Incidence of Management Changes at the Postoperative Week 1 Visit after Cataract Surgery: Results from the Perioperative Care for IntraOcular Lens Study

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• PURPOSE: To ascertain the incidence of unexpected management changes at the postoperative week 1 visit in asymptomatic patients who have had an uncomplicated cataract surgery and a routine postoperative day 1 examination.

• DESIGN: Retrospective observational study.

• METHODS: A retrospective chart review was conducted of all cases of cataract extraction by phacoemulsification with intraocular lens insertion performed by the Comprehensive Ophthalmology Service at Massachusetts Eye and Ear between January 1, 2014 and December 31, 2014. The preoperative consultation, operative report, and postoperative day 1 and week 1 (postoperative days 5-14) visits were reviewed. Cases with intraoperative complications, as well as clinical findings at postoperative day 1 requiring close follow-up, were excluded. The main outcome measure was incidence of unexpected management changes at the postoperative week 1 visit after cataract surgery, defined as an unanticipated change in postoperative drops, additional procedures, or urgent referral to a specialty service.

• RESULTS: Overall, 1938 surgical cases of 1471 patients were reviewed, and 1510 cases (77.9%) underwent uncomplicated phacoemulsification with intraocular lens implantation with a routine postoperative day 1 examination. Of these 1510 cases, 238 (15.8%) reported symptoms at the postoperative week 1 visit, including flashes, floaters, redness, pain, or decreased vision, which warranted an examination. In total, 1272 cases were asymptomatic, and only 11 of these cases (0.9%) had an unexpected management change at postoperative week 1. Eight of 11 patients were asymptomatic steroid responders requiring alteration of their postoperative drops. Two of these patients had an intraocular pressure >30 mm Hg.

• CONCLUSIONS: Unexpected management changes at the postoperative week 1 timepoint after cataract surgery are rare in asymptomatic patients who have had uncomplicated cataract surgery and a routine postoperative day 1 examination. Limited data are available to outline an optimal postoperative regimen after cataract surgery. The results of this study suggest that postoperative week 1 examinations could potentially be performed on an as-needed basis in the appropriate subgroup of patients after cataract surgery. (Am J Ophthalmol 2019;199:94–100. © 2018 Elsevier Inc. All rights reserved.)

THE MOVE TOWARD VALUE-BASED HEALTH CARE DELIVERY has challenged physicians and organizations to deliver quality patient outcomes efficiently and safely. Cataract surgery is the most common surgery performed in the United States, with approximately 3 million surgeries performed annually and numbers continuing to grow.[1–4] It is currently the highest procedural expenditure of the Centers for Medicare and Medicaid Services, with costs estimated at >$3 billion annually.[1,2] Elucidating the most efficient and safe postoperative care regimen after cataract surgery offers the potential to add value and lower costs to patients, ophthalmologists, and the health care system by decreasing the frequency of postoperative visits in a subset of patients who are low-risk for management change and identifying the subset that needs to be followed more closely for early diagnosis of complications. The most common schedule in the United States is for patients to be seen postoperatively the day, week, and month after cataract surgery.

The 2016 Preferred Practice Pattern from the American Academy of Ophthalmology (AAO) recommends that patients who have undergone routine cataract surgery have their first postoperative visit within the first 48 hours after surgery, while more complex cases should be seen within 24 hours.[5] The rationale behind

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this recommendation has been studied in multiple studies, suggesting that an early postoperative visit is important to detect intraocular pressure (IOP) elevations in particular but may not affect long-term visual outcomes.[6,7] The timing of subsequent visits is left to the discretion of the surgeon, acknowledging that there are a lack of data to specify an optimal follow-up schedule. The postoperative day 1 examination is imperative to assess for immediate postoperative complications, and the postoperative month 1 examination is typically an appropriate time to perform a postoperative manifest refraction.

