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Complications of uneventful phacoemulsification on the first postoperative day: to determine the necessity of the first day review

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Abstract

Purpose: To establish the type and number of complications detected on the first postoperative day and to determine the necessity of the first day review.
Study design: Clinical audit**.**
Methods: This is a retrospective review of 297 patients who underwent routine phacoemulsification cataract surgery by qualified ophthalmologists and trainees from September to December 2020 at our day-care operation theatre. All cases of uncomplicated phacoemulsification were analysed for the types and frequency of complications on postoperative day one.
Results: Of 297 cases of routine cataract surgery, 6.7% of cases were excluded due to intraoperative complications. Of the remaining 277 cases, a total of 54 cases (19.5%) were found to have complications on day 1 postoperative review. These included raised intraocular pressure (67.0%), epithelial defect (20.0%), intense inflammation with presence of fibrin (5.0%), retained soft lens matter (4.0%), retained fibres (2.0%), and exposed corneal suture (2.0%). Two patients (0.7%) needed the removal of soft lens matter. Of 36 cases of raised intraocular pressure, 1 patient required anterior chamber paracentesis for retained viscoelastic, 18 patients required topical antiglaucoma medication, 15 patients needed systemic oral acetazolamide, and 2 patients with pre-existing glaucoma were instructed to continue their antiglaucoma medications.

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Conclusions: Following uneventful phacoemulsification, only 19.5% of patients were found to have complications on day 1 postoperative review. The most frequent complication was raised intraocular pressure, which can be detected on the day of surgery. Reviewing patients on the same day of surgery can reduce workload and demands on clinician time. It can also significantly reduce health care costs without compromising patient safety.

Keywords: complications, day-care surgery, first postoperative day, phacoemulsification

Komplikasi pada hari pertama selepas pembedahan Fakoemulsifikasi tanpa sebarang komplikasi semasa pembedahan: Bagi Menentukan Keperluan Pemeriksaan Hari Pertama

Abstrak

Tujuan: Untuk menentukan jenis dan bilangan komplikasi yang dikesan pada hari pertama selepas pembedahan dan untuk menentukan keperluan pemeriksaan hari pertama.
Reka bentuk kajian: Audit klinikal.
Kaedah: Kajian retrospektif telah dijalankan ke atas 297 pesakit yang menjalani pembedahan katarak fakoemulsifikasi rutin oleh pakar oftalmologi dan doktor pelatih bertauliah dari September hingga Disember 2020 di bilik pembedahan rawatan harian kami. Semua kes fakoemulsifikasi tanpa sebarang komplikasi semasa pembedahan telah dianalisa untuk jenis dan kekerapan komplikasi pada hari pertama selepas pembedahan.
Keputusan: Daripada 297 kes pembedahan katarak secara fakoemulsifikasi, 6.7% kes dikecualikan disebabkan terdapat komplikasi semasa pembedahan. Daripada baki 277 kes, sebanyak 54 kes (19.5%) didapati mengalami komplikasi pada hari pertama pemeriksaan selepas pembedahan. Ini termasuk peningkatan tekanan intraokular (67.0%); kecacatan epitelium (20.0%); keradangan sengit dengan kehadiran fibrin (5.0%); bahan kanta lembut yang tertinggal (4.0%); gentian tertinggal (2.0%) dan jahitan kornea terdedah (2.0%). Dua pesakit (0.7%) memerlukan pembuangan bahan kanta lembut. Daripada 36 kes peningkatan tekanan intraokular, seorang pesakit memerlukan prosedur paracentesis ruang

anterior bagi mengeluarkan viskoelastik yang tertinggal, 18 pesakit memerlukan ubat anti-glaukoma topikal, 15 pesakit memerlukan acetazolamide secara sistemik, dan dua pesakit glaukoma telah diarahkan untuk meneruskan ubat anti-glaukoma mereka.
Kesimpulan: Pemeriksaan pada hari pertama selepas pembedahan fakoemulsifikasi tanpa sebarang komplikasi semasa pembedahan mendapati hanya 19.5% pesakit didapati mengalami komplikasi. Komplikasi yang paling kerap adalah peningkatan tekanan intra-okular yang boleh dikesan pada hari yang sama selepas pembedahan. Pemeriksaan pesakit pada hari pembedahan yang sama boleh mengurangkan beban kerja dan masa bagi pakar perubatan. Ia juga boleh menjimatkan kos penjagaan kesihatan yang ketara tanpa menjejaskan keselamatan pesakit.

