

Visual outcomes in the management of dropped nucleus without using the fragmatome

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Abstract

Background: Phacoemulsification (Phaco) and intraocular lens implantation is the commonest surgical practice for the treatment of cataract. Posterior capsular rupture and dropping the nucleus into the vitreous is one of the less common but sight threatening complication of phacoemulsification. Trans pars plana posterior vitrectomy (TPPV), removal of the dropped lens fragments and insertion of an intraocular lens is the preferred treatment option for the above complication. The intraocular lens may be placed in the sulcus where capsular ring is intact or scleral fixation is done in the case of absent capsular ring.

Methodology: This study is a retrospective review of patients who had TPPV, removal of the lens fragments through the corneal incision using torsional phaco hand piece and sulcus insertion of multipiece intraocular lens (IOL) as the treatment for dropped lens fragments complicating cataract surgery at Nawaloka Hospitals PLC, Colombo, Sri Lanka. Forty four consecutive patients who underwent TPPV from January 2018 to December 2019 have been studied. The notes on the medical records at the initial presentation, second and eighth week post vitrectomy records were reviewed.

Results: Forty four patients were reviewed within the 24-month period. There were 30 (68.2%) males and 14 (31.8%) females. All the patients were operated within a week after phacoemulsification. The best corrected visual acuity was 6/9 or better in 33 (75%) eyes at two weeks and 8 weeks post-surgery. There were no major complications observed in the series.

Conclusion: Dropped nucleus following phacoemulsification can be managed by removal of the lens through the corneal incision using phaco handpiece with good visual outcomes.

Introduction

Phacoemulsification and intraocular lens implantation is the most common surgical procedure performed for the treatment for cataract extraction. Posterior dislocation of lens fragments into the vitreous is a relatively uncommon complication of cataract

surgery, but it is potentially sight threatening. Retained lens fragments in the vitreous may cause poor visual outcome because of elevated intraocular pressure (IOP), uveitis, rhegmatogenous retinal detachment (RRD), and other sequelae¹⁻⁵. The reported incidence of dropped nucleus ranges between 0.3% and 1.1%^{6,7}. Smaller pieces of lens fragments are generally managed with conservative approach. Larger pieces usually require surgical removal^{8,9}. Trans pars plana vitrectomy and release of vitreous adhesions from the dropped nucleus, followed by removal of the dislocated lens fragments using a phacofragmatome or vitrectomy probe is the most effective solution¹⁰. Most eyes with retained lens fragments generally do well after vitrectomy, with the majority recovering with good visual outcome^{1,11}.

However, some complications leading to poor outcome have been found to occur in patients with posterior dislocated lens fragments especially when attempts were made to retrieve the lens fragments causing vitreous traction^{2,8}. The cumulative rate of retinal detachment before or during vitrectomy and after vitrectomy from previous reports is 15.6%^{12,13}. Vilar et al reported a combined rate of retinal detachment of 17.5% in their study¹⁰. This study aimed to evaluate the visual outcomes of PPV, removal of the dropped nucleus and sulcus insertion of multipiece intraocular lens (IOL) for the treatment of posterior dislocated lens fragments after phaco surgery.

Study design

The study is a hospital-based retrospective review covering a 24-month period from January 2018 to December 2019. The place of the study is Nawaloka Hospital Plc. Colombo, Sri Lanka. Nawaloka Hospitals Plc is one of the largest private hospitals in Colombo, the capital city of Sri Lanka. It is a multidisciplinary hospital and accredited by Joint Commission International. It is equipped with a complete ophthalmology unit which has other subspeciality facilities including vitreoretinal services.

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Study population

All the patients who underwent TPPV and sulcus insertion of multipiece IOL (Sensor 3-Piece IOL, Johnson and Johnson Surgical Vision Inc) for posterior lens dislocation following Phaco from January 2018 to December 2019 were reviewed retrospectively. Patients with iris damage, slit-lamp detectable corneal oedema, pre-existing diabetic retinopathy, any other macular pathology and history of poor vision other than refractive errors before cataract were excluded from the sample.

Data collection

The operating theatre records were searched for all patients who underwent TPPV for dropped nucleus from January 2018 to December 2019. The patient record numbers of these patients were obtained from the operating theatre registry and traced the records. All the records of the patients who fulfilled the inclusion criteria were enrolled in the study. The information retrieved from the case notes included the age and gender of the patients, the ocular features at presentation. The visual acuity, intraocular pressure, cornea edema, presence of anterior chamber activity, the lens status. presence of vitritis and posterior segment findings (retinal detachment, choroidal detachment, macular oedema) were corded and entered in an excel sheet. The data at the presentation, second week post op and eight week post op were transferred to the spread sheet.

