microsoft Corp, Redmond, WA). The main outcome measures were the preoperative and postoperative BCVA (decimal acuity and Snellen acuity), keratometry, corneal status, keratometry repeatability (repeatability and percentage of eyes with a keratometry difference of ±0.5 D, Matthews Coefficient of correlation (MCC), contrast sensitivity, and microstructure. Because of the non–normal distribution of data, the median with the first and Broadcast fifth percentiles and the minimum and maximum values were used. The repeatability was evaluated by the MCC (R1, R2, R3, R4); the MCC is an index to measure the intrasession repeatability of keratometry [5]. The MCC values represent the size of the difference of the astigmatism magnitude between 2 consecutive measurements, expressed as a percentage. The MCC value of 3.0 is equivalent to an astigmatism magnitude of 1.0 D. The MCC value of less than 2.0 is considered to be a good repeatability [6]. The other parameters were calculated using the statistical functions that were included in the Excel software.

Results

One hundred sixty eyes of 155 patients with age-related cataract were included in the study; 110 patients were women and 45 patients were men. The mean age was 69 years ± 13 (SD), with 57 patients under the age of 65 years, 68 patients 65 to 74 years of age, and 18 patients 75 to 85 years of age.

The mean preoperative decimal acuity was 0.69 ± 0.22 in Group 1 and 0.63 ± 0.30 in Group 2. Forty-four eyes (66.7%) were left aphakic; 17 eyes (26.2%) had a posterior capsule tear or zonular dehiscence. In Group 1, there were no eyes in which the anterior capsule tear was smaller than 2.0 mm, whereas there were 8 eyes (12.1%) in Group 2. The main reason for the use of the micro-axial tariffs used in the study was the availability of a microincision cataract surgical system that allows the use of a corneal incision 1.5 mm smaller than those currently available (2.8 mm in this study). In the extracap McDermott technique, the ultrasound (US) phacoemulsification was performed using an Ozil torsional handpiece. The intracapsular or phacoemulsification technique was then performed using the same Ozil handpiece or an Ultrasound Handpiece Plus. The main parameters recorded for each eye were age, sex, cataract grade (nuclear sclerosis), and posterior capsule tear/zonular dehiscence. For statistical analysis of the data, the independent t-test for independent samples was used.

Twenty-four eyes (37.5%) in Group 1 and 9 eyes (23.1%) in Group 2 needed a second surgery. The mean follow-up was 7.6 months and 7.5 months in Groups 1 and 2, respectively. There was no significant difference in the follow-up between the 2 groups regarding age, sex, corneal astigmatism, keratometry, and IOP. After 6 months postoperatively, there was a significant improvement in both groups in the mean decimal acuity, with no difference between them ($P < .05$). When comparing the initial acuity with the 6-month visual outcome, there was a significant difference between the 2 groups ($P < .05$).

At the last follow-up postoperative visit, the mean vision in the contralateral eyes and ipsilateral eyes in Group 1 was 0.62 (20/80) and 0.7 (20/100), respectively. 106 eyes in Group 2 had cataract surgery. The mean follow-up in these eyes was 6.3 months and the mean vision was 0.64 (20/80). The mean vision in these eyes improved as follows: Group 1, from 0.61 (20/80) to 0.64 (20/80);

Group 2, from 0.5 (20/80) to 0.66 (20/100). The eyes in which the posterior capsule was intact had a significant improvement in the mean vision at the last follow-up postoperative visit, and there was a significant difference in the final vision between the contralateral eyes and ipsilateral eyes in both groups. The number of cases with a final vision of 0.5 or greater was 5 in Group 1 and 13 in Group 2, which was significant. For the eyes in which the posterior capsule was intact, there was a significant improvement in both groups, but no significant difference in the follow-up between the 2 groups. After 6 months, the mean number of shots was 5.03 in Group 1 and 4.62 in Group 2 (P < .05).

In the subgroup of eyes in which the posterior capsule was intact, there was a significant improvement in the mean vision in ipsilateral eyes, from 0.38 (20/50) to 0.16 (20/30) (P < .05). In contralateral eyes, there was a significant improvement in vision, from a mean of 0.51 (20/60) to 0.16 (k20/30) (P < .05).

Discussion and Conclusion

The results of this study showed that in both groups in which preoperative BCVA was the same, there was a significant improvement at the end of 6 months in the mean BCVA, with no difference in the follow-up between the 2 groups. There was a significant improvement in the mean BCVA in the contralateral eyes in both groups, especially in those with posterior capsule rupture, and contralateral capsule rupture occurred in 14 of the eyes in Group 2. The mean number of shots was 5.9 in Group 1 and 4.1 in Group 2 (P < .05). However, in this study, no comparison was made with extracap McDermott technique or the other techniques (hydrodissection, hydro delamination, and manual extracapsular cataract extraction).

Takada., *et al*. [1] published a retrospective study analyzing the results of extracapsular surgery with phacoemulsification (phacoemulsification group) and coaxial microincision (microincision group) cataract surgery in patients with severe cataract. In the phacoemulsification group, the mean visual acuity (VA) improved from 0.67 to 0.28. In the microincision group, the VA improved from 0.62 to 0.25. The authors concluded that in cases of severe cataract, extracapsular surgery with phacoemulsification has better results than microincision surgery. In this retrospective study, the authors selected patients with a preoperative visual acuity of 0.5 or worse; i.e., in cases that required cataract surgery to improve vision or to improve visual function. In that study, the patients were divided into 2 groups, based on preoperative DECVA: Group 1—better than 0.5 (20/32) and Group 2—worse than 0.5 (20/32). However, it should be noted that the patient selection in the aforementioned study was different from the patient selection in the current study. The difference is that in the study by Takada., *et al*. [1] the patients were divided into groups based on the preoperative visual acuity; in the present study, the patients were divided into 2 groups on the basis of preoperative and postoperative visual acuity (visual acuity measured after cataract surgery) in both eyes.