However, the results of a postoperative week 1 examination often do not yield unexpected management changes. In fact, anecdotal evidence and international practice patterns suggest that some providers may not regularly schedule a postoperative week 1 visit after an uncomplicated surgery with a routine postoperative day 1 visit. To our knowledge, there are currently limited published data available to support or refute this practice. One article from New Zealand investigating 1000 cases of cataract surgery found that 4.1% of cases had an unexpected management change at the postoperative week 1 visit.[8] This study was performed 17 years ago, and there have been significant advancements in cataract surgery since that time, warranting a more current assessment of unexpected management changes at this visit.

The purpose of this study is to assess the incidence of unexpected management changes at the postoperative week 1 visit after cataract surgery in asymptomatic patients with no intraoperative complications and a routine postoperative day 1 examination using data from the Perioperative Care for IntraOcular Lens (PCIOL) Study. The PCIOL Study is a large retrospective database of cataract surgeries performed at the Massachusetts Eye and Ear Infirmary aiming to correlate preoperative and intraoperative patient characteristics with postoperative outcomes. It is an ideal database to assess the incidence of management changes at the postoperative week 1 visit because it includes surgical cases from a group of 10 cataract surgeons with diverse surgical styles who routinely conduct scheduled visits at postoperative week 1 for all cases.

METHODS

INSTITUTIONAL REVIEW BOARD APPROVAL WAS OBTAINED from the Massachusetts Eye and Ear Infirmary for all aspects of this retrospective cohort study involving review of patient data. A waiver of patient consent was granted given the retrospective nature of this study. All work was Health Insurance Portability and Accountability Act–compliant.

The electronic medical records of Massachusetts Eye and Ear were queried for all cases of cataract extraction by phacoemulsification with intraocular lens insertion performed by the Comprehensive Ophthalmology Service between January 1, 2014 and December 31, 2014. Specifically, Classification of Procedural Terminology codes 66982 (extracapsular cataract extraction with insertion of intraocular lens prosthesis, complex) and 66984 (extracapsular cataract extraction with insertion of intraocular lens prosthesis) were used to identify cases for chart review. Subsequently, detailed chart review of the electronic medical record was performed for each case.

All retrospective chart reviews were conducted primarily by 4 trained study personnel. Before beginning data collection, each study personnel underwent training with a study investigator (D.S.B.) to review the study design, aims, and standard definitions of all variables reviewed. For each surgical case, the preoperative consultation closest to the date of surgery, operative report, postoperative day 1 visit, postoperative week 1 visit, and postoperative month 1 visit were reviewed. All preoperative, intraoperative, and postoperative variables were recorded based on the assessment and plan of the attending surgeon.

Cases were excluded based on preoperative characteristics if the patient had already had cataract surgery in the fellow eye and a steroid IOP response or rebound iritis was noted. In addition, patients were not included in further analysis for postoperative week 1 management changes if certain intraoperative characteristics were noted. Specifically, patients were excluded if the following was noted on the operative report: (1) posterior capsule tear; (2) anterior capsule rent; (3) anterior vitrectomy; (4) zonular dehiscence; (5) placement of a capsular tension ring; (6) placement of an intraocular lens in the sulcus or anterior chamber; (7) nuclear fragments were dropped in the vitreous; or (8) performance of a concurrent vitreoretinal procedure.

The postoperative day 1 examination was reviewed and patients who had unexpected findings warranting a postoperative week 1 follow-up visit were excluded. These unexpected findings included (1) IOP ≥30 mm Hg in the operative eye in patients without a noted history of glaucoma, ocular hypertension, or glaucoma suspect; (2) IOP ≥21 mm Hg in the operative eye in patients with a noted history of glaucoma, ocular hypertension, or glaucoma suspect; (3) a wound leak; (4) an epithelial defect; (5) retained lens fragment; (6) intraocular lens out of position; (7) severe corneal edema; (8) performance of an anterior chamber paracentesis; (9) additional IOP-lowering drops prescribed other than drops used preoperatively; and (10) adjustment of the frequency of either the steroid, antibiotic, or nonsteroidal anti-inflammatory (NSAID) drops compared with the surgeon's standard regimen (Figure).

