

Results of vitrectomy performed at the time of phacoemulsification complicated by intravitreal lens fragments

Toshiyuki Kageyama, Masahiko Ayaki, Miki Ogasawara, Chihiro Asahiro, Shigeo Yaguchi

Abstract

Aim—To evaluate outcome of vitrectomy performed at the time of phacoemulsification complicated by intravitreal lens material.

Methods—Clinical records associated with consecutive 8536 phacoemulsification procedures were reviewed retrospectively.

Results—17 (0.20%) eyes had a posterior capsule rupture with retained lens material in the vitreous cavity that required vitrectomy. Final visual acuity was 0.5 or better in 14 eyes (82%) and 0.4 to 0.1 in three eyes (18%). Retinal detachment occurred in one eye during vitrectomy and two after the surgery. Cystoid macular oedema was observed in two eyes and none developed glaucoma. The corneal endothelial cell loss was 5.7% (SD 6.8 %) (n=15) at 3–6 months postoperatively.

Conclusions—Combined vitrectomy and intraocular lens implantation at the time of phacoemulsification complicated by intravitreal lens material is an option to be considered to reduce the risk of postoperative complications including secondary glaucoma and corneal endothelial cell damage.

(Br J Ophthalmol 2001;85:1038-1040)

Dislocation of crystalline lens fragments into the vitreous cavity is an uncommon but potentially serious complication of cataract surgery. It can lead to marked intraocular inflammation resulting in cystoid macular oedema, vitreous opacification, glaucoma, and retinal detachment.¹⁻⁶ For the purpose of reducing the further ocular damage, since 1992 we have routinely converted to three port vitrectomy in such case.

The first purpose of present study was to estimate the incidence of complicated phacoemulsification and aspiration (PEA) which needed vitrectomy to remove lens fragments in the vitreous; secondly, to evaluate intraoperative and postoperative complications and visual outcome after the procedure.

Patients and methods

We retrospectively reviewed the operative records of consecutive patients who underwent PEA from 1 June 1992 to 31 December 1999 at University of Showa, Fujigaoka Hospital, using computerised electronic databases. A total of 8536 PEA procedures were performed during the study period and 17 (0.20%) were combined with vitrectomy for removal of lens material. All eyes had a large fragment of lens

material in the vitreous cavity at least one third the size of the nucleus. A total of 7295 surgeries were performed by 11 senior surgeons who were very experienced in vitrectomy. Others were by 21 ophthalmological trainees. Surgical procedures of vitrectomy included three port pars plana vitrectomy, three port pars plana vitrectomy with phacofragmentation, or three port limbal based vitrectomy. In the case of trainee operators, vitrectomy was performed by the senior surgeon who was to be available any time in the operating theatre.

The imaging of the corneal endothelium was used for detailed evaluation of surgical intervention. The images were recorded with a specular microscope (SP-8000, Konan Co, Hyogo, Japan), and the density of endothelial cells was analysed both before and 3–6 months after the operation. We compared the results of the study group with that of control cases, 115 consecutive patients who underwent PEA only. The Mann-Whitney U test was used for statistical analysis.

Results

Seventeen eyes undergoing PEA followed by vitrectomy for intravitreal lens material were entered into the study. Twelve (0.16%) of 7295 PEA were by senior surgeons, and five (0.40%) of 1241 were by ophthalmological trainees. Clinical features and details of each case are summarised in Table 1. The average age was 71 years (range 49–90) and the mean follow up period was 11 months (range 3–40). Three port pars plana vitrectomy was performed in 12 patients (71%) and three port limbal based vitrectomy in five (29%). A posterior chamber intraocular lens (IOL) was implanted primarily in 16 eyes (94%). Intraoperative complications—that is, iatrogenic retinal tear, occurred in two eyes (12%), proceeding to retinal detachment in one case (case 5).

Postoperative complications occurred in six eyes (35%) (Table 1). Two eyes developed retinal detachment, one (case 7) at 2 months after operation and the other (case 8) at 12 months. Although retinal reattachment surgery was successful in both cases, visual acuity worsened in patient 8 as a result of previous macular detachment and proliferative vitreoretinopathy. Cystoid macular oedema was observed in two eyes (cases 14 and 16). Both failed to achieve improvement of visual acuity. One eye (case 15) had IOL dislocation 4 months after the operation, requiring scleral fixation of the IOL. A slight elevation of intraocular pressure up to 27 mm Hg occurred in two eyes (cases 5 and

Department of Ophthalmology, Fujigaoka Hospital, Showa University School of Medicine, Yokohama, Japan

T Kageyama
M Ayaki
M Ogasawara
C Asahiro
S Yaguchi

Correspondence to: Toshiyuki Kageyama, MD, Department of Ophthalmology, Showa University School of Medicine, Fujigaoka Hospital, 1-30 Fujigaoka, Aoba-ku, Yokohama 227-8501, Japan
tkageyama8@aol.com

Accepted for publication 2 April 2001

Table 1 Preoperative data and intraoperative and postoperative complications for eyes with intravitreal lens materials

