Published in final edited form as:

Can J Ophthalmol. 2019 June ; 54(3): 382–387. doi:10.1016/j.jcjo.2018.05.015.

Visual and anatomic outcomes of cataract surgery with intraoperative or postoperative complications in a teaching institution

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Abstract

Purpose—To review visual and anatomic outcomes after cataract surgery with complications in a teaching institution.

Methods—Consecutive case series. A chart review was conducted of patients who underwent phacoemulsification with intraoperative or postoperative complications, performed by ophthalmology residents under direct supervision of experienced ophthalmology attendings. Best corrected visual acuity (BCVA), OCT parameters, and postoperative treatments were reviewed at 1, 3, 6, and 12 months postoperatively.

Results—133 eyes were analyzed. Mean BCVA was 50±23 approxETDRS letters at the preoperative visit and improved by a mean of 8 letters (N=128; p=0.001), 16 letters (N=117; p<0.001), 14 letters (N=79; p<0.001), and 4 letters (N=34; p=0.37) at 1, 3, 6, and 12 months. The mean OCT central subfoveal thickness increased by less than 50 µm at all time points and this change was not statistically significant at 12 months. BCVA increased by 3 lines in 41%, 56%, 57%, and 44% of eyes at 1, 3, 6, and 12 months. Median BCVA was 20/40 or better at each follow-up period. Fifty-three (40%) eyes required a secondary surgical procedure due to intraoperative or postoperative complication. A significant proportion of eyes received anti-inflammatory drops through 1 year.

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Declarations of interest: none. All authors have approved the final article.

Authors have no proprietary interests in the materials described in the article.

These data were presented as a poster at the Association for Research in Vision and Ophthalmology, Seattle, WA, May 2016

Conclusions—After cataract surgery with intraoperative or postoperative complications, a majority of eyes experienced substantial visual gains and only mild retinal thickening while being managed with long-term anti-inflammatory drops and additional surgical procedures.

Keywords

cataract extraction; complications; optical coherence tomography; phacoemulsification; outcome; vitrectomy

Introduction

Cataract extraction is the most common surgery performed by ophthalmology residents in training in the United States.¹ Phacoemulsification performed by residents typically results in a final visual acuity of 20/40 or better in over 90% of patients; however, a major intraoperative complication may decrease the likelihood of achieving this level of visual acuity.^{2,3} Posterior capsular tear (PCT), vitreous loss, and retained nuclear fragments are the most common intraoperative complications of cataract surgery, and the less experienced surgeons tend to have higher complication rates.³ Several published studies report on the rates of intraoperative and postoperative complications in resident-performed surgeries, however few report on visual and especially anatomic outcomes.^{3–5} Making use of department-maintained morbidity and mortality records as well as visual acuity and OCT data, the purpose of the current study is to assess the visual and anatomic outcomes of resident-performed cataract extractions in cases with intraoperative or major postoperative complications.

Material and Methods

This retrospective, non-comparative consecutive case series was approved by the Miami Veterans Affairs Medical Center Institutional Review Board (IRB) and is in compliance with the Health Insurance Portability and Accountability Act (HIPAA). All resident-performed cataract extractions with any intraoperative or major postoperative complications between January 2006 and July 2014 were included. All cataract extractions were performed by second- or third-year residents under direct supervision of ophthalmology attendings experienced at teaching cataract surgery. All patients were consented to have surgery performed by resident-attending teams as part of their routine clinical care. Notably, operative case selection in our program is based on a standardized set of criteria such that second-year residents do not participate in cases with a pupil ≤ 6 mm, high myopia >6 D, pseudoexfoliation, phacodonesis, extremely dense 4+ nucleus, monocular patients, and history of trauma, intravitreal injections, or vitreoretinal surgery. In addition, all cases are fully staffed by an experienced faculty member who intervenes to the degree and duration necessary for optimal surgery completion. Throughout the study period, one instructor (AKJ) was responsible for actively collecting surgical complication data from operative reports and follow-up clinic visits for Morbidity and Mortality meetings that occurred every 6 weeks.