The examination and surgeon's assessment and plan for the postoperative week 1 visit for each case was reviewed. A visit was considered to be within the postoperative

week 1 timeframe if it occurred between postoperative day 5 and postoperative day 14 after surgery. If there was no postoperative visit in this timeframe, the case was excluded. Patients who specifically noted a decrease in vision, redness, pain, flashes, or new floaters in the operated eye on subjective assessment of symptoms were excluded. An unexpected management change at postoperative week 1 was defined as (1) a deviation from the taper plan prescribed at postoperative day 1 for the steroid, antibiotic, and NSAID drops; (2) prescription of an additional eye drop excluding artificial tears; (3) performance of a procedure other than suture removal; or (4) urgent or emergent referral to a specialty ophthalmology service. The charts of all patients who were noted to have postoperative week 1 management change were reviewed again by one of the study investigators (D.S.B., C.E.K.) to verify that an unexpected management change had occurred at the postoperative week 1 visit. STATA software (version 12.0; StataCorp, College Station, TX, USA) was used for all descriptive statistics provided in this study.

RESULTS

OVERALL, 1938 SURGICAL CASES OF 1471 PATIENTS WERE reviewed. Of these, 49 patients were excluded because of intraoperative events and 379 patients were excluded as a result of an examination finding at postoperative day 1 that warranted follow up within 1 week or sooner. Most commonly, this was related to elevated IOP in 165 of 379 cases (43.5%) that were excluded. One hundred fifty-four cases (40.6%) were excluded because of an adjustment of the frequency of the steroid, antibiotic, or NSAID eyedrops compared with the surgeon's standard protocol. The 2 most common adjustments were an increase in the frequency of steroid drops secondary to increased corneal edema or anterior chamber inflammation and withholding NSAID drops because of ocular surface staining pattern or an epithelial defect.

In addition, 238 cases were excluded at the postoperative week 1 timepoint. Fifty-seven cases (23.9%) did not have a postoperative week 1 visit during the designated time interval between postoperative days 5 and 14. Three patients presented to either the primary surgeon's clinic or the Massachusetts Eye and Ear Infirmary emergency ward before the scheduled postoperative week 1 appointment. One of these patients had a retinal detachment requiring urgent repair. Most commonly, patients were excluded at this timepoint because of reported symptoms of flashing lights, floaters, decreased vision, redness, or pain at the scheduled postoperative week 1 visit. Detailed information on exclusion criteria is presented in Figure.

Of the total cohort, 1272 eyes of 1009 patients were included in this study. Fifty-nine percent of the study population was female, and the average age was 68.8 years (Table 1). Approximately 14.7% of the cases included were eyes with a history of glaucoma, ocular hypertension, or were glaucoma suspects. In addition, 8.9% of eyes were of patients who were current or former alpha blocker users. The clinical characteristics of the included cases are described in further detail in Table 2.

At the postoperative week 1 visit, 11 of 1272 (0.9%) included cases had an unexpected management change (Table 3). There were no cases of endophthalmitis or retinal detachment diagnosed at the postoperative week 1 timepoint in this cohort. This was confirmed with chart review through the postoperative month 1 timepoint.

Two patients had a prolonged steroid taper because of greater than expected anterior chamber inflammation. NSAID drops were stopped early in 1 case with increased ocular surface staining. The most common unexpected management change was addition of an IOP-lowering drop in 8 cases (0.63%) with an elevated IOP at the postoperative week 1 timepoint.

All of these cases of elevated IOP were asymptomatic and had a normal IOP at the postoperative day 1 visit. Follow-up for all of these visits was between postoperative days 5 to 11 and was considered to be a possible early steroid response. The range of IOP at the postoperative week 1 visit for the 8 cases was 24 to 37 mm Hg. Only 2 cases (0.2%) had an IOP >30 mm Hg. In all cases, the surgeon's standard steroid taper was continued, and an IOP-lowering drop was added. Of the 2 cases that were the patient's second eye to have cataract surgery, neither had a known history of a steroid response in the fellow eye. One patient had a preoperative history of ocular hypertension that was being observed. None of the other patients had a previous diagnosis of ocular hypertension, glaucoma, or glaucoma suspect.