Case	Age/sex	Preoperative visual acuity*	Final visual acuity*	Preoperative ocular comorbidity	Dislocated lens material	Lens removal method	IOL implantation	Intraoperative and postoperative complications
1	72/M	0.3	0.6		Nucleus	PPV	Suture	
2	66/F	0.2	1.0		Cortex	PPV	Insertion	
3	75/F	0.06	1.2		Cortex	LV	Insertion	
4	61/F	0.08	0.9	Posterior lenticonus	Nucleus	PPV	Insertion	Retinal tear†
5	90/M	0.01	0.6		Nucleus	PPV, Fragmatome	—	RD†, OHT‡
6	82/F	0.4	1.0	DMR	Nucleus	PPV, Fragmatome	Suture	
7	58/M	0.4	1.0	Posterior lenticonus	Nucleus	PPV	Insertion	RD‡
8	80/M	0.5	0.1		Cortex	LV	Insertion	RD‡
9	74/F	0.6	1.0		Cortex	PPV	Insertion	
10	65/F	0.3	1.0		Cortex	PPV	Insertion	
11	50/M	0.7	1.2		Cortex	PPV	Insertion	
12	71/F	0.5	1.0		Cortex	LV	Insertion	
13	87/F	0.1	1.0	Small pupil	Cortex	LV	Suture	
14	68/F	0.6	0.6		Nucleus	LV	Insertion	CMO‡
15	49/M	0.2	0.9		Nucleus	PPV	Insertion	Luxation of IOL‡
16	68/M	0.4	0.2	Small pupil, DMR	Nucleus	PPV	Insertion	CMO‡, OHT‡
17	87/M	0.01	0.4		Cortex	PPV	Suture	

DMR = diabetic retinopathy; PPV = three port pars plana vitrectomy; LV = three port limbal based vitrectomy; suture = intraocular lens (IOL) sutured to sclera; insert = IOL placed upon anterior capsule; RD = retinal detachment; PC = photocoagulation; CMO = cystoid macular oedema; OHT = ocular hypertension within 1 week after operation.

*Decimal.

†Intraoperative complications.

‡Postoperative complications.

16). Both were well controlled with medication and it was discontinued within a week.

Corneal endothelial cells were counted in 15 eyes (88%). The endothelial cell loss in the complication and no complication groups were 5.7% (SD 6.8%) and 5.3% (7.4%), respectively; the difference was not statistically significant ($p=0.7664$). Final visual acuity was 0.5 or better in 14 eyes (82%), and 0.4–0.1 in three eyes (18%).

Discussion

The incidence of dislocation of lens fragments into the vitreous cavity during PEA was 0.20% in the present study, in accord with previous reports.^{7,8} Postoperative retinal detachment was observed in two patients (12%) in our series. The cumulative rate of retinal detachment after vitrectomy for retained lens fragments was calculated as 9% (56/616) by Monshizadeh *et al.*⁹ Our results confirmed considerable risk of retinal detachment even when the fragments were removed at the time of PEA.

Postoperative cystoid macular oedema, reported to occur in up to 27% in patients undergoing vitrectomy with retained intravitreal lens material,^{1–4,6} developed in two (12%) of our patients (Table 2). Secondary glaucoma, reported in 13–41% in patients undergoing

vitrectomy to remove lens fragments,^{1,2,4,6} did not develop in any of the eyes that we treated (Table 2). Kim *et al* also reported that glaucoma did not develop in any of their eight patients undergoing vitrectomy at the time of cataract surgery.² Our ability to minimise incidence of secondary glaucoma supports previous reports concluding that early vitrectomy can lower the risk of secondary glaucoma.^{6,10,11} Visual prognosis was also favourable compared to those in previous reports (Table 2). In our group only two eyes had pre-existing posterior segment diseases such as diabetic retinopathy, which may explain in part our success in converting from PEA to vitrectomy.

Corneal endothelial cell damage in eyes undergoing vitrectomy for intravitreal lens material has not been previously studied to our knowledge. There was no statistically significant difference between the complication and no complication groups although eyes with complicated PEA and vitrectomy are supposed to have more corneal endothelial cell damage than those with uncomplicated surgery owing to excessive intraocular manipulations.

In summary, the incidence of postoperative complications was no greater than in earlier studies and no patients developed glaucoma. Corneal endothelial cell loss was slight, similar to that with PEA only. Our results showed better consequence, indicating the possible advantage of primary vitrectomy to prevent them by removing the retained lens material which may cause persistent uveitis.^{2,6,10,11} Being retrospective, our study was not conclusive. None the less our results suggest simultaneous vitrectomy with careful manipulation may be beneficial to minimise the complications caused by retained lens material. Fewer floaters and eliminating the need for two separate operations are also to the patients' advantage. Hence, when vitreoretinal surgeons are readily available, we recommend that simultaneous vitrectomy with IOL implantation at the time of PEA complicated by intravitreal lens material.

Table 2 Visual results and postoperative complications for reported patients with retained lens fragments

Series	Year	No of eyes	Visual acuity	Retinal detachment	Cystoid macular	Secondary
			20/40 or better	after vitrectomy	oedema	glaucoma
			No (%)	No (%)	No (%)	No (%)
Gilliland ¹	1992	56	28 (50)	4 (7)	3 (5)*	14 (25)§
Kim ²	1994	62	42 (68)	2 (3)	7 (11)	8 (13)¶
Borne ³	1996	121	82 (68)	11 (9)	4 (3)†	—
Margherio ⁴	1997	126	56 (44)	13 (10)	34 (27)	32 (25)§
Yeo ⁶	1999	22	13 (59)	1 (5)	0 (0)	9 (41)‡
Current study	2001	17	14 (82)	2 (12)	2 (12)	0 (0)

*Includes only patients with visual acuity 20/200 or worse.

†Includes only patients with visual acuity counting fingers or worse.

‡Intraocular pressure (IOP) >20 mm Hg.

§IOP >25 mm Hg.

¶IOP >30 mm Hg.

None of the authors has a financial or proprietary interest in any material or method mentioned.

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Br J Ophthalmol 2001 85: 1038-1040

doi: 10.1136/bjo.85.9.1038

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