Kata kunci: fakoemulsifikasi, hari pertama selepas pembedahan, komplikasi, rawatan harian Ia memenuhi matlamat pembangunan mampan (SDG) termasuk matlamat SDG 3 dengan memastikan kesihatan dan kesejahteraan pesakit yang baik dan matlamat SDG 7 tenaga mampu milik dan bersih, dengan mengurangkan penjimatan penjagaan kesihatan pesakit.

Introduction

Cataract surgery is one of the most commonly performed surgical procedures worldwide.[1] The increasing number of cataract surgeries performed and the following postoperative visits constitute a huge workload for the ophthalmic clinic.[1] Small incision phacoemulsification is becoming the technique of choice for cataract surgery, providing rapid visual rehabilitation and minimizing problems with astigmatism and suture management.[2] The popularization of this technique associated with changes in patient expectation, expansion of day-care surgery, and pressure on clinic time has made streamlining of follow-up protocol desirable. At our centre, the postoperative visit schedule comprises 3 follow-up visits on postoperative day 1 (POD1), 1 week, and 6 weeks. POD1 is performed by the respective surgeon or operative team, either by an ophthalmic medical officer or ophthalmologist. This review comprises an assessment of symptoms, recording of visual acuity and intraocular pressure (IOP) by Goldmann applanation tonometry, and slit-lamp examination of the anterior segment.

The necessity for a POD1 review in routine phacoemulsification was questioned more than 20 years ago.[3] The timing of postoperative review should be adjusted to ensure the expeditious recognition and management of complications to optimize the outcome of surgery.[3] Recent studies suggest that true day-care surgery with the first review performed 4 to 6 hours postoperatively or without early review may be safe alternatives to traditional practice if adequate access to advice or

the clinic is available.[2] The 2016 Preferred Practice Pattern from the American Academy of Ophthalmology recommends that the first follow-up visit should be scheduled within 48 hours after uncomplicated cataract surgery.[3] Based on these guidelines, there was no doubt that a POD1 visit is mandatory for complicated surgeries.

This audit aimed to evaluate the current nature and number of complications present on POD1 following uncomplicated phacoemulsification cataract surgery (PCS) performed in the day-care operation theatre, University Malaya Medical Centre (UMMC). In addition, it also sought to determine the necessity of this POD1 review by looking at the rate of intervention and incidence of sight-threatening complications based on our current data. An uneventful cataract operation was defined as a procedure with no intraoperative complications such as posterior capsule rupture, vitreous loss, lost nucleus, and zonular dehiscence.[3]

Methods

This is a retrospective review of 297 patients who underwent routine PCS by ophthalmologists and ophthalmologist in training Masters students of ophthalmology (from September 1 to December 31, 2020 at day-care operation theatre, University Malaya Medical Centre. All cases with uncomplicated PCS were identified from the day-care operating theatre census book UMMC. The data regarding the type and frequency of postoperative complications on POD1 were further retrieved from electronic medical records.

Our audit objectives were to establish the type and number of complications detected on POD1 as well as to determine the necessity of POD1 by looking at the rate of intervention and incidence of sight-threatening complications.

Our audit standard was based on the cataract surgery guidelines laid out in 2017 by the Royal College of Ophthalmologists, where under section 1.9 Postoperative assessment, 1.9.3 states “Do not offer in-person, first-day review to people after uncomplicated cataract surgery.”