The following intraoperative and major postoperative complications were recorded: corneal burns, wound leak, pseudophakic bullous keratopathy, secondary glaucoma, hypotony,

posterior capsule tear, vitreous prolapse, retained lens fragment, zonular dehiscence, IOL subluxation, retinal tear or hole, retinal detachment, vitreous hemorrhage, and endophthalmitis. Cataract extraction technique, additional intraoperative steps or procedures performed, intraoperative use of triamcinolone acetonide (Kenalog or Triesence) or Trypan blue were also collected. Clinical charts were reviewed to collect the following data preoperatively and at 1, 3, 6, and 9-12 months postoperatively: previous ocular comorbidities, best corrected Snellen visual acuity (BCVA), intraocular pressure (IOP), ophthalmic drop usage, optical coherence tomography (OCT) findings, postoperative treatments including intravitreal injections, and any secondary/tertiary surgeries in the study eye. Secondary surgery was defined as any return to the operating room within 12 months. The visual acuity, lens status, and cataract extraction in the fellow eye were recorded as well as the patients' age and gender. Eyes were imaged with a spectral-domain OCT (Cirrus, Zeiss Meditec Inc., USA). Central subfoveal thickness (CST) was determined as the value of the innermost circle in the macular thickness protocol.

Statistical analysis was performed using SPSS Version 21.0 (IBM Corp., Armonk, NY, USA). Patient visits were classified into follow-up examination windows, defined as follows: 1 month; 3 months (2-4 months); 6 months (5-7 months), and 12 months (9-13 months). If more than one visit occurred within a follow-up window, the one closest to the defined interval visit was selected for analysis. For purposes of calculating differences in visual acuity and easier interpretation, Snellen visual acuities were converted into approximate Early Treatment Diabetic Retinopathy Study (approxETDRS) letter scores.⁶ Changes in visual acuity and OCT measurements from baseline at the various follow-up endpoints were compared to the preoperative values in the same eyes by paired t-test. Pearson correlation coefficients were used to evaluate the strength of relationship between variables (e.g., central subfoveal thickness and BCVA). Statistical significance was set to $p < 0.05$.

Results

Demographics and Past Surgical History

Our morbidity and mortality records revealed 133 eyes of 131 patients with cataract surgery complications between January 2006 and July 2014. As expected of a mostly older male military veteran population, the mean age was 73 ± 11 (mean $\pm$ standard deviation, SD) years (range 46-93 years) and 127 (97%) were male. Mean follow-up was 7.9 ± 4.1 months (range 0.4-21.8 months). Sixty-five eyes (49%) had no preoperative ocular morbidities other than a cataract, while 68 eyes (51%) presented with ocular comorbidities (Table I). Of note, 30 (23%) eyes were receiving glaucoma drops at baseline, and 49 (37%) patients had previous fellow eye cataract surgery (Table I).

Of the 49 (37%) study eyes with previous fellow eye cataract surgery, 7 (14%) fellow eyes had an intraoperative complication including: posterior capsular tear (N=5), retained lens fragment (N=1), and intraoperative retinal detachment (N=1), perhaps indicating intrinsic complexity of cataracts in these patients. The median baseline BCVA in the fellow eye at the time of the study eye preoperative visit was 20/30 (range: 20/20-NLP), with the mean BCVA letter score of 68 ± 22 approxETDRS letters.

Surgical Approach and Complications During Primary Cataract Extraction

The preoperative surgical plan included simple phacoemulsifications (N=130) and combined phacoemulsification with glaucoma implant (N=3). However, 119 eyes (117 phaco and 2 combined phaco-implant) had an intraoperative complication that required one or more additional surgical steps during primary phacoemulsification. All intraoperative complications are listed in Table II, with the most common being posterior capsular tear in 80% of eyes and retained lens fragment in 36% of eyes. The extra surgical maneuvers included anterior vitrectomy in 101 (85%) eyes, conversion to extracapsular cataract extraction in 4 (3%) eyes, pars plana vitrectomy (PPV) with lensectomy (PPL) in 10 (8%) eyes, PPV/PPL with endolaser (EL) in 3 (3%) eyes, and PPV/PPL/EL with C3F8 gas injection in 1 (0.8%) eye.

