

Intravitreal Phacoemulsification Using Torsional Handpiece for Retained Lens Fragments

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Abstract

Purpose: To evaluate the results of intravitreal phacoemulsification with torsional hand piece in eyes with posteriorly dislocated lens fragments.

Methods: In this prospective, interventional case series, 15 eyes with retained lens fragments following phacoemulsification were included. All patients underwent standard three-port pars plana vitrectomy and intravitreal phacoemulsification using sleeveless, torsional hand piece (OZiL™, Alcon's Infiniti Vision System). Patients were followed up for a minimum of six months to evaluate the visual outcomes and complications.

Results: The preoperative best-corrected visual acuity (BCVA) ranged from light perception to 0.3. No complications such as thermal burns of the scleral wound, retinal damage due to flying lens fragments, or difficult lens aspiration occurred during intravitreal phacoemulsification. Mean post-operative BCVA at the final follow-up was 0.5. Two eyes developed cystoid macular edema, which was managed medically. No retinal detachment was noted.

Conclusion: Intravitreal phacoemulsification using torsional hand piece is a safe and effective alternative to conventional longitudinal phacofragmentation.

Keywords: Phacoemulsification; Cataract; Vitrectomy

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INTRODUCTION

Dislocation of lens nucleus or lens fragments into the vitreous cavity during phacoemulsification is an uncommon, but potentially sight threatening complication. It has been reported in up to 0.1% to 1.5% of cataract surgeries.^[1,2] Retained fragments may result in severe intraocular inflammation, rise in

intraocular pressure (IOP), and corneal edema. If not treated promptly, they may lead to cystoid macular edema (CME) and retinal detachment (RD).

Pars plana vitrectomy (PPV) with phacofragmentation is the preferred modality of treatment of dislocated lens fragments.^[3,4] With availability of modern fragmentomes, the majority of cases can be managed successfully with satisfactory visual and anatomical results. However, the fragment tip with its axial movements tends to repel lenticular fragments during surgery, and the projectile nature of such a fragment may damage retina resulting in permanent visual loss. Perfluorocarbon liquids (PFCL) are an excellent adjunct to the surgery for prevention of this damage. But use of PFCLs raises

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the cost of surgery as well as total duration of surgery,^[5] and retained PFCL bubbles are associated with various complications.

Since torsional phacoemulsification has lesser repulsive action on nuclear pieces, we conducted this study to evaluate the efficacy of torsional hand piece in the management of posteriorly dislocated lens fragments.

METHODS

This was a prospective interventional case series that included 15 eyes with retained lens fragments following phacoemulsification for cataract. All eyes eligible for pars plana vitrectomy were included in the study. Eyes with concomitant RD were excluded from this study. Eyes with uveitis, raised IOP, or corneal edema were treated medically with topical steroids and anti-glaucoma medications to allow adequate posterior segment visualization before posting the patient for surgery.

A single surgeon performed all the surgeries (VK). The surgical technique included standard 20-gauge pars plana vitrectomy. Following adequate vitrectomy, a posterior vitreous detachment was induced, and the nuclear fragments were freed of all vitreous adhesions. Intravitreal phacoemulsification was then carried out using sleeveless, torsional hand piece (OZiL™, Alcon’s Infiniti Vision System). Phacoemulsification parameters included aspiration flow rate of 30 mmHg, vacuum of 150 mmHg, and torsional ultrasound power of 50%. The power was then adjusted according to the hardness of the retained lens fragments. Following this, a thorough retinal periphery examination was performed to rule out retinal breaks. PFCL was not used in any of the cases. Intraocular lens was implanted in the same sitting, in the

ciliary sulcus over the anterior capsule if capsulorhexis margin was intact or in the anterior chamber if there was no capsular support.

All eyes were followed up for a minimum of six months following surgery with regards to best-corrected visual acuity (BCVA), IOP (Goldmann applanation tonometry), and spectral domain optical coherence tomography (SD-OCT) to evaluate CME. In addition, special emphasis was given to the scleral port sites for burns or necrosis. The study was conducted in accordance with the Declaration of Helsinki.

