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Core Vitrectomy Preceding Triple Corneal Procedure in Patients at High Risk for Increased Posterior Chamber Pressure

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Abstract: We evaluated the effectiveness of performing a core vitrectomy to prevent intraoperative posterior chamber pressure elevation in eyes at high risk for development of this complication, prior to penetrating keratoplasty, extracapsular cataract extraction and posterior chamber lens (IOL) implantation. Results in 10 cases with core vitrectomy were compared with 10 cases without (controls); in all eyes with vitrectomy, a posterior chamber IOL was easily implanted but four eyes of the control group developed vitreous complications. Our results indicate that core vitrectomy does facilitate IOL implantation during a triple corneal procedure in eyes at increased risk of elevated posterior chamber pressure. **Jpn J Ophthalmol 1997;41:251–254** © 1997 Japanese Ophthalmological Society

Key Words: Core vitrectomy, elevated posterior pressure, triple corneal procedure.

Introduction

In patients with both corneal and lenticular opacities, a triple corneal procedure (penetrating keratoplasty, extracapsular cataract extraction, posterior chamber intraocular lens [IOL] implantation) produces excellent results[1–3] and has become an accepted alternative to staged procedures for many patients. When elevated vitreous pressure is present, however, complications such as iris prolapse or lens protrusion can occur and IOL implantation may be difficult or impossible. Standard prophylaxis has consisted of ocular compression, or the administration of osmotic agents before or during surgery. These measures are simple but often ineffective. Other methods that have been recommended[4–6] include a limbal skewer technique[5] and pars plana vitreous fluid aspiration,[6] which are intended to prevent vitreous loss and permit implantation of the posterior chamber IOL. Neither technique has been evaluated in a controlled study or compared with standard practices.

In the present study, a simple standard core vitrectomy preceded the triple corneal procedures in patients who were considered, preoperatively, to be at high risk for the development of elevated posterior chamber pressure intraoperatively. We compared the outcomes in these patients with a control group that received only the standard treatment for prevention of elevated intraoperative posterior chamber pressure.

Patients and Methods

Ten eyes of 10 patients, 48–72 years old (average: 60.7 years), were included in this 1994 study group and were considered to be at high risk for an intraoperative increase in posterior chamber pressure because of a history of severe corneal infection or secondary glaucoma (Table 1). At the time of surgery, there was no active infection and intraocular pressure was well-controlled in all eyes. All patients gave their written informed consent for participation in this study.

For the core vitrectomy, a single sclerotomy was made 4 mm posterior to the corneal limbus in the superotemporal quadrant (Figure 1). The vitreous cutter was inserted 10 mm into the center of the vitre-

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Table 1. Core Vitrectomy Before Triple Corneal Procedure

Case	Age	Sex	Disease	Glaucoma
1	48	M	herpetic k.	+
2	54	F	bacterial k.	+
3	68	M	re-PKP	+
4	72	F	re-PKP	+
5	66	F	re-PKP	+
6	68	F	herpetic k.	−
7	62	F	bullous k.	+
8	57	M	bullous k.	+
9	59	F	herpetic k.	+
10	53	M	herpetic k.	−

k: keratitis. PKP: penetrating keratoplasty.
+: glaucoma present. −: no glaucoma.

ous cavity; under negative transorifice pressure, the vitreous was excised and drained for 1 minute. Drainage was facilitated and a satisfactory reduction of positive posterior chamber pressure was achieved by application of external pressure to the eye during drainage (Figure 2). The sclerotomy was then closed with interrupted 10-0 polyester sutures.

The triple corneal procedure followed. A scleral ring was fixed to the globe with four 7-0 silk sutures; the cornea was marked and a 4/5 thickness cut was made with a trephine. The anterior chamber was entered through the partial-thickness incision, using a diamond knife, and a section of host cornea was resected to form a corneal window. After extracapsular cataract extraction and IOL implantation, a 0.5 mm oversized graft was excised from the endothelial donor surface with a hand-held trephine and sutured into place with a single running suture and eight interrupted 10-0 nylon sutures. Sodium hyaluronate was used as necessary.

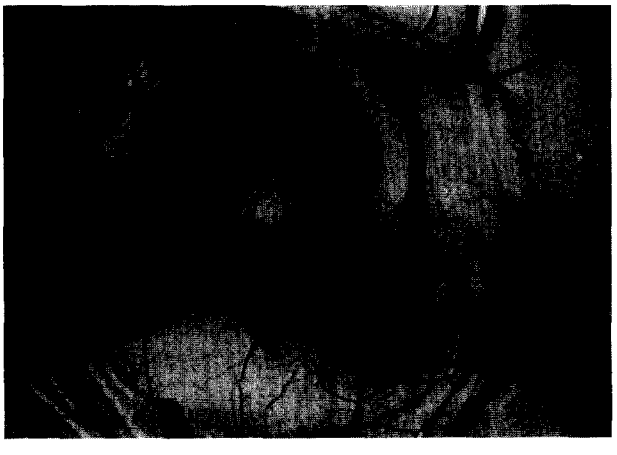

Figure 1. Vitreous cutter was inserted through single port 4.00 mm from circumferential corneal limbus.

Figure 2. Under negative transorifice pressure, vitreous was excised and drained for 1 minute with application of external pressure to eye.

The control group included 10 eyes of 10 patients randomly chosen from patients with the same risk factors for intraoperative elevation of posterior chamber pressure. These patients were similar in age (50–75 years; mean, 63.4 years) and had had triple corneal procedures during 1993. The triple corneal procedure was identical to that described for the study group.