Among the 101 eyes requiring an anterior vitrectomy, the IOL was placed in the sulcus in 80 (79%) surgeries, anterior chamber in 12 (12%) surgeries, and haptic in the sulcus with optic in the capsular bag in 6 (6%) surgeries. In addition, three eyes with anterior vitrectomy were left aphakic and later received a sulcus IOL (n=1) or ACIOL (n=2). Among the 4 eyes converted to extracapsular cataract extraction, all 4 eyes (3%) had ACIOL placement. Among the 14 eyes requiring PPV/PPL, 11 (79%) eyes received a sulcus IOL, 1 (7%) received an ACIOL, and 2 (14%) were left aphakic and subsequently an ACIOL was inserted in one eye. The remaining 14 study eyes had IOL placement in the bag with no mention of intraoperative complication during primary cataract surgery, but they were later diagnosed with various postoperative complications as described below and required removal of retained lens fragments from the anterior chamber (n=8), leaky wound suturing (n=1), toric IOL repositioning (n=2), subluxed IOL exchange (n=2), and corneal burn management (n=1).

Postoperative Course and Complications after Primary Cataract Extraction

In total, twenty-four (18%) eyes developed postoperative complications, either after primary cataract surgery (n=14) or during/after secondary procedures (n=10). Specific complications and the time of onset are listed in Table II. Secondary procedures were required in 53 (40%) eyes due to intraoperative or postoperative complications. These included 26 (49%) PPV/PPL, 4 (8%) secondary IOL placement with or without PPV, 5 (9%) IOL repositioning, 5 (9%) PPV with IOL exchange, 8 (15%) removal of small lens fragment from anterior chamber, 1 (2%) PPV/EL/16% C3F8, 2 (4%) scleral buckle (SB) with PPV/EL/16% C3F8, 1 (2%) glaucoma drainage device for uveitic glaucoma. One eye (2%) with anterior vitrectomy developed acute endophthalmitis and was treated with a vitreous tap and injection of antibiotics and later vitrectomy. Tertiary procedures were required in 4 (3%) eyes. These were one SB/PPV/EL/16% C3F8, one PPV/EL/16% C3F8, one PPV with intravitreal antibiotics and dexamethasone, one penetrating keratoplasty for pseudophakic bullous keratopathy.

Visual Outcomes and Optical Coherence Tomography

Median and mean baseline and postoperative BCVA and mean change at each follow-up period are shown in Table III. Comparing follow-up visual acuities of the eyes seen at each time point to their respective baseline preoperative acuities, the mean improvement was

significant at 1, 3, and 6 months, with approximately half of the eyes improving by 3 or more lines. A quarter of all eyes were seen at 1 year with the median vision improving from 20/70 to 20/40 and 44% of eyes improving at least 3 lines of vision. The mean improvement was 4 ± 26 approxETDRS letters and was not significant at 1 year. A minority of the eyes lost 3 lines or more at each time point (Table III).

At the preoperative visit, an OCT was performed in 55 eyes (41%) and the mean OCT central subfield thickness (CST) was $232 \pm 62 \mu\text{m}$ (range 198-348, N=55). OCT measurements at baseline and follow-up through 12 months are listed in Table IV. The mean OCT central subfoveal thickness (CST) mildly increased by a mean of $30 \mu\text{m}$ (N=45; $p < 0.001$), $24 \mu\text{m}$ (N=33; $p = 0.031$), $45 \mu\text{m}$ (N=23; $p = 0.004$), and $7.7 \mu\text{m}$ (N=10; $p = 0.62$) at 1, 3, 6, and 12 months. Most eyes, other than three eyes with exudative age-related macular degeneration that also exhibited subretinal fluid, developed intraretinal cystic or non-cystic thickening. There was a negative correlation between changes in OCT CST and BCVA at 6 months after cataract surgery ($R = -0.58$, $P = 0.004$), but no significant correlation at other follow-up points.