RESULTS

Mean age of the patients was 58.2 years (range: 48-72 years). Ten female and 5 male patients were included in this study. The patients’ demographic characteristics are described in Table 1. While 6 eyes underwent this procedure in the same sitting as the cataract surgery, the rest of the eyes were operated 3-14 days (mean 4.2 days) after the primary surgery. Pre-operative BCVA ranged from light perception to 0.3, and mean postoperative BCVA was 0.5. Mean follow-up period was 8 months with a range of 6 to 12 months. No intraoperative difficulty was encountered in levitating the nuclear fragments or their emulsification in any case. No case developed retinal breaks, and no burns were noted at the sclerotomy sites.

Postoperatively, none of the eyes developed RD during the minimum follow-up period of 6 months. Two patients developed CME that was successfully managed with medical therapy in the form of topical Ketorolac Tromethamine drops (0.4%).

Table 1. Patients’ demographic data

Age	Sex	Timing of surgery*	Preoperative BCVA†	Intraocular lens	Final BCVA	Complication
55	Female	6	LP	AC IOL	0.33	-
60	Female	5	LP	AC IOL	0.5	-
63	Female	7	LP	Sulcus	0.16	CME
52	Male	6	LP	AC IOL	0.67	-
63	Male	7	HM	AC IOL	0.67	-
70	Female	12	LP	AC IOL	0.5	-
48	Male	14	LP	AC IOL	0.25	-
59	Female	4	LP	AC IOL	0.5	-
60	Female	3	HM	Sulcus	0.67	-
54	Male	0	0.1	Sulcus	1	-
64	Female	0	0.1	AC IOL	0.67	-
57	Female	0	0.33	Sulcus	0.5	-
54	Male	0	0.25	Sulcus	0.1	CME
55	Female	0	0.16	Sulcus	0.67	-
59	Female	0	0.1	Sulcus	0.5	-

*According to the days after primary surgery; †Best corrected visual acuity. AC IOL, anterior chamber intraocular lens; Sulcus, posterior chamber intraocular lens over the remnants of anterior capsule in the ciliary sulcus; CME, cystoid macular edema; LP, light perception; HM, hand motion

DISCUSSION

Torsional phacoemulsification is an innovative technology which involves side-to-side movement of the phacoemulsification tip rather than conventional longitudinal movements.^[6,7] It is known that eliminating longitudinal repelling forces at the phaco tip dramatically improves the follow-ability and reduces the chatter of the fragments.^[8] This results in enhanced efficacy and safety. This property of torsional hand piece prompted us to use it for intravitreal phacoemulsification for retained lens fragments.

In this prospective interventional case series of 15 patients, all eyes underwent intravitreal phacoemulsification with torsional hand piece successfully. This technique has previously been reported to be safe in a series of 12 and comparative series of 17 patients.^[9,10] In our study, no intraoperative difficulties were encountered in any case. In fact, due to less repulsive action of torsional hand piece, the phacoemulsification tip remained occluded with the fragments for a greater time. This decreased the need to repeatedly pick up the fragments from the retinal surface and hence shortened the duration of the surgery. The surgeon did not feel the need for excessive maneuvers and repeated suction "to catch the flying lenticular fragments". No scleral burns were recorded at the time of the sclerostomy closure and no post-operative scleral necrosis was noted in any case. Such changes can affect postoperative astigmatism and stability of ocular surface.^[9]

Fourteen of the 15 patients in our study group had improved BCVA post operatively. Eleven of these 14 patients (78%) had final BCVA better than 0.5. Three of these 14 patients with final BCVA less than 0.5 had preexisting nebular corneal opacities in the visual axis. One patient developed a drop of BCVA from 0.25 to 0.1 because of the onset of diabetic maculopathy following the surgery. Since the torsional hand piece has a relatively smaller length than the conventional phaco fragmentome tip, it may be difficult to reach the posterior pole to lift up the lens fragments especially in lengthy myopic eyes.^[9] However, we did not encounter such difficulty in our cases. It is known that torsional phacoemulsification is safer than conventional longitudinal emulsification for corneal endothelium.^[8] Whether less ultrasonic power is beneficiary for the RPE or neurosensory retina remains to be established.

To summarize, intravitreal phacoemulsification with torsional hand piece is a safe and effective technique for retained lens fragments. This can be incorporated into the commercially available fragmentomes to make the results of pars plana vitrectomy with phaco fragmentation more rewarding.

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Nil.

Conflicts of Interest

There are no conflicts of interest.

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