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Long-Term Prognosis of Extracapsular Cataract Extraction and Intraocular Lens Implantation in Diabetic Patients

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Abstract: Although cataract extraction with intraocular lens implantation (IOL) is being used for increasing numbers of patients, there is still insufficient information regarding the long-term outcome for these patients. In this retrospective study of 140 eyes of 102 patients, 97 eyes (69%) achieved a best visual acuity of 20/40 or better. After a minimum 6-month postoperative period, 26 eyes (19%) had developed retinopathy: eight eyes progressed from nonproliferative to proliferative retinopathy. Glycosylated hemoglobin levels and fasting blood glucose were significantly higher at time of surgery in the eight that progressed than in those who did not ($P = 0.002$, $P = 0.034$). There were 65 unilateral IOL implantations; in 10 (15%) of these eyes, retinopathy progressed. Retinopathy also progressed in 70% of the fellow eyes of these patients. In patients whose retinopathy did not progress, 95% of the fellow eyes also showed no progression. Also, patients with progression in the pseudophakic eye frequently had progression in the fellow unoperated eye. Postoperative progression was symmetrical ($P = 0.0001$). Our analysis suggests that progression of diabetic retinopathy following IOL implantation can be correlated to diabetic control at the time of surgery. **Jpn J Ophthalmol 1997;41:319–323** © 1997 Japanese Ophthalmological Society

Key Words: Diabetic retinopathy, extracapsular cataract extraction, intraocular lens implantation.

Introduction

When cataract extraction with intraocular lens (IOL) implantation was introduced, diabetes was considered to be a contraindication. Subsequent studies encouraged use of the procedure for diabetic patients, indicating that it provided good visual rehabilitation, and that laser photocoagulation could also be used, as necessary, after surgery.[1–10] Some studies, however, warned of a high incidence of intraoperative and/or postoperative complications, and of postoperative progression of retinopathy.[1,3,7,8,10–21] We, therefore, made a retrospective study of 140 eyes of diabetic patients with extracapsular cataract extraction (ECCE) and posterior chamber IOL implantation who were treated in our clinic and followed for at least 6 months after surgery to evaluate the effectiveness of this procedure in diabetic patients.

Materials and Methods

We reviewed the records of 102 non–insulin-dependent diabetic patients (140 eyes) who had had ECCE with posterior chamber IOL (polymethyl methacrylate [PMMA]) implantation between January 1989 and June 1993. They were followed for a minimum of 6 months after surgery. Although we primarily selected patients without diabetic retinopathy, or with background retinopathy, we also accepted those with preproliferative or proliferative diabetic retinopathy that could be controlled with preoperative and/or postoperative laser photocoagulation. Study patients included 44 men and 58 women, 43–94 years old (mean: 68.6), with an average 12.5-year (± 9.3 years) history of diabetes. At the time of surgery, glycosylated hemoglobin (HbA1c) levels were 5.3–11.8% (mean: 7.1%).

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Table 1. Intraoperative Complications and Fixation of Intraocular Lens

Preoperative Stage of Diabetic Retinopathy (Number of Cases)	Rupture of Posterior Capsule	Fixation of Intraocular Lens			
		In Bag	Out of Bag	Suture	Unknown
None (83)	9	72	7	1	3
Background (42)	7	35	4	0	3
Preproliferative (3)	0	3	0	0	0
Quiescent Proliferative (19)	1	9	0	0	0
Active Proliferative (3)	0	3	0	0	0

All patients had been examined ophthalmoscopically: fluorescein angiograms were obtained where indicated. Five stages of diabetic retinopathy (DR) were identified: none, background (BDR), preproliferative (PPDR), quiescent proliferative (quiescent PDR), and active proliferative (active PDR). Quiescent PDR was defined as PDR managed by panretinal photocoagulation with new vessel regression and no further neovascularization at the 6-month follow-up examination. Active PDR was defined as PDR requiring panretinal photocoagulation for regression of new vessels on the optic disc and/or retina. Table 1 shows details of intraoperative complications and the fixation of IOL.

Postoperative diabetic retinopathy was evaluated by ophthalmoscopy and also with fluorescein angiography, if indicated. Diabetic retinopathy progression was identified as (1) postoperative, but not preoperative, retinopathy; (2) preexisting PDR with postoperative aggravation of the nonproliferative changes with or without the occurrence or aggravation of macular edema, or, development of PPDR or PDR; (3) preexisting PPDR showing proliferative changes; or (4) PDR and postoperative aggravation of proliferative changes or development of macular edema. Postoperative observation ranged from 6 to 58 months (mean: 19.9).

Eyes were classified into two groups: group 1 consisted of 26 eyes with diabetic retinopathy that progressed postoperatively; group 2 consisted of 114 eyes with diabetic retinopathy that did not progress postoperatively. Analysis of these groups indicated factors that contributed to the postoperative progression.