Intraocular Pressure and Topical and Intraocular Treatments

At the preoperative visit, the mean intraocular pressure (IOP) was 16 ± 5 mm Hg (range: 6-44, N=133). The IOP was not significantly different from baseline at any follow-up visit (Table V). The proportion of eyes on at least one pressure-lowering drop was between 17% and 23% before cataract surgery (depending on the cohort seen at each postoperative time point) and changed to 31% at 1 month ($P = 0.002$), 26% at 3 months ($P = 0.077$), 32% at 6 months ($P = 0.19$), and 29% ($P = 0.29$) at 12 months. The mean number of pressure-lowering drops was significantly higher only at 1-month compared to baseline. The proportion of eyes on at least one anti-inflammatory drop, either a steroidal or nonsteroidal agent, was zero at the preoperative visit and 73%, 32%, 29%, and 24% at month 1, 3, 6, and 12.

Eleven (8%) eyes received various intravitreal injections during the study period. Six (5%) eyes with pre-existing wet age-related macular degeneration (AMD) and one (1%) eye with diabetic macular edema (DME) were treated before and after cataract extraction with an anti-vascular endothelial growth (VEGF) factor medication. Overall, four (3%) eyes received anti-VEGF injections for Irvine-Gass syndrome. Twenty-seven (20%) eyes received intravitreal triamcinolone acetonide (Triesence or Kenalog) for vitreous visualization during PPV/PPL for a retained lens fragment in the vitreous cavity.

Discussion

Visual and anatomic results were reviewed after intraoperative and major postoperative complications in resident-performed phacoemulsification surgery. The visual outcomes demonstrate that with appropriate follow-up and additional treatments, the majority of patients experience substantial visual acuity improvements, with statistically significant improvements in approxEDTRS letter scores through 6 months, and the median final BCVA was 20/40 or better at each follow-up period through 12 months. Anatomy by OCT remains fairly constant with a mean increase in CST of less than 50-microns through 12 months. However, intraoperative or major postoperative complications lead to a significant (40%)

rate of additional surgical procedures (mostly PPV and lensectomy for retained lens fragments), and need for long-term use of anti-inflammatory drops. It should be noted that the less common complication types, such as vitreous hemorrhage and retinal detachment, did not act as outliers and disproportionately drive the significance of our results; in fact excluding them and analyzing only the most common complication, posterior capsular tear, yielded the same result - mild OCT changes and significant visual improvement. A subanalysis removing the eyes with AMD and DME did not change the OCT results. Lastly, the majority of eyes with mild CST increase were sufficiently treated with anti-inflammatory drops, indicating optimal control with topical medications alone.

The limitations of the current study are its retrospective nature, small number of cases, and lack of exclusion of cases with other ocular pathologies such as DME or AMD which may limit visual acuity outcomes. However, all eyes with complications were included regardless of comorbidity because the primary goal was to survey the types of complications among our resident cases. Loss to follow-up may also have impacted visual acuity outcomes especially of the smaller cohort (~25%) that was seen at 1 year. Lastly, OCT was not obtained in all study eyes because it did not become a standard preoperative and postoperative test in our department until 2009. Prior to 2009, the OCT was only obtained in eyes suspected to have macular thickening, thus introducing bias into our data set.

Prior studies have confirmed the intuitive assumption that surgical volume and surgical experience correlate inversely with complication rates.^{3,7} However, despite residents having a higher complication rate than faculty members, there is no significant difference in visual outcomes between resident and attending-performed cataract extractions.³ Ti et al. reported a significantly higher posterior capsule rupture rate for residents (3.4%) than faculty (1.4%), however 93.7% of residents' patients and 93.8% of faculty's patients achieved vision of 20/40 or better after surgery.³ This is consistent with our observation of a 3.5% complication rate in resident-performed cataract extractions at our institution. The overall complication rate in the current study was 3.5% (49/1399) for cases performed between 1/2012-7/2014, before which a complete log of phacoemulsifications is unavailable except for cases with complications. Interestingly, visual results have been reported to be comparable between residents and faculty members even for cases with vitreous loss.³ We were unable to perform that comparison in the current study, since almost all cataract surgeries at our institution are performed by resident-attending teams.

In regards to anatomic findings, a previous study demonstrated significantly higher macular thickness following complicated (with posterior capsular tear) versus uncomplicated cataract surgery.⁸ In the current study, the retinal anatomy by OCT was fairly stable, with a mean increase of macular thickness less than 50 microns through 12 months. However, approximately one-third of eyes at 3 and 6 months and one-fourth of eyes at 12 months, were managed by at least one anti-inflammatory drop (either a steroid or a non-steroidal anti-inflammatory agent). Given the mild increase in OCT thickness, only four eyes received an intravitreal injection for the indication of Irvine-Gass syndrome. Central subfoveal thickness by OCT did not correlate with BCVA other than at 6 months, where there was a negative correlation between OCT CST and BCVA.