Inclusion criteria were all patients who underwent uncomplicated PCS with intraocular lens implantation in Ophthalmology Day-Care Operating Theatre, UMMC. Exclusion criteria included complicated cataract surgery, posterior capsule rent with or without vitreous loss, anterior capsule rent, anterior vitrectomy, zonular dehiscence, placement of a capsular tension ring, placement of an intraocular lens in the sulcus or anterior chamber, left aphakic, nuclear fragment dropped in the vitreous, corneal abrasion/epithelial defect, vitreous haemorrhage, hyphema, iridodialysis, iris prolapse, suprachoroidal haemorrhage, phacoemulsification converted to extracapsular cataract extraction (ECCE)/intracapsular cataract extraction (ICCE), ECCE, ICCE, and combined phacoemulsification surgery (*e.g.*, trabeculectomy or vitreoretinal surgery).

Results

A total of 297 cases of routine cataract surgery were performed in UMMC between September 1 and December 31, 2020. Twenty cases (6.7%) were excluded due to complicated cataract surgery such as posterior capsule rent with or without anterior vitrectomy, primary ECCE, phacoemulsification converted to ECCE or ICCE, or combined surgery (trabeculectomy).

A total of 277 cases were included in this audit. There were 128 males (46.2%) and 149 females (53.8%) aged 42 to 79 years (mean 61 years old). As presented in Figure 1, the highest age range was 70–79 years (*n* = 123, 44%), followed by 60–69 years (*n* = 116, 42%), 50–59 years (*n* = 33, 12%), and 40–49 years (*n* = 5, 2%). As shown in Table 1, Chinese ethnicity had the highest number of patients with 115 (41.5%), followed by Malays with 102 (36.8%), and Indians with 60 (21.7%). The majority of cases were performed by trainees (*n* = 155, 55.9%), followed by specialists (*n* = 74, 26.8%) and consultants (*n* = 48, 17.3%) throughout the 4 months of the study (Fig. 2).

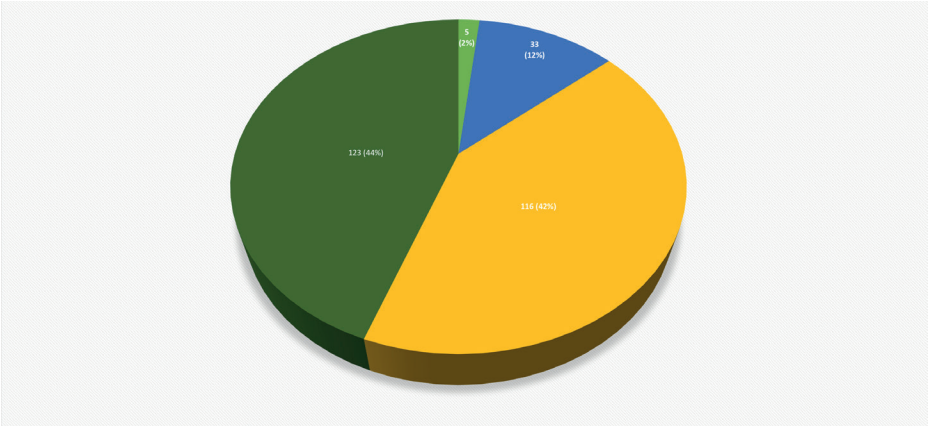

Fig. 1. Age range among patient who underwent uncomplicated phacoemulsification with intraocular lens implantation in the daycare operation theatre, UMMC from September 2020 to December 2020.