Results

Figure 1 gives the preoperative and most recent postoperative, best corrected visual acuity. Of the 140 eyes, 97 (69%) attained visual acuity of 20/40 or better and 12 (9%) attained 20/200 or worse. In 119 eyes (85%), there was an improvement of at least 2 Snellen lines at the most recent visit (Table 2). In seven eyes (5%), there was reduced visual acuity of at least 2 Snellen lines at the most recent visit; four of these had macular edema, two had vitreous hemorrhage.

Some form of postoperative complication occurred in 92 eyes (Table 3); fibrin formation in 64 (46%); transient elevation of IOP in 26 (19%); irregular pupil in 31 (22%); vitreous hemorrhage in four (3%); and macular edema in 14 (10%). Although the first two complications were transient and not significant in most cases, the last two are serious and lead to visual impairment.

Both postoperative visual acuity and postoperative progression of retinopathy are concerns. Of the 140 eyes, 26 (19%) had postoperative progression of retinopathy, including 10 with no preoperative retin-

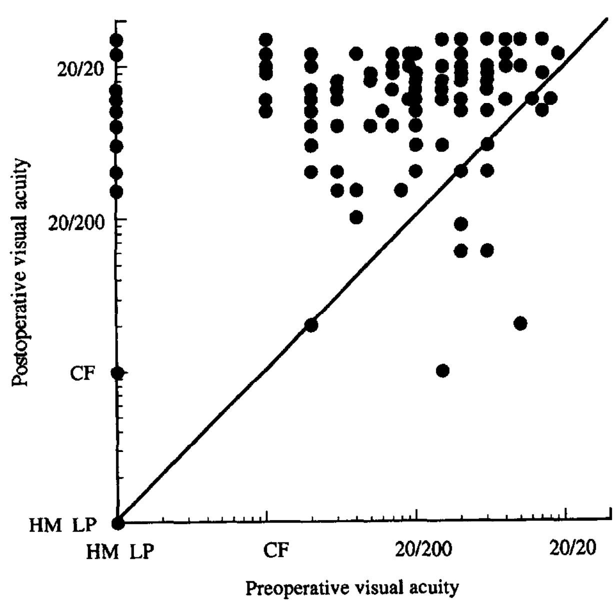

Figure 1. Scattergram of preoperative and postoperative visual acuity. LP: light perception. HM: hand motion. CF: counting fingers.

Table 2. Postoperative Visual Acuity

Preoperative Stage of Diabetic Retinopathy	Postoperative Visual Acuity					
	≤20/200	20/200–20/40	≥20/40	Increase[a]	No Change[b]	Decrease[c]
None (83)	6	13	64	73	6	4
Background (42)	5	11	26	34	5	3
Preproliferative (3)	0	0	3	3	0	0
Quiescent Proliferative (9)	0	6	3	7	2	0
Active Proliferative (3)	1	1	1	2	1	0

[a] Improved visual acuity by at least 2 Snellen lines at most recent visit.
[b] Visual acuity changed within 1 Snellen line at most recent visit.
[c] Visual acuity decreased by least 2 Snellen lines at most recent visit.

opathy, eight with mild background retinopathy, and four with moderate background retinopathy. In four eyes with quiescent proliferative retinopathy there was postoperative progression. Postoperative laser photocoagulation was used for 19 eyes; eight eyes developed proliferative, from nonproliferative, retinopathy.

In group 1, 26 eyes with diabetic retinopathy that progressed after surgery, and in group 2, 114 eyes with retinopathy that did not progress postoperatively, there were no statistically significant differences in age or duration of DM ($P = 0.068$, $P = 0.088$). However, the preoperative hemoglobin A1c (HbA1c) and fasting blood glucose of group 1 were significantly higher ($P = 0.002$, $P = 0.034$; Table 4).

We also studied postoperative retinopathy in 65 patients who had unilateral cataract surgery. These patients were followed for at least 6 months to determine if the condition progressed symmetrically. Figure 2 shows the progression of retinopathy in both the operated and the nonoperated fellow eye. Progression occurred in the operated eye of 10 patients; seven of these patients also had progression in the nonoperated fellow eye. There was no progression in the operated eye of 55 patients; only three of these patients developed retinopathy in the fellow eye. Postoperative progression of retinopathy in this series was symmetrical ($P = 0.0001$).

Discussion

Previous studies have found that cataract extraction with IOL implantation produced good visual acuity in diabetic patients, with 48–94% achieving 20/40 or better.[1,3,4,6,8,14,16,18] In our study, 69% achieved 20/40 and 91%, 20/200 or better. Because we included three patients with preproliferative, and twenty with proliferative, retinopathy in this study, we believe that the results are comparable to previous reports. However, we found a postoperative decrease in visual acuity in 5% of the patients and postoperative progression of diabetic retinopathy in 19%. We are not certain that these patients should forego cataract surgery, have cataract surgery only, or have surgery with IOL implantation, despite the possibility of unsatisfactory results. Specific indications for cataract surgery in diabetic patients must be defined.