It should be noted that starting in July 2014, we incorporated mandatory EYESI surgical simulator (VRmagic Holding AG, Mannheim, Germany) training for second-year residents prior to first live operating room experience. While several studies have shown the utility of simulator training in cataract surgery,^{9,10} our recent results demonstrate a significant decrease in intraoperative complication rate ($p=0.0069$) following simulation training.¹¹ Future research may address the impact of virtual simulation on visual and anatomic outcomes.

Conclusions

In the current study, a high proportion of eyes that underwent resident-performed cataract extraction with complications still experienced substantial visual gains compared to baseline and fairly stable retinal anatomy on OCT, despite required additional surgical procedures and anti-inflammatory drops.

Acknowledgments

Funding Sources

This work was supported by the National Institutes of Health Core Grant [P30EY014801]; Research to Prevent Blindness Unrestricted Grant, Department of Defense Grant [W81XWH-13-1-0048].

The sponsor or funding organization had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript.

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Highlights

- After cataract surgery with intraoperative and postoperative complications, the majority of patients experience significant visual acuity improvements.
- The median final best-corrected visual acuity was 20/40 or better at each follow-up period through 12 months.
- The mean OCT central subfoveal thickness increased by less than 50 μm at all time points and this change was not statistically significant at 12 months.
- Forty percent of eyes required a secondary surgical procedure.
- The proportion of eyes on anti-inflammatory drops steadily decreased from 1 to 12 months.

Table I**Preoperative Diagnoses in the Study Eyes**

Diagnosis	Number (Percent) of study eyes *
None other than cataract	65 (49%)
Glaucoma	33 (25%)
Age related macular degeneration (AMD)	18 (14%)
↳ Dry AMD	↳ 11 (61%)
↳ Wet AMD	↳ 7 (39%)
History of trauma	14 (11%)
Non-proliferative diabetic retinopathy (NPDR)	7 (5%)
Previous glaucoma surgery	7 (5%)
Previous anti-VEGF injection	7 (5%)
Pseudoexfoliation (PXF) syndrome	6 (5%)
Diabetic macular edema (DME)	5 (4%)
Previous laser	4 (3%)
↳ Focal/grid laser	↳ 3 (2%)
↳ Panretinal Photocoagulation (PRP)	↳ 2 (2%)
Epiretinal membrane (ERM)	3 (2%)
Quiescent proliferative diabetic retinopathy (PDR)	2 (2%)
Macular scar	2 (2%)
Previous retinal detachment repair	2 (2%)
Other previous incisional surgery	2 (2%)
Vitreomacular traction (VMT)	1 (1%)
Retinal hole	1 (1%)
Band keratopathy	1 (1%)
History of ocular surface neoplasia	1 (1%)
Keratoconus	1 (1%)
Previous intravitreal triamcinolone acetate injection (IVTA)	1 (1%)
Fellow Eye Cataract Surgery	49 (37%)

* Total number of study eyes = 133; one eye could have more than one diagnosis.

Table II**Intraoperative and Postoperative Complications Diagnosed after Primary Cataract Extraction**

Intraoperative *		Postoperative **		
Complications	Number (%) of intra-operative complications	Complications	Number (%) of post-operative complications	Average time±SD of onset after cataract extraction (months)
Posterior capsular tear	106 (80%)	Retinal tear or hole	9 (37%)	1.06 ± 2.08 (range 0.10-5.29)
Retained lens fragment in vitreous cavity	40 (30%)	IOL subluxation	5 (21%)	1.10 ± 1.13 (range 0.20-2.43)
Retained lens fragment in anterior chamber (unrecognized during primary phaco)	8 (6%)	Retinal detachment	4 (17%)	4.60 ± 5.15 (range 0.13 – 12.12)
Zonular dehiscence	15 (11%)	Wound leak	4 (17%)	0.13± 0.12 (range 0.03-0.26)
Retinal tear	3 (2%)	Hypotony	2 (8%)	0.15 ± 0.16 (range 0.03 – 0.26)
Vitreous hemorrhage ***	2 (1.5%)	Pseudophakic bullous keratopathy	2 (8%)	11.37
Corneal burn	2 (1.5%)	Vitreous hemorrhage	1 (4%)	0.13
Retinal detachment	1 (0.8%)	Infectious endophthalmitis	1 (4%)	0.18
Hyphema	3 (2%)	Secondary glaucoma	1 (4%)	1

* One eye could have one or more complications listed; the total number of eyes is 133.