Standard measures to prevent intraoperative elevation of posterior chamber pressure are ocular compression and the administration of osmotic agents before or during surgery. The effectiveness of a core vitrectomy preceding the triple procedure was determined by comparing the frequency of intraoperative vitreous complications, the success of IOL implantation, endothelial cell density, and the proportion of eyes with clear grafts 2 years postoperatively in the two groups.

Results

Indications for surgery in the study eyes included herpetic keratitis (four eyes), re-keratoplasty (three eyes), bullous keratopathy (two eyes), and bacterial keratitis (one eye) (Table 1). Eight eyes, all without infection, had a history of secondary glaucoma requiring medical treatment. There was no vitreous loss or prolapse during the triple procedure, and IOL implantation into the capsular bag was successful in all eyes. None developed cystoid macular edema postoperatively.

Indications for surgery in the control group were re-keratoplasty (four eyes) and herpetic keratitis, bacterial keratitis, and trauma (two eyes). There were six eyes, all noninfectious, with secondary glau-

Table 2. Triple Procedure Without Core Vitrectomy (Control Group)

Case	Age	Sex	Disease	Glaucoma	Vitreous Herniation	Vitreous Loss
1	67	F	herpetic k.	−	−	−
2	56	F	bacterial k.	−	+	−
3	61	M	re-PKP	+	−	−
4	50	M	re-PKP	+	+	+
5	69	F	herpetic k.	−	−	−
6	64	M	re-PKP	+	−	+
7	67	F	trauma	+	−	−
8	63	M	trauma	+	+	−
9	62	F	re-PKP	+	−	−
10	75	M	bacterial k.	−	−	−

k; keratitis. PKP: penetrating keratoplasty. +: complication present. −: complication absent.

coma (Table 2). Intraoperative vitreous complications occurred in 4 of the 10 eyes. In two eyes, vitreous prolapse prevented capsular placement of an IOL, necessitating ciliary sulcus implantation. In two others, there was severe vitreous herniation and IOL implantation was unsuccessful: these patients were left aphakic and were later fitted with contact lenses. In the remaining six, surgery was completed without vitreous complications and with successful capsular placement of the IOLs.

Table 3 shows the 2-year postoperative incidence of vitreous herniation or vitreous loss, the success rates of IOL implantation, IOL position, endothelial cell density, and proportion of eyes with clear grafts in the two groups. The incidence of vitreous complications (none of 10 eyes) in the study group was significantly lower than the control group (4 of 10 eyes; $P = 0.0433$, Fisher's direct stochastic analysis). There were no significant differences between groups in endothelial cell density or proportion of eyes with clear grafts.

Table 3. Clinical Course

Parameter	Core Vitrectomy	Control
Average age	60.7 years	63.4 years
Sex		
Male	4	5
Female	6	5
Vitreous herniation	0	3
Vitreous loss	0	2
Success rate (%)	100	80
IOL position		
(bag)	10	6
(sulcus)	0	2
Cell count (cells/mm^2)	1969 ± 335[a]	1896 ± 288
Clear graft rate (%)	80	80

[a] Average ± standard deviation.

Discussion

Although a younger patient age is a predisposing factor for intraoperative posterior chamber pressure elevation, it is our impression that patients with a history of infectious keratitis or glaucoma are also at increased risk when having a penetrating keratoplasty. The precise mechanism causing the increased pressure in these cases is unknown at present, but may be similar to that leading to expulsive hemorrhage in which predisposing factors include inflammation and glaucoma.[7] In some patients with increased pressure, the iris or lens will prolapse forward when the corneal button is resected unless special preventive measures are taken. The use of ocular compression or preoperative osmotic agents seldom prevents vitreous prolapse; when posterior chamber pressure elevation is severe, the IOL implantation procedure may not be successful.

McCartney et al[5] recommend a limbal skewer technique to restore the shape of the anterior segment and prevent vitreous loss when posterior chamber pressure elevation occurs. This technique, however, requires considerable surgical expertise. Fine[4] reported that vitreous aspiration was effective in preventing pressure increase in aphakic eyes during penetrating keratoplasty. Also, Meyer and Musch[6] reported that cortical cleaning and intracapsular IOL implantation were achieved without difficulty in all 16 cases that had pars plana vitreous aspiration with triple corneal procedures. In the present study, we found that, for our high-risk patients, the pars plana core vitrectomy led to a significant reduction in the incidence of intraoperative pressure elevation. However, because the procedures described by Fine[4] and Meyer and Musch[6] do not require cutting the vitreous, there may not be a satisfactory reduction of the elevated posterior chamber pressure in all cases.

Our technique involved a single sclerotomy made through the pars plana 4 mm posterior to the corneal limbus. The vitreous was cut and aspirated for 1 minute with a satisfactory reduction of posterior chamber pressure in all cases. No retinal detachment or vitreous hemorrhage occurred. Vitreous prolapse from the sclerotomy did occur in three eyes when the vitreous cutter was removed. In these cases, the prolapsed vitreous was removed, using the cutter, without difficulty or complications. The only disadvantage noted in combining core vitrectomy with the triple procedure was the difficulty in placing trephine marks on the cornea due to reduced intraocular pressure after removal of the vitreous. Further study is needed to solve this problem.

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This study has shown that safe IOL insertion was possible in all cases when core vitrectomy preceded the triple corneal procedure (Table 1), whereas vitreous herniation or prolapse occurred in 4 of 10 eyes in the control group (Table 2) resulting in aphakia and the need for contact lenses in two eyes. These results show that, for patients at high risk for intraoperative elevation of posterior chamber pressure, core vitrectomy prior to a triple corneal procedure reduces the risk of IOL complications and has a positive effect on the patient's quality of life.

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