DISCUSSION

IN THIS STUDY EVALUATING THE INCIDENCE OF UNEXpected management changes in asymptomatic patients at the postoperative week 1 visit after routine cataract surgery, the overall rate of management changes was 0.9%. Only 1 previous study specifically evaluated this question at the postoperative week 1 timepoint, and the AAO Preferred Practice Pattern for Cataract in the Adult Eye acknowledges that there is limited evidence on the optimal postoperative visit schedule.[5,8]

The most common unanticipated examination finding at the postoperative week 1 visit was an unexpected asymptomatic elevation in IOP. Although this was within the first postoperative week, it was thought to be caused by an early steroid response. There are several factors to consider regarding this result. Only 2 cases (0.2%) had an IOP >30 mm Hg. In addition, the IOP-lowering drop

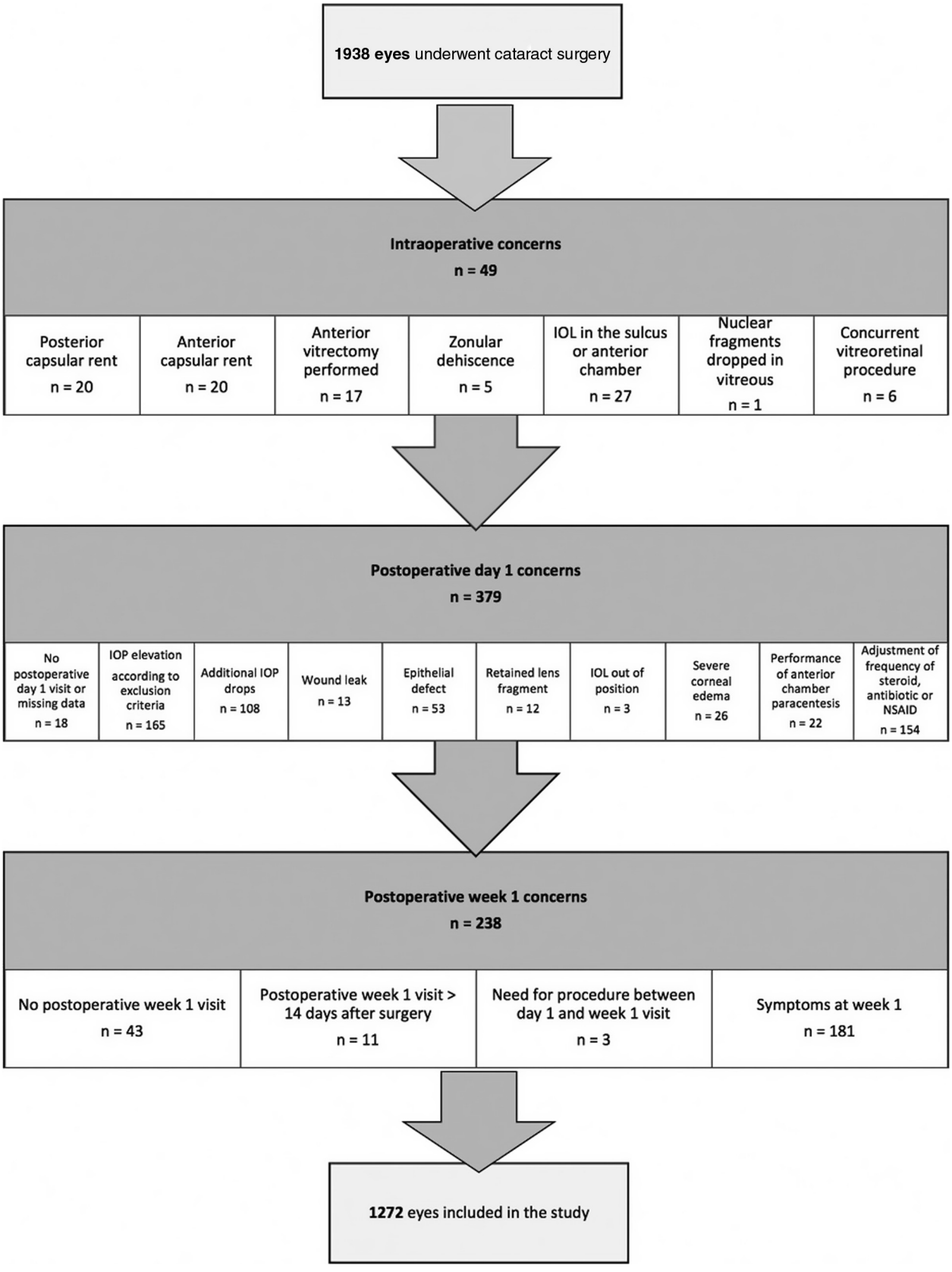

FIGURE. Study flow diagram of exclusion criteria to identify cases of cataract surgery without intraoperative, postoperative day 1, or postoperative week 1 concerns. Reasons for exclusion and the number of cases excluded at each timepoint in the study are shown. For each timepoint, cases are listed under each subcategory for which an exclusion criterion was met (ie, some cases may be listed under multiple exclusion criteria). Of the 1938 cases initially reviewed, 1272 (65.6%) were included in the final analysis. IOL = intraocular lens; IOP = intraocular pressure; NSAID = nonsteroidal anti-inflammatory drug.

TABLE 1. Baseline Demographic Characteristics for Patients Included in the Analysis of Unexpected Postoperative Week 1 Management Changes After Cataract Surgery

Characteristic	N or n (%)
Total study cohort, patients	1009 (100.0)
Female	595 (59.0)
Race	
White	711 (70.5)
Black/African American	78 (7.7)
Asian	46 (4.6)