** Postoperative complications developed in a total of 24 (18%) eyes.

*** Vitreous hemorrhage seen during primary phacoemulsification in two patients on anticoagulants who also developed a hyphema.

IOL=intraocular lens

Table III

Visual Acuity (VA) at Baseline and Through Month 12.

		Follow-Up Period			
		Month 1 (N eyes total = 128)	Month 3 (N eyes total = 117)	Month 6 (N eyes total = 79)	Month 12 (N eyes total = 34)
Baseline	approxETDRS [†] Mean±SD	50±23	50±23	52±22	55±18
	approxETDRS Median[range]	58[0,76]	58 [0,76]	61 [0, 76]	61 [0, 76]
	Median Snellen VA * [range]	20/70 [20/30, HM]	20/70 [20/30, HM]	20/60 [20/30, HM]	20/60 [20/30, CF]
	N(%) eyes with 20/40 or better	28 (22%)	25 (21%)	20 (25%)	10 (29%)
Follow-Up	approxETDRS [†] Mean±SD	59±26	67±22	66±22	60±28
	approxETDRS Median[range]	68[0,85]	76 [0,92]	70 [0, 85]	70 [0, 85]
	Median Snellen VA [range]	20/45 [20/20, L.P]	20/30 [20/15, CF]	20/40 [20/20, HM]	20/40 [20/20, CF]
	N(%) eyes with 20/40 or better	64 (50%)	75 (64%)	47 (60%)	18 (53%)
Change ^{***}	Mean approxETDRS [†] letters improved ±SD	8±28	16±25	14±26	4±26
	P-value ^{**}	P=0.001	P<0.001	P<0.001	P=0.37
	3 line improvement: N (%)	52 (41%)	66 (56%)	45 (57%)	15 (44%)
	3 lines loss: N (%)	19 (15%)	7 (6%)	7(9%)	4 (12%)

At months 1, 3, and 6 there were significant increases in approxETDRS letter score compared to baseline.

[†] ApproxETDRS, approximate ETDRS letters.

* Baseline data only represent those patients who returned at each time point.

^{**} Paired t-test^{***} The change is calculated by comparing follow-up visual acuities to preoperative visual acuities for the specific cohort of eyes seen at that particular time point.

Table IV

Optical Coherence Tomography Measurements at Baseline and Through Month 12.

Follow-Up Period	Measurement	Baseline		Follow-Up		Change		P-value ***
		Mean±SD	Median[range]	Mean±SD	Median[range]	Mean±SD or R**		
Month 1 N=45 eyes	SDOCT CST *(microns)	239± 46	240[114-348]	269± 46	269[163-419]	30±39		<0.001
	SDOCT Macular Volume (mm ³)	9.1± 1.0	9.5[5.7-10.6]	10.0± 0.8	10.0[8.3-12.3]	0.89±0.88		<0.001
	SDOCT change vs VA change					R=− 0.064		0.68
Month 3 N=33 eyes	SDOCT CST *(microns)	243± 40	238[114-348]	267± 57	260[117-376]	24±61		0.031
	SDOCT Macular Volume (mm ³)	9.2± 0.9	9.5[6.3-10.6]	10.1± 0.8	10.1[8.3-12.3]	0.86±0.82		<0.001
	SDOCT change vs VA change					R= −0.24		0.17
Month 6 N=23 eyes	SDOCT CST *(microns)	250± 44	252[130-348]	295± 63	287[228-484]	45±68		0.004
	SDOCT Macular Volume (mm ³)	9.4± 0.55	9.5[8.4-10.6]	10.3± 1.0	10.0[9-12.9]	0.91±1.0		<0.001
	SDOCT change vs VA change					R= −0.58		0.004
Month 12 N=10 eyes	SDOCT CST *(microns)	248± 39	240[216-348]	256± 29	253[219-311]	7.7±47		0.62
	SDOCT Macular Volume (mm ³)	9.1± 0.7	9.25[7.8-10.2]	9.9±0.9	9.95[8.1-11.2]	0.73±0.8		0.018
	SDOCT change vs VA change					R= −0.01		0.97