Surgical procedure

Standard three-port 23G PPV was carried out in all the patients. The vitrectomy was performed using Constellation® vitrectomy machine (Alcon International, CA). Small nuclear fragments were cut and aspirated using the vitrectomy cutter. Larger nuclear fragments were lifted up with 25G microvitrector into the anterior chamber and removed using torsional phacoemulsification through 2.2 mm incision. The corneal endothelium was protected during phacoemulsification using dispersive (Viscoat-Alconophthalmic Viscosurgical Device) and cohesive (Appavisc-Appasamy Ocular Device Pvt. Ltd. respectively) viscoelastic solutions. Peroperative intravitreal triamcinolone acetone was used in all cases for complete vitrectomy. There was no triamcinolone left in the eye at the end of the surgery. Follow-up of at least two months was provided for all the patients reviewed. TPPV has been done in all patients within one week of post phacoemulsification.

Ethical clearance was obtained from the Ethical Review Committee of Nawaloka Research and Educational Unit, Nawaloka Hospitals Plc, Colombo, Sri Lanka.

Data analysis: Data were analyzed using R-version 4.0.0 statistical software. Frequency tables, mean and standard deviation values were generated.

Results

A total of 44 patients were identified to have undergone PPV for dropped nucleus following cataract surgery during the period under review. There were 14 (31.8%) females and 30 (68.2%) males. The average age of the patients was 69.7 years. Their ages ranged from 42 to 93 years (Table 1). All the patients have been referred within three days of the attempted phaco.

Table 1. Age and the gender distribution of the patients

<i>Gender</i>	<i>Frequency</i>	<i>%</i>
Male	30	68.2
Female	14	31.8
Age range		
≥42- <50	5	11.4
≥ 50- <60	4	9.1
≥ 60- <70	12	27.3
≥ 70- <80	13	29.5
≥ 80- <90	9	20.5
≥ 90	1	2.3

Evaluation of the patients at presentation showed initial best corrected visual acuity (BCVA) better than or equal to 6/60 in 29 (65.9%) of the patients. The anterior chamber lens matter was present in 09 (20.5%) of the patients. Intraocular pressure (IOP) was measured as greater than 20 mmHg by applanation tonometer in 18 (40.9%) of the patients (Table 2). All 44 patients were on acetazolamide 250 mg twice a day post phaco surgery as a usual practice by the general surgeons who referred the patients.

Table 2. Distribution of patients by raised intraocular pressure

<i>IOP (mmHg)</i>	<i>Frequency</i>	<i>%</i>
<20	26	59.1
≥20- <25	9	20.5
≥ 25- <30	5	11.4
≥ 30	4	9.1

Thirty six patients (81.8%) had lens fragments larger than one third of the lens while four patients (09.1%) had complete lens in the vitreous due to blow out capsular rupture during hydrodissection (Table 3).

Table 3. Distribution of patients by size of the nuclear fragment dropped into the vitreous

Size of the lens fragment	Number of patients	Percentage
Complete lens dislocation	4	9.1
More than 1/3 of the lens dropped	36	81.8
Less than 1/3 of the lens dropped	04	9.1

The mean BCVA of the patients improved significantly after PPV, which is consistent with previous reports¹⁴⁻¹⁶. The final best corrected visual acuity was 6/9 or better in 72.7% of the eyes (Table 4). There is no statistically significant difference of the visual acuity of patients at the six weeks and three months postoperatively. There were no major post vitrectomy complications in the series.

Table 4. Post operative best corrected visual acuity at 6 weeks and 6 months

Visual acuity	2 weeks	%	8 week	%
≥ 6/9	32	72.7	33	75.0
<6/9- ≥6/18	11	25.0	10	22.7
<6/18- ≥ 6/60	01	2.3	01	2.3

Discussion

TPPV is the preferred management for dropped nucleus after complicated cataract surgery. The commonly practiced surgical technique is to remove the lens fragments using the fragmatome. In this study, I have removed the lens fragments through the phaco incision without extending the corneal incision. The corneal endothelium was protected using viscoelastic surgical devices.

The mean BCVA in the study sample improved significantly after PPV, which is better than the previous reports^{13,15}. This may be due to selection bias

as there were no anterior segment complicated patients included in the sample. The early referral of the patients by the general ophthalmologists not only allowed the surgical intervention faster but also made the vitrectomy easier as there was no significant inflammation at the time of the surgery. Some researchers found that delayed vitrectomy correlated with poor visual outcome¹⁵ and was associated with higher ocular complication rates¹⁷.

In previous studies, using a fragmatome to remove retained lens fragments was associated with a significantly worse visual outcome as well as an increased risk of RRD^{18,19}. In the current study, the visual acuity was increased and no RRD seen. There was no clinically detectable macular edema post operatively during the period studied.

The levated IOP (≥25 mmHg) was detected in 9 eyes (16.7%) at presentation. This complication has been reported in 25%-52% in other series^{1,19,20}. The lower incidence of raised intraocular pressure in the current study may be due to use of acetazolamide and the early presentation for PPV.

Conclusion

Dropped nucleus following phacoemulsification can be managed with better visual outcome with early pars plana vitrectomy and sulcus insertion of multipiece intraocular lens. Removal of the lens fragments through the corneal incision using phaco instruments is a safe alternative method to fragmatome inside the vitreous cavity. This may lead to reduced post operative cystoid macular edema.

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