Table 1. Demographic characteristic of patients

Variables	**Observations (*n* = 277)**
Gender (*n*, %)	
Male	128 (46.2)
Female	149 (53.8)
Ethnicity (*n*, %)	
Malay	102 (36.8)
Chinese	115 (41.5)
Indian	60 (21.7)

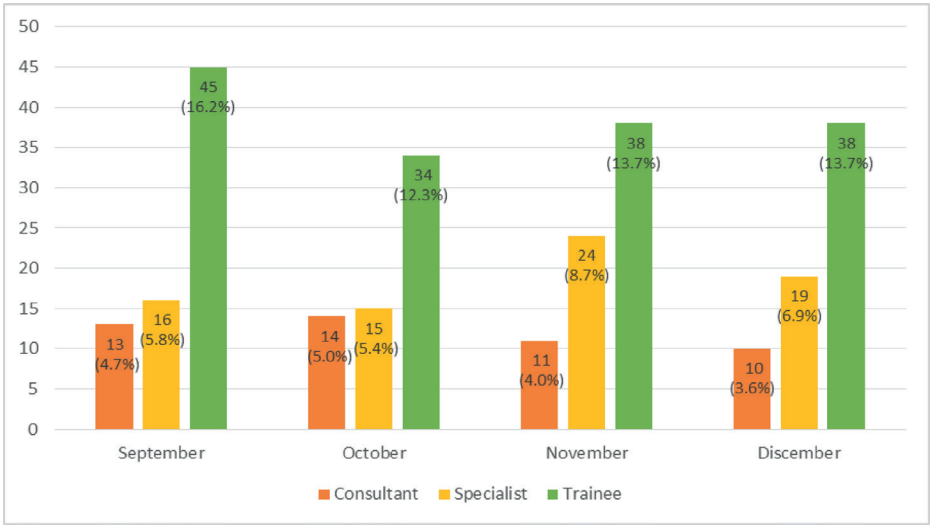

Fig. 2. The grade of the surgeon who perform uncomplicated phacoemulsification with intraocular lens implantation in the day-care operation theatre, UMMC from September to December 2020.

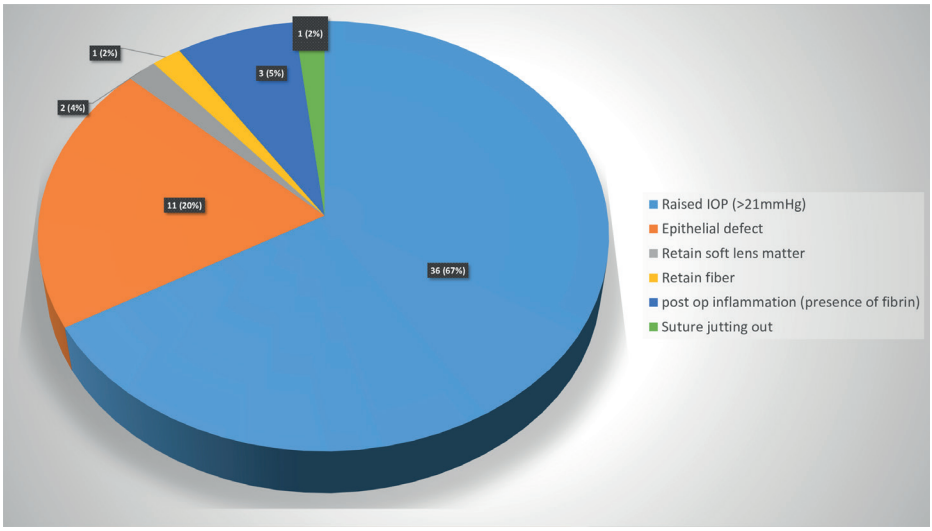

Fig. 3. Types of complication developed during day 1 postoperative review.

