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CASE SERIES

Combined 20-gauge and 23-gauge pars plana vitrectomy for the management of posteriorly dislocated lens: a case series

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Objective: To present a new surgical approach for the management of posteriorly dislocated lens by using a combination of 20-gauge (20G) and 23-gauge (23G) pars plana vitrectomy.

Design: An interventional case series

Methods: This technique was performed on six patients (five men, one woman; mean age, 66.67 years; range, 66–72 years). Two 23G trans-conjunctival sclerotomy ports were created for infusion and illumination along with a 20G sclerotomy port for introducing the vitrectomy probe or fragmatome.

Results: This procedure was successfully performed on six eyes. On postoperative day one, the media were clear and the retina could be seen by indirect ophthalmoscopy. Hyphema developed in one eye and resolved within a week. There were no observed cases of retinal tear, wound leakage, hypotony, or endophthalmitis. The post-operative follow-up period ranged from three to twelve months (mean, 8.1 months). By the final visit, two patients had achieved a visual acuity of 20/40 or better, three patients, 20/70, and one patient, 20/200.

Conclusion: The combination of 20G and 23G pars plana vitrectomy is an efficacious and safe procedure for management of posteriorly dislocated lens.

Keywords: lensectomy, fragmatome, sutureless vitrectomy

Introduction

The 23-gauge (23G) sutureless vitrectomy technique is becoming increasingly popular because of the decreased surgical trauma, faster wound healing, and improved postoperative comfort associated with this technique. Because small surgical incisions do not require sutures, the operation times for 23G sutureless vitrectomy and the postoperative inflammation are reduced, and patient recuperation is more rapid.[1–5]

Fragmatomes are not yet available in a 23G version; therefore, I introduced a new technique that combines 23G and 20-gauge (20G) vitrectomy and lensectomy for the management of posteriorly dislocated lens and dropped nuclei.

Materials and methods

This prospective study was conducted on 6 eyes of 6 patients who were diagnosed with posteriorly dislocated lens and underwent pars plana vitectomy between May 2008 and April 2009 at the Department of Ophthalmology, Prapokklao Hospital. After all the patients were given detailed explanations of the procedure and its potential benefits and risks, informed consent was obtained from them. Each patient underwent a complete preoperative ophthalmic examination, which included measurement of the

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best corrected visual acuity (BCVA) using a standard Snellen chart, a slit-lamp examination, applanation tonometry, and dilated fundus examination.

Surgical technique

Two 23G transconjunctival sclerotomy ports were created for infusion and illumination (Alcon Laboratories Inc., Fort Worth, TX, USA), and a third 20G sclerotomy port was created for introducing the vitrectomy probe. To create the 23G port, the conjunctiva was displaced by approximately 1–3 mm with a pressure plate. A 23G trocar-cannula was first inserted through the conjunctiva and sclera, parallel and 3.5 mm posterior to the limbus, and then at an angle of approximately 5° until it just passed the end of the bevel. At that point, the handle was raised slightly to an angle of approximately 30° and the cannula was then inserted into the hub. The trocar was removed while the cannula was stabilized with forceps. The third port was created via a localized peritomy and sclerotomy with a 20G microvitreoretinal blade. The vitrectomy probe or fragmatome was introduced through the 20G port. A complete vitrectomy was performed before the trans pars plana lensectomy in order to remove vitreous traction from the lens. The fragmatome was set at an ultrasound power of 30%–50% and a vacuum of 100–150 mmHg. Increasing the infusion pressure from 35 mmHg to 50 mmHg ensured the prevention of intraoperative hypotony. Modified 4-point scleral fixation of intraocular lenses (IOLs)[6–7] was also performed on five eyes with trauma. Plugs were placed in the cannula, which was removed at the end of the surgery by applying gentle traction with the help of forceps. The displaced conjunctiva was repositioned with a cotton swab or smooth forceps while the single 20G opening was sutured with 7-0 Vicryl. Care was taken to examine for sclerotomy leakage at physiological pressure.

Intraoperative indirect ophthalmoscopy was also performed on all patients in order to examine their peripheral retina. Complete ophthalmic examinations, which included measurement of the BCVA, slit-lamp biomicroscopy, tonometry, and dilated fundus examination, were performed one day, one week, one month, six months and one year after the operation.

Results

This above surgical procedure was successfully performed on six eyes of six patients. The preoperative data are summarized in Tables 1 and 2. Five of these patients were referred to my hospital for the treatment of traumatic posterior dislocation of the lens, whereas the sixth had experienced lens dislocation after cataract extraction by phacoemulsification. Perfluorocarbon liquid (PFO) was used for retinal protection in the five patients with crystalline lens. Phacofragmentation was safely performed in the sixth patient without the use of PFO. Of the five patients with traumatic dislocation, one (case 2) presented with lattice degeneration and a small retinal hole; these were treated using endolaser photocoagulation. The retina was flat intraoperatively and postoperatively.

On postoperative day one, the media were clear and the retina could be seen by indirect ophthalmoscopy. Hyphema developed in one eye and resolved within a week. There were no observed cases of retinal tear, wound leakage, hypotony, or endophthalmitis. The duration of the postoperative follow-up ranged from three to twelve months (mean, 8.1 months). By the final visit, two patients had achieved a visual acuity of 20/40 or better and three patients, 20/70. One patient (case 2) had a history of secondary glaucoma and achieved a postoperative visual acuity of only 20/200. One patient developed cystoid macular edema, which partially resolved with medical treatment. Retinal detachment was not detected during the follow-up period.

Discussion

A posteriorly dislocated lens after intraocular surgery or blunt eye trauma is an uncommon event, and is associated with complications such as intraocular inflammation, corneal edema, elevated intraocular pressure, retinal detachment, and vitreous hemorrhage.[8] In cases of partial lens dislocation associated with traumatic zonular dialysis of less than 160°, implantation of a capsular tension ring (CTR) before or

Table 1 Patients who underwent combined 20G and 23G pars plana vitrectomy/lensectomy

Patient	Age	Gender	Lesion	Cause	Diagnosis	Preop BCVA	Postop BCVA
1	66	M	OD	Trauma	PDL	CF/30 cm	20/40
2	72	F	OS	Trauma	PDL, G	3/200	20/200
3	72	M	OD	Trauma	PDL, Uveitis	CF/20 cm	20/70
4	66	M	OS	Trauma	PDL, VH	HM/10 cm	20/70
5	65	M	OS	Trauma	PDL	CF/30 cm	20/30
6	65	F	OS	Cataract	Dropped nucleus	9/200	20/70

Abbreviations: OD, oculus dexter; OS, oculus sinister; PDL, posteriorly dislocated lens; G, glaucoma; VH, vitreous hemorrhage; BCVA, best-corrected visual acuity; CF, count fingers; HM, hand motion; M, male; F, female.

Table 2 Preoperative ocular findings

Patient	Anterior segment finding pupils/iris capsule/zonule	Posterior segment finding
1	3 mm, round, 360° zonular dialysis	No vitreous hemorrhage, crystalline lens in posterior vitreous cavity, no retinal break
2	3 mm, iridodialysis, 360° zonular dialysis	No vitreous hemorrhage, crystalline lens in posterior vitreous cavity, lattice degeneration with a small retinal hole
3	2 mm, round, iris hole, 360° zonular dialysis	Haziness of vitreous gel, crystalline lens in posterior vitreous cavity, no retinal break
4	2 mm, round, 300° zonular dialysis	Vitreous hemorrhage, crystalline lens in anterior vitreous cavity, no retinal break
5	2 mm, round, 360° zonular dialysis	No vitreous hemorrhage, crystalline lens in posterior vitreous cavity, no retinal break
6	2 mm, round, P/C tear, intact anterior capsular ring, IOL in the sulcus	No vitreous hemorrhage, 80% of crystalline lens in vitreous cavity, no retinal break

Abbreviation: P/C, posterior capsule.

during phacoemulsification with an in-the-bag posterior chamber (PC) IOL is a relatively safe technique with a high success rate. The CTR is efficient in preventing IOL dislocation in eyes with traumatic zonular deficiency.[9] For severe lens instability with a zonular dialysis greater than 180° and complete lens dislocation, a pars plana approach should be considered.[10]

It is clear that 20G pars plana vitrectomy and lensectomy are the best methods for the management of posterior dislocation of the lens and the resultant complications, in particular, uveitis, glaucoma, and retinal detachment. The ultimate goal of a vitreoretinal surgeon is to remove the retained lens material while avoiding vitreous traction and retinal injury.

The 23G sutureless vitrectomy technique is becoming increasingly popular and the indications for this technique have expanded to include conditions such as non-clearing vitreous hemorrhage, epiretinal membrane, macular holes, vitreomacular traction, and intraocular foreign body. Generally, posteriorly dislocated lens or dropped nucleus are contraindications for this sutureless technique.[11] This is because some vitrectomy tools such as the ultrasonic fragmatome are currently not available in a 23G version. In this study, I used a combination of 20G and 23G sclerotomies and instruments. This combination technique has previously been successfully used in cases of epiretinal membrane, macular holes, diabetic vitreous hemorrhage, and tractional retinal detachment.[12]

To the best of my knowledge, there are no reports in the literature on the combined use of 23G and 20G vitrectomy with lensectomy for the management of patients with posteriorly dislocated lens and dropped nucleus. With regard to retained lens fragments, cortical and small nuclear fragments may be removed using a 23G cutter. Large or hard fragments are removed using a 20G fragmatome.

In this study, both vitrectomy and lensectomy were successfully performed on all six eyes without any complications. Intra-operative hypotomy can occur during lensectomy because of fluid leakage through the 20G opening. To prevent this, I increased the infusion pressure from 35 mmHg to 50 mmHg and decreased the maximum fragmatome vacuum. Another problem with this technique (during the vitrectomy or lensectomy) is the difficulty in interchanging hands if the second superior port needs to be enlarged. However, for all subjects in this study, conversion of the second port to 20G sclerotomy was not required.

The major limitations of this study are the small sample size and short follow-up period. For more accurate conclusions, studies with a larger sample size and longer follow-up should be performed.

In conclusion, the combined 20G and 23G vitrectomy with lensectomy can be used as an alternative method for the management of posteriorly dislocated lens and dropped nucleus as the 23G fragmatome is not yet available. Furthermore, the single-suture 20G sclerotomy in this technique may help shorten the surgical opening and closing times.

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