Similar to earlier reports,[5,6,14,16,20,22] 26 eyes (19%) in this study had progression of retinopathy postoperatively. In the previous studies, patients with diabetic retinopathy, particularly proliferative retinopathy, more frequently had progression of retinopathy

Table 3. Postoperative Complications and Progression of Diabetic Retinopathy

Preoperative Stage of Diabetic Retinopathy (Number of Cases)	Postoperative Complications						Stage of Diabetic Retinopathy		Postoperative Laser Photo-coagulation
	Fibrin Formation	Transient Elevation of IOP	Irregular Pupil	Vitreous Hemor-rhage	Macular Edema	Posterior Capsulotomy	Progres-sion	Stable	
None (83)	35	18	19	0	3	7	10	73	3
Background (42)	22	7	10	2	7	4	12	30	5
Preproliferative (3)	1	1	1	0	0	0	0	3	3
Quiescent Proliferative (9)	3	0	0	0	4	4	4	5	5
Active Proliferative (3)	3	0	1	2	0	2	0	3	3

Table 4. Progression of Diabetic Retinopathy and Systemic Conditions

	Progression of Diabetic Retinopathy		
	Yes (N = 26)	No (N = 114)	P value
Age (Years)	65.5 ± 10.8	69.5 ± 9.8	0.068
Duration of Diabetes Mellitus (Years)	15.7 ± 7.9	12.1 ± 9.3	0.088
Preoperative Hemoglobin A1c (%)	8.1 ± 2.5	6.8 ± 1.6	0.002
Preoperative Fasting Blood Glucose (mg/dL)	180 ± 99	146 ± 66	0.034

after surgery than patients without preoperative retinopathy.[3,5,14] In our study, however, 10 eyes without preoperative retinopathy, eight with mild background retinopathy, four with moderate background retinopathy, and four with quiescent proliferative retinopathy showed progression postoperatively; none with active proliferative retinopathy progressed. We believe that progression was not seen in the eyes with active proliferation because only eyes in which retinopathy could be controlled by preoperative and/or postoperative laser photocoagulation were selected. Of 125 eyes without retinopathy or with background retinopathy, 22 had progression postoperatively; laser photocoagulation was used for eight of these. Postoperative laser photocoagulation successfully controlled progression in most eyes, indicating that, with careful patient selection and timely postoperative photocoagulation, the problem of postoperative exacerbation of retinopathy can be minimized.

Many previous studies have strongly suggested that IOL implantation aggravates diabetic retinopathy. We evaluated the postoperative progression of retinopathy in 65 patients with unilateral surgery to determine if progression was symmetrical. We found that progression in the operated eye was frequently accompanied by progression in the fellow eye; if progression was absent in the operated eye, the fellow eye usually did not deteriorate. Results of the present study show that postoperative progression was symmetrical (P = 0.0001), and the ECCE with IOL implantation in DM patients did not influence progression in many cases. While earlier research also indicated that IOL fixation and posterior capsule conditions affect progression of retinopathy,[2,11,23] our results did not corroborate this. We believe that ECCE with IOL implantation in diabetic patients has no influence on the progression of retinopathy.

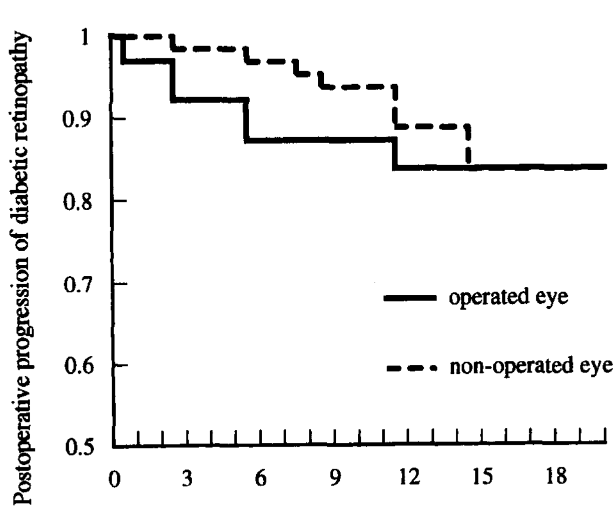

Figure 2. Progression of diabetic retinopathy.

It is essential to determine which DM patients are at risk for postoperative progression of retinopathy. Previous studies indicated greater risk for patients with preoperative retinopathy,[3,5,14] for younger patients, and for women.[16] Our study found an older mean age and a longer duration of DM in the group with progression; however, the differences were not statistically significant. Our results, similar to earlier reports, indicate statistical significance in a higher preoperative HbA1c and fasting blood sugar. Other investigators have concluded that HbA1c correlating with the blood glucose level for a few months preoperatively, and fasting blood glucose correlating with blood level for a few days preoperatively, cannot be used as predictors of progression postoperatively.[3] We believe that these factors are useful predictors; however, we do not necessarily believe that preoperative control of the blood glucose level influences the postoperative development of retinopathy. These preoperative levels do influence treatment postoperatively: blood sugar level must be strictly controlled to obviate progression of retinopathy. Caution must also be used in acute normalization of blood glucose level preoperatively, another factor implicated in postoperative progression of retinopathy.[24]

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