Core Vitrectomy is Useful for Performing Phacoemulsification and Intraocular Lens Implantation as Primary Surgery for Acute Angle Closure Glaucoma

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Purpose : To evaluate the results of phacoemulsification and intraocular lens implantation (PEA+IOL) by means of a core vitrectomy as primary surgery for acute angle closure glaucoma (AACG). **Setting** : Department of Ophthalmology, Japan Red Cross Wakayama Medical Center, Wakayama, Japan. **Methods** : We reviewed the records of six patients who underwent primary PEA+IOL with an additional core vitrectomy for AACG. **Results** : The mean preoperative intraocular pressure (IOP) was 57.5 mmHg. No intraoperative complications were observed. The mean postoperative IOP was 16.0 mmHg one day after surgery. No additional glaucoma surgery was necessary in any eye. At the final visit, the mean postoperative IOP was 11.3 mmHg. No eyes required antiglaucoma medication. No occurrence of bullous keratopathy was observed in any case throughout the follow-up period. **Conclusions** : PEA+IOL with additional core vitrectomy was thus found to be a safe and effective treatment for both postoperative IOP control and the preservation of corneal endothelial cells. A core vitrectomy should therefore be performed when it is difficult to perform PEA+IOL for AACG.

Key words ① **Acute angle closure glaucoma** ② **Core vitrectomy** ③ **Phacoemulsification** ④ **Cataract surgery** ⑤ **Intraocular lens implantation**

Acute angle closure glaucoma (AACG) is classically treated by either peripheral iridectomy (PI) or laser iridotomy (LI) to relieve the symptoms of pupillary block. Several studies have previously evaluated the effect of cataract surgery on chronic angle closure glaucoma (CACG)[1]. More recently, Yoon JY reported the effectiveness of phacoemulsification and intraocular lens implantation (PEA+IOL) for AACG patients whose intraocular pressure (IOP) could not be sufficiently controlled by conventional treatment[2]. Ming suggested that PEA+IOL was useful for the primary treatment of AACG[3]. Jacobi also concluded that PEA+IOL was a better procedure for the treatment of uncontrolled AACG when faced with options of PEA+IOL or PI[4].

For CACG, the surgery of PEA+IOL is difficult because of a shallow anterior chamber and weakness of Zinn's zonule[5], while in the case of AACG, it is more difficult to perform because of a shallower anterior

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chamber and the presence of corneal edema as a result of a high IOP. Over 40 patients have undergone PEA+IOL for AACG primarily at our hospital. We encountered some cases with a severe shallow chamber and corneal edema due to high IOP even after medical treatment. To complete PEA+IOL safely and easily in these cases, we performed a core vitrectomy before continuous curvilinear capsulorrhexis (CCC).

PATIENTS AND METHODS

All the patients with a clinical diagnosis of AACG were first treated with such systemic medications as carbonic anhydrase inhibitors and hyperosmotic agents to decrease the IOP. Following medical treatment, they were offered PEA+IOL, but not either PI or LI, under topical anesthesia at the Japan Red Cross Wakayama Medical Center. All the patients gave their informed consent for our treatment protocol.

We reviewed the medical records of six consecutive patients who underwent primary PEA+IOL with an additional core vitrectomy for AACG. The core vitrectomy was performed when the anterior chamber could not be formed, even after viscoelastic agents were injected to improve a very shallow anterior chamber. When corneal edema was severe due to high IOP, a core vitrectomy was needed to decrease the IOP and to visualize the anterior capsule.

The core vitrectomy was performed using a one-port access with sclerotomies 3.5mm posterior to the limbus, using an anterior vitreous cutter (20 gauge) for about five seconds.

RESULTS

The postoperative follow-up ranged from one to nine months (mean, three months). The six subjects treated in this study consisted of six females, ranging in age from 64 to 81 years (mean, 72 years). The mean preoperative IOP was 57.5 mmHg (range, 44-70 mmHg). The mean axial length was 22.4 mm. The number of preoperative corneal endothelial cells averaged 2585/mm^2.

Before the core vitrectomy, it was difficult to perform CCC due to corneal edema and the shallow anterior chamber. The core vitrectomy decreased the IOP, widened the anterior chamber angle and improved the corneal edema. After the core vitrectomy, CCC was normally performed and PEA+IOL was safely completed.

The mean operation time was 35.6 min. No intraoperative complications were observed. The mean postoperative IOP was 16.0 mmHg (10-30 mmHg) one day after surgery. No additional glaucoma surgery was necessary in any eye. At the final visit, the mean postoperative IOP was 11.3 mmHg. No eyes required antiglaucoma medication. The visual acuity improved by two lines or more in five eyes, while it remained unchanged in the other eye. The number of postoperative corneal endothelial cells averaged 2507/mm^2. In addition, no occurrence of bullous keratopathy was observed in any of the cases throughout the follow-up period, and there were no postoperative vitreoretinal complications such as retinal detachment or vitreous hemorrhage. The results are summarized in Table 1.

Table 1

		intraocular pressure(mmHg)			corneal endothelial cells/mm^2		visual acuity	
Case	Age/Sex	preope	postope	final	preope	postope	preope	postope
1	69/F	50	12	8	2553	2317	L.S.	L.S.
2	64/F	55	10	11	2814	2560	0.02	1.2
3	81/F	70	30	11	2466	2553	0.02	0.7
4	70/F	70	20	14	2540	2430	H.M.	0.4
5	77/F	44	16	13	2524	2485	0.3	0.7
6	69/F	56	8	11	2610	2695	0.1	0.9
Ave.	72	57.5	16	11.3	2584.5	2506.7		

DISCUSSION

Recently, several studies have reported that PEA+IOL is an effective primary surgical procedure for AACG[3),4),6)]. We routinely perform PEA+IOL on such patients with AACG after medical treatment. The core vitrectomy enables us to perform PEA+IOL safely and easily in some cases with a very shallow chamber and severe corneal edema due to high IOP. Consequently, in cases reported here, CCC was complete and the IOL was positioned in the bag in all eyes.

The final IOP was postoperatively controlled at a level below 14 mmHg without any topical antiglaucoma medication or additional glaucoma surgery in all six eyes. The average final IOP (11.3 mmHg) was significantly lower than that in eyes receiving PEA+IOL without a core vitrectomy[4)]. We believed that the core vitrectomy widened the anterior chamber angle and reduced the peripheral anterior synechia, thus resulting in a decrease in the IOP.

The postoperative population of corneal endothelial cells was over 2000/mm^2 in all cases. The number of corneal endothelial cells decreased to below 1500/mm2 in some cases receiving PEA+IOL without a core vitrectomy (unpublished data). The core vitrectomy enlarged the surgical space of the anterior chamber, thus resulting in less damage to the corneal endothelial cells. Therefore, the core vitrectomy was considered helpful in preserving corneal endothelial cells.

In conclusion, PEA+IOL with an additional core vitrectomy was found to be a safe and effective treatment for both postoperative IOP control and the preservation of corneal endothelial cells. A core vitrectomy should therefore be performed when it is difficult to perform PEA+IOL due to the presence of corneal edema and a shallow anterior chamber in AACG.

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