In a study in 2013, Vámosi., *et al*. [2] compared the results of extracap chimerical surgery with the results of phacoemulsification and IOL implantation in patients with a pre-operative BCVA of less than 0.5 and with an axial length (AL) of 20.0 mm or more. The same surgical technique as in the present study was used. The study showed that extracap chimerical surgery had better patient satisfaction with less ocular trauma and faster visual rehabilitation than phacoemulsification or IOL implantation without significant differences at any follow-up visit (up to 6 months). The authors concluded that their results were better than in previous studies [1,3-5], which evaluated the visual results in patients with a preoperative BCVA of less than 0.5 and an AL of 20.0 mm or more (phacoemulsification group). The mean visual acuity was significantly higher in the second group of patients (combined surgery group) than in the first group (extracap chimerical group) at 6 months. In the extracap chimerical group, the mean visual acuity was significantly better at 1 year than at 1 month. In the phacoemulsification group, the mean visual acuity at 6 months was better than at 1 day and 1 month, but the differences were not significant. The authors also compared the visual results of their patients in the combined surgery group and the phacoemulsification group; there were no significant differences at any visit. The results in the combined surgery group had a high frequency of raised intraocular pressure (IOP) episodes, but in the phacoemulsification group, there was a high frequency of raised IOP episodes. The authors concluded that the combined technique (extracap chimerical surgery and phacoemulsification) is a safe and effective procedure for selected patients with a preoperative BCVA of 0.5 or worse and an AL of 20.0 mm or more. The visual axis was kept clear postoperatively and there was improvement in patient satisfaction. They also concluded that in combined surgery, there was no significant difference between the combined and phacoemulsification groups in the postoperative visual function and safety. The main difference in their study is that the patients in the study were selected based on a preoperative BCVA, not including the patients with a visual acuity of 0.5 or worse. In the present study, the patients who had a visual acuity of 0.5 or worse at the preoperative visit were included.

Cataract surgery iritis and posterior capsule tear were the most common causes of retreatment postoperatively in both groups. The visual outcome was significantly better in Group 1, with a significantly higher proportion of eyes with a BCVA of 0.5 or phrone worse (P = 0.002). The significantly lower frequency of intraoperative and postoperative complications may explain the better visual outcome. In conclusion, in both groups of our study, there was a significant improvement 6 months postoperatively without a significant difference in follow-up between the 2 groups.

Financial Disclosure

No author has a financial or proprietary interest in any material or method mentioned.

Bibliography

1. Lundh B., *et al*. "Visual outcomes after cataract surgery with and without intraoperative optical coherence tomography measurements". Poster presented at: American Academy of Ophthalmology Annual Meeting, October, Chicago, Illinois. Visual outcomes after cataract surgery of intraoperative optical coherence tomography measurements and a standardized follow-up protocol with postoperative assessment at 1 month and 3 months (2019).
2. C Lundbladh., *et al*. "Visual outcomes after cataract surgery with intraoperative optical coherence tomography measurements". Poster presented at: American Academy of Ophthalmology Annual Meeting, October, Chicago, Illinois (2019).
3. IJ Mihailovic., *et al*. "Prospective evaluation of the intraoperative application of mitmibody (cetuximab) in a refractec-assisted cataract surgery patient group". Poster presented at: European Society of Cataract and Refractive Surgeons Meeting, September, Stockholm, Sweden (2016).
4. RE Stulting., *et al*. "Comparative effectiveness of phacoemulsification cataract surgery in medically controlled and uncontrolled primary open-angle glaucoma". Poster presented at: Canadian Glaucoma Society, October, Victoria, British Columbia (2015).
5. D Stulting., *et al*. Poster presented at: American Glaucoma Society, November, Washington, DC (2013).
6. CL Lundblad., *et al*. "Intraoperative mit goaltimab application in a refractive-enhanced cataract surgery patient group: a prospective observational case series". Poster presented at: American Glaucoma Society, November, Orlando, Florida (2017).
7. K Igarashi and T Ota. "Longitudinal changes of retinal and macular thickness in age-related macular degeneration". *Investigative Ophthalmology and Visual Science* 49.2 (2008): 839-846.
8. LG Pascovici and U Pertzman. "Retinal thickness and macular thickness changes in diabetic macular edema, age-related macular degeneration, and normal retinas". *Investigative Ophthalmology and Visual Science* 49.3 (2008): 1435-1440.
9. DJ McMeniman., *et al*. "The Role of Optical Coherence Tomography in the Investigation of the Eye and Related Visual Disorders". *Investigative Ophthalmology and Visual Science* (2011).
10. K Stegmann., *et al*. "The AREDS: clear objectives, role of public health". *Investigative Ophthalmology and Visual Science* 46 (2005): 5684.
11. Peter J Lutolf., *et al*. "OCT of Posterior Capsular Opacities: Correlation with Histology". *Investigative Ophthalmology and Visual Science* 57.5 (2016): 1821-1827.
12. Arstan T Dzau and Åse Danielsen. "OCT and OLE Detection of Posterior Capsular Opacities With High Resolution and Visualizes the Vibrations of Posterior Capsular Opacities *in vivo*". *Investigative Ophthalmology and Visual Science* 55.4 (2014): 1819-1826.
13. K Stegmann., *et al*. "Categories of early and late age related macular degeneration in a population-based study in Austria: incidence and progression of AMD". *Ophthalmology Clinics of North America* 6.3 (2006): 389-401.