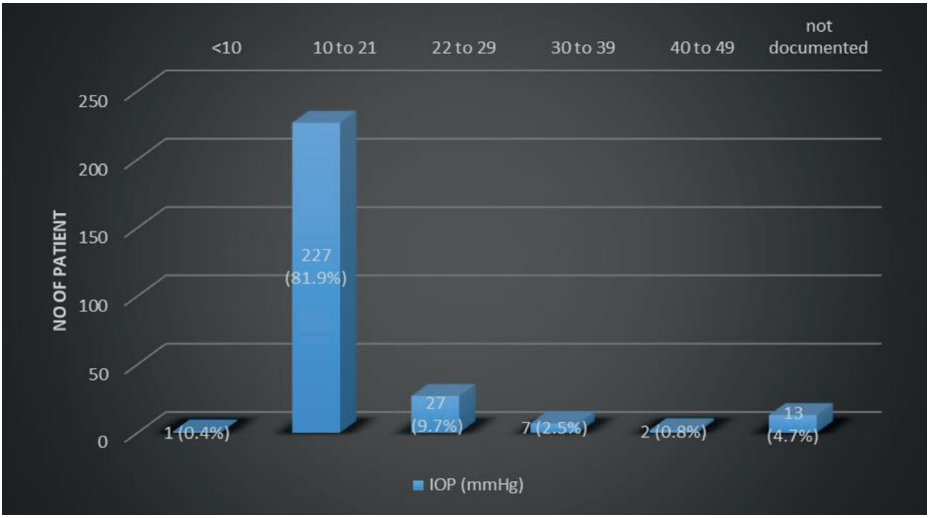

Fig. 4. Intraocular pressure range among patients during day 1 post-operative review.

Fifty-four of 277 cases (19.5%) were noted to develop a complication on POD1. These include raised IOP (*n* = 36, 67.0%); epithelial defect not discovered intraoperatively (*n* = 11, 20.0%); intense postoperative inflammation with presence of fibrin (*n* = 3, 5.0%); retained soft lens matter (*n* = 2, 3.6%); retained fibres (*n* = 1, 2.0%); and corneal suture jutting out (*n* = 1, 2.0%), as shown in Figure 3. Twenty-nine cases (53.7%) were performed by trainees, while 25 cases (46.3%) were performed by ophthalmologists. Two patients (0.7%) returned to the operation theatre due to retained soft lens matter. Most patients (*n* = 227, 81.9%) had normal IOP (10–21 mmHg) on POD1, while 1 patient (0.4%) had an IOP of 9 mmHg, 27 patients (9.7%) had IOPs in the range of 22–29 mmHg, 7 patients (2.5%) had IOPs in the range of 30–39 mmHg, and 2 patients (0.8%) had an IOP of 40 mmHg (Fig. 4). The lowest IOP was 9 mmHg while the highest IOP was 40 mmHg, with a mean IOP of 24.5 mmHg.

For those who presented with high IOP, 2 patients (5.6%) complained of headache and discomfort while the rest were asymptomatic. Regarding the causes of high IOP, most did not have a specific cause and we found no detailed documentation, 4 patients (11.1%) had pre-existing glaucoma and were not compliant with their antiglaucoma medication postoperatively, and 1 patient (2.8%) had retained viscoelastic in the anterior chamber and required anterior chamber paracentesis. In the IOP range of 22–29 mmHg, 9 patients (25.0%) were not given any antiglaucoma medication, 9 patients (25.0%) were given timolol eyedrops, 7 patients (19.4%) were given oral acetazolamide for 3 days, and 2 patients (5.6%) who had pre-existing glaucoma were instructed to continue their antiglaucoma eyedrops. On the other hand, there were 7 patients with IOP in the range of 30–39 mmHg, of which 6 (16.7%) were given oral acetazolamide for 3 days and 1 (2.8%) with IOP of 30 mmHg

Table 2. Management changes in patients with uncomplicated phacoemulsification during postoperative day one review

Variables	*n* (%)
Change in antibiotic and steroid regimen	
Switched tobramycin 0.3%/dexamethasone 0.1% eyedrops to moxifloxacin 0.5%/ciprofloxacin 0.3% eyedrops and prednisolone 1% eyedrops	20 (7.2)
Addition of eye drop/ointment	
Chloramphenicol ointment 1%	11 (4.0)
Tobramycin 0.3%/dexamethasone 0.1% ointment	4 (1.4)
Duratears Naturale ointment	1 (0.4)
Hydroxypropyl methylcellulose 0.3% eyedrops	1 (0.4)
Sodium chloride 3% eyedrops	45 (16.2)
Timolol 0.5% eyedrops	7 (2.5)
Addition of oral medication	
Acetazolamide	17 (6.1)
Ciprofloxacin	1 (0.4)
Procedure performed	
Anterior chamber paracentesis	1 (0.4)