Hispanic	47 (4.6)
Other	22 (2.2)
Not available	105 (10.4)
Age, y (mean ± SD)	68.8 ± 10.5

SD = standard deviation.

TABLE 2. Preoperative Characteristics of All Eyes Included in the Analysis of Unexpected Postoperative Week 1 Management Changes after Cataract Surgery

Preoperative Characteristic	N or n (%)
Total study cohort, eyes	1272 (100.0)
Right eye	655 (51.5)
Second eye	535 (42.1)
Glaucoma suspect	133 (10.5)
Ocular hypertension	26 (2.0)
Glaucoma	28 (2.2)
Pseudoexfoliation	41 (3.2)
History of previous intraocular surgery	61 (4.8)
History of pars plana vitrectomy	56 (4.7)
History of alpha blocker use	113 (8.9)
History of diabetes	236 (18.6)

was able to be stopped shortly after the steroid drops were tapered in all cases. Presumably, the IOP would normalize without additional treatment once the steroid drop had been tapered as scheduled over the course of a few weeks.

A previous study of 1000 cataract surgery cases investigating the incidence of management changes at the postoperative week 1 visit found that there was a management change in 4.1% of cases.[8] However, this rate was reported for all cases reviewed, including those patients who were symptomatic at the postoperative week 1 visit and those who had an intraoperative complication. In the current study, specific criteria were applied to exclude patients who were symptomatic or had an unexpected event intraoperatively, and the rate of unexpected management changes was much lower. This underscores the importance of applying the current results to the appropriate subgroup of patients. In addition, the most common management changes found in the previous study were uveitis and cystoid macular edema. This study was conducted 17 years ago, and improvements in phacoemulsification technology have decreased the rates of these complications postoperatively.