Baseline data only represent those patients who returned at each time point. OCT parameters were mildly increased compared to baseline at every follow-up point. OCT CST did not correlate with BCVA other than at 6 months, where there was a negative correlation.

* Spectral-Domain Optical Coherence Tomography (SDOCT) central subfoveal thickness (CST)

** Pearson Correlation Coefficient.

*** Paired t-test

Table V

Intraocular Pressure and Topical Medication Use Through Month 12.

Follow-up period	Measurement	Baseline		Follow up	Follow-up Median [range]	Change	
		Baseline Mean $\pm$ SD or N (%) eyes	Baseline Median [range]			Mean Change $\pm$ SD	P-value
Month 1 (N eyes total = 127)	Intraocular Pressure	15.8 $\pm$ 4.3	15[6-37]	16.0 $\pm$ 3.5	16[6-28]	0.23 $\pm$ 5.2	P=0.62
	Number of eyes on 1 pressure-lowering drop	22 (17%)		39 (31%)		17	P=0.002 *
	Number of pressure-lowering drops per eye	0.47 $\pm$ 1.13	0 [0-4]	0.77 $\pm$ 1.28	0 [0-5]	0.30 $\pm$ 1.32	P=0.012
	Number of eyes on 1 steroid or NSAID drop	0		94 (73%)		86	P<0.001 *
Month 3 (N eyes total=115)	Intraocular Pressure	16.0 $\pm$ 4.4	16[6-37]	16.5 $\pm$ 6.4	15[7-55]	0.5 $\pm$ 7.6	P=0.49
	Number of eyes on 1 pressure-lowering drop	22 (19%)		30 (26%)		8	P=0.077 *
	Number of pressure-lowering drops per eye	0.52 $\pm$ 1.17	0 [0-4]	0.68 $\pm$ 1.28	0 [0-5]	0.16 $\pm$ 1.01	P=0.098
	Number of eyes on 1 steroid or NSAID drop	0		37 (32%)		29	P<0.001 *
Month 6 (N eyes total=78)	Intraocular Pressure	16.5 $\pm$ 4.7	16[8-37]	16.6 $\pm$ 4.6	16[9-32]	0.14 $\pm$ 6.0	P=0.83
	Number of eyes on 1 pressure-lowering drop	18 (23%)		25 (32%)		7	P=0.19 *
	Number of pressure-lowering drops per eye	0.62 $\pm$ 1.25	0 [0-4]	0.77 $\pm$ 1.23	0 [0-5]	0.15 $\pm$ 1.3	P=0.30
	Number of eyes on 1 steroid or NSAID drop	0		23 (29%)		16	P=0.002 *
Month 12 (N eyes total=34)	Intraocular Pressure	16.4 $\pm$ 4.8	16[6-24]	16.0 $\pm$ 5.3	14[9-35]	-.0.39 $\pm$ 5.9	P=0.71
	Number of eyes on 1 pressure-lowering drop	6 (18%)		10 (29%)		4	P=0.29 *
	Number of pressure-lowering drops per eye	0.53 $\pm$ 1.26	0 [0-4]	0.74 $\pm$ 1.29	0 [0-5]	0.21 $\pm$ 1.18	P=0.31
	Number of eyes on 1 steroid or NSAID drop	0		8 (24%)		7	P=0.016 *

Baseline data only represent those patients who returned at each time point. The number of eyes on one or more steroid or NSAID drops was increased significantly compared to baseline at every follow-up period. IOP did not change significantly throughout the study period, and only in the first month was there a significant increase in the number of eyes on pressure-lowering drops and number of pressure-lowering drops per eye.

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* McNemar Test. Other p-values are Paired t-test.
** NSAID= non-steroidal anti-inflammatory drug

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