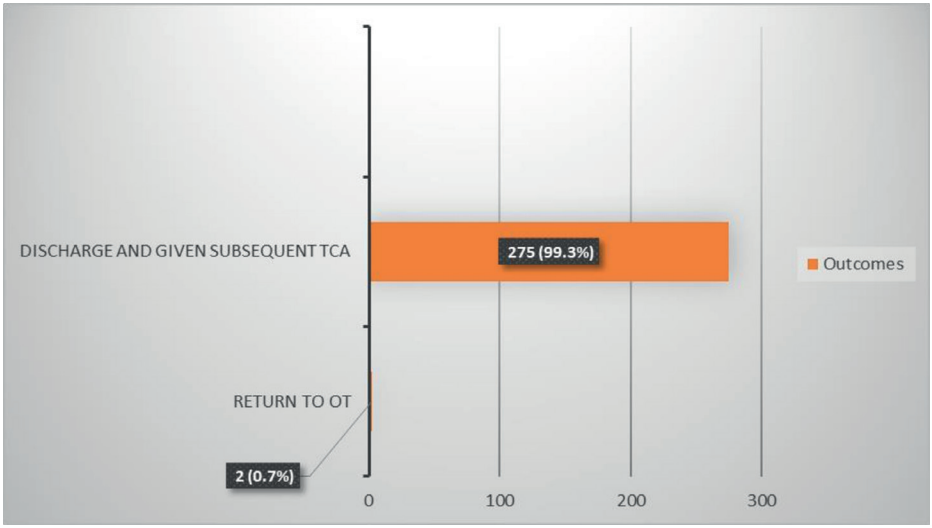

Fig. 5. The outcomes of day 1 postoperative review.

was not given antiglaucoma medication. Two patients (5.6%) with IOP of 40 mmHg were given oral acetazolamide 500 mg and their IOP was rechecked after 1 hour, followed by oral acetazolamide 250 mg BD for 3 days. These details of management are presented in Table 2.

As to outcomes, most patients (*n* = 275, 99.3%) were discharged on the same day and only 2 patients (0.7%) required further surgical intervention (Fig. 5).

Discussion

In general, a POD1 review serves several roles. These include screening for treatable early postoperative complications, patient education on postoperative care and eye drops instillation, and patient reassurance, as well as to provide feedback to the surgeon.[2] Streamlining follow-up may release limited resources but is only desirable if standards of care are maintained. Hence, we aimed to examine the necessity of this review concerning the first of these roles.

According to the Cataract National Dataset of the United Kingdom, the most common postoperative complications were corneal oedema, striae, and Descemet's membrane folds (5.18% cases), followed by postoperative uveitis (3.29%), IOP above 21 mmHg (2.57%), cystoid macular oedema (1.62%), and posterior capsule opacification (1.22%).[3] In our centre, the commonest complication was corneal oedema, which was similar to the United Kingdom dataset, followed by raised IOP. In contrast, cystoid macula oedema, intraocular lens dislocation, wound leak, choroidal effusion/haemorrhage, hyphema, hypopyon/endophthalmitis, toxic anterior segment syndrome, retinal tear/detachment, or vitreous haemorrhage did not occur in our group on POD1. Since our centre is an ophthalmology training centre, most cataract surgeries were performed by trainees under the guidance and supervision of an ophthalmologist. The rate of complications such as corneal oedema and retained soft lens matter/fibres/viscoelastic were higher among trainees due to a lack of experience in performing phacoemulsification.