In the Ocular Hypertension Treatment Study, only 1 patient of 819 developed primary open-angle glaucoma at 6 months in the observation group of patients with elevated IOP between 24 and 32 mm Hg.[9] This suggests that short-term moderate IOP elevations in otherwise healthy eyes may be permissible. However, this consideration should be balanced with the potential for much higher pressures that can be observed with steroid-related ocular hypertension.[10,11]

There were no cases of endophthalmitis in this study, but one potential concern in conducting an as-needed postoperative week 1 visit is that an asymptomatic case of early endophthalmitis could be missed. Asymptomatic postsurgical endophthalmitis is rare, however. In the Endophthalmitis Vitrectomy Study, 98.8% of patients in the study had

TABLE 3. Postoperative Week 1 Visit Management Changes in Asymptomatic Patients with a Normal Postoperative Day 1 Examination After Cataract Surgery (N = 1272)

Management Changes	n (%)
Change to drop regimen taper	
Change in antibiotic regimen	0 (0)
Change in steroid regimen	2 (0.16)
Change to NSAID regimen	1 (0.08)
Addition of non-IOP gtts	0 (0)
Addition of IOP gtts	8 (0.63)
Procedure performed (excluding suture removal)	0 (0)
Suture removal	39 (3.07)
Referral to outside service	0 (0)

IOP = intraocular pressure; gtts = drops; NSAID = nonsteroidal anti-inflammatory drug.

≥1 presenting symptom of either red eye, pain, blurred vision, or swollen lid.[12]

This study has several strengths. There has been 1 smaller study in the United Kingdom of 50 patients evaluating the use of a phone call as an effective means of assessing symptoms in place of the United Kingdom's standard postoperative week 2 visit, and several studies in the United Kingdom and Singapore evaluating alternative methods to an in person assessment for the postoperative day 1 visit.[7,13–19] Our study is the first to provide evidence of an optimized cataract surgery follow-up schedule in line with the 2016 AAO Preferred Practice Pattern, which recommends a first visit 24 to 48 hours after surgery. Therefore, the current study addresses a novel research question with broad implications and area for further study. To answer this question, a large sample size of >1000 cases was used. In addition, 10 different surgeons with diverse surgical styles and postoperative management

were included in the study, strengthening the generalizability to other populations.

Although this study has many strengths, there are some limitations. Many patients were excluded because of possible symptoms at postoperative week 1. However, because of the retrospective nature of this study, there was no standardization of symptom screening. In addition, this study was conducted at an academic institution, which may limit the generalizability to other populations. While this study has a large sample size, the incidence of unexpected management changes was low and therefore did not allow for further subgroup analyses to identify specific risk factors for unexpected management changes.

A third of cases initially reviewed for this study were excluded because of intraoperative complications, postoperative day 1 examination findings, or symptoms at postoperative week 1. These patients were thought to benefit from an examination at postoperative week 1 given the possibility of examination findings that may require a change in management. The specific criteria used in the study can assist clinicians in identifying the appropriate subgroup of patients to whom these study results may be most applicable.

In addition to possibly identifying an unexpected clinical finding at the postoperative week 1 visit, this visit may have other purposes to consider. Many surgeons may use the postoperative week 1 visit as an opportunity to discuss cataract surgery in the fellow eye. Also, this is typically the visit when planned, but significant, changes are made to the eyedrop regimen, including stopping the antibiotic drop and beginning a steroid drop taper. One previous study showed that social media messaging reminders of postoperative instructions at postoperative day 7 significantly increased medication adherence.[20] Another study showed that telephone follow-up in the postoperative week 2 to 3 timeframe was effective and associated with high patient satisfaction.[13] It is likely important to have some form of patient interaction at the postoperative week 1 timepoint; however, a phone call or social media communication may be sufficient. Future studies to develop and validate standardized questionnaires that could be administered over the telephone and identify patients in need of an examination are warranted. This type of hybrid model could help streamline care for both patients and providers.

In summary, the incidence of an unexpected management change in asymptomatic patients at the postoperative week 1 visit after routine cataract surgery and an unremarkable postoperative day 1 examination was <1%. An asymptomatic IOP rise prompting treatment was the most common change. This study provides novel information for guiding postoperative visit schedules after cataract surgery. It may be possible to eliminate the postoperative week 1 examination for the appropriate subgroup of patients. However, larger studies identifying risk factors for unexpected management changes, as well as prospective studies validating alternative methods of assessment, such as telephone calls or social media communications, may be useful.

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