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Original Research Article

RISK FACTORS AND SURGICAL APPROACH FOR PARS PLANA VITRECTOMY OF POSTERIORLY DISLOCATED INTRAOCULAR LENSES

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Abstract: *The retrospective study was conducted in the Department of Ophthalmology, Nishtar Medical Hospital, and Bakhtawar Amin Trust Hospital from January 2022 to January 2023 to evaluate risk factors and surgical approach for posterior dislocation of the intraocular lens into vitreous requiring pars plana vitrectomy. A total of 30 eyes of 30 patients (20 male and 10 female) were included in the study. Standard PPV vitrectomy was performed in all patients. The Iris fixation technique was used in patients having a 3-piece lens design. A sclera fixation technique was performed to secure the lens and prevent it from falling onto the retina. IOL (Intra-Ocular Lens) was exchanged in eyes in which it was previously damaged. Results showed that in 28 (93.3%) eyes, the original lens was conserved and positioned on the scleral wall, iris, or both. The existing lens could not be preserved in 2(6.6%) eyes. 92.1% of cases had a single risk factor for IOL dislocation. After surgery, uncorrected visual acuity (UCVA) improved from 20/400 on the initial visit to 20/80 on the final (P=0.001). UCVA remained unchanged in 3 (10%) patients and improved in 27 (90%) patients. It can be concluded that the incidence of posterior IOL dislocation has been increasing. Intravitreal substance injections, myopia, and previous vitrectomy are the major risk factors. In most cases, the existing lens can be preserved and secured in the posterior chamber through pars plana vitrectomy.*

Keywords: Pars Plana Vitrectomy, Intraocular Lens, Lens Dislocation

Introduction

Cataract surgery may lead to malpositioning of the intraocular lens(IOL), and there has been an increasing incidence of posteriorly dislocated intraocular lenses (Darian-Smith et al., 2022; Jeon et al., 2023). IOL dislocation early (3 months) after the cataract surgery is mainly caused by surgically induced or preexisting zonular dehiscence. On the other hand, IOL dislocation at the later stages (6-9 years after surgery)is caused by ocular trauma or progressively weakening zonules (Foo et al., 2021; Kristianslund et al., 2017).

Iatrogenic lens dislocation can be caused by intravitreal injection leading to vitreous prolapse; in some cases, no risk factor is identified (Kristianslund et al., 2021). The optimal surgical approach to manage posteriorly dislocated IOL is under debate. The most common approaches are IOL repositioning and exchange (Bajgai et al., 2018; Bieliński et al., 2019; Kristianslund et al., 2021). A study compared the accuracy of both techniques for managing IOL subluxation. The results showed no major