IOP spikes after cataract surgery are thought to be self-limiting, peaking at approximately 6 hours, and may be more common in glaucoma patients. The risk of anterior ischemic optic neuropathy, other vascular events, and field progression in glaucomatous patients is of concern during this period, although the actual incidence appears low. Treating elevated IOPs persisting at the first follow-up may only marginally alter this risk as the pressure is likely to have developed soon after surgery and been high for several hours. Elevated IOP is not consistently associated with pain or blurring, so self-referral in the absence of routine review may miss cases. Ideally, the pressure spike can be diminished although prophylaxis does not appear to be uniformly successful.

The risk factors for IOP spikes following PCS include residual viscoelastic material, resident-performed surgery, glaucoma, pseudoexfoliative syndrome, axial length

greater than 25 mm, tamsulosin intake, and topical steroid application in steroid responders. Postoperative anterior chamber inflammation might also result in an early IOP increase. A POD1 follow-up visit can be safely switched to a postoperative review 4 to 6 hours on the day of surgery, as any IOP elevation that will occur typically reaches its highest peak at just a few hours postoperatively. The IOP typically peaks at 3 to 7 hours postoperatively and remains increased during the first 24 hours after surgery. The raised IOP is usually transient and does not influence the long-term quality of vision, although IOP spikes are potentially more dangerous in eyes with pre-existing optic nerve damage, such as in patients with glaucoma or atherosclerosis-related ischemia.

Occasionally, a patient with a pressure of 40 to 50 mmHg will experience pain and perhaps nausea, resulting in dissatisfaction with the surgery or a phone call to the surgeon in the middle of the night. Several topical IOP-lowering agents have been evaluated, but none to date have completely prevented the occurrence of IOP spikes.

Raised IOP can be a result of trabecular meshwork obstruction by retained ophthalmic viscoelastic device, vitreous in the anterior chamber, inflammatory cells, or pigment dispersion related to excessive intraocular manipulations.[3] The retained soft lens matter might result in increased IOP, uveitis, corneal oedema, cystoid macula oedema, or retinal detachment.[3]

The other complications seen in our series are likely self-limiting, without deviation from standard treatment, or producing symptoms provoking self-referral. Shorter-acting local anaesthetic agents or topical anaesthesia may reduce the rate of corneal abrasion through the earlier recovery of corneal sensation. Endophthalmitis is not usually apparent before 48 hours postoperatively, even when caused by virulent organisms. Therefore, its detection is unlikely to be affected if follow-up procedures are changed. A small number of potentially sight-threatening complications were recognized in this unselected population at a rate comparable to those of other reports.

A study done by Tan *et al.* suggested that POD1 hospital visits may be safely managed by a nurse-administered telephone questionnaire. In their study, only 1 of 238 patients reported a poor general condition and was asked to return for a clinic review on POD1.[4] Hence, it is safe to conclude that rather than a POD1 review, a postoperative review of 4 to 6 hours on the same operative day is sufficient enough. The use of appropriately trained nonmedical practitioners also provides an alternative means of review by reducing the demand for physician time.

The limitations of this audit were its short duration and small sample size. The duration of this audit was only four months as compared to other published clinical audit data. Another limitation was improper and missing documentation of POD1 review regarding complications and IOP.

Conclusion

There is no evidence to eliminate a 24-hour postoperative follow-up after a complicated surgery. However, routine POD 1 follow-up following uneventful phacoemulsification could be safely substituted by a postoperative review within 4 to 6 hours of the surgery, which could result in significant health care savings without compromising patient safety. It is advised that patients experiencing any issues should be seen in the postoperative period at a low threshold. Doing this can reduce workload and demands on clinician time and the corresponding accrual of staffing and financial resource benefits, while patients can indirectly save nonmedical costs such as transport and accommodation, as well as reduce burden and inconvenience on their family members.

Declarations

Ethics approval and consent to participate
This is a retrospective study of the medical records of patients in day-care operation theatre, University Malaya Medical Centre from September 2020 to December 2020. This study adhered to the tenets of the Declaration of Helsinki.

Competing interests
The authors declare no conflicts of interest with respect to the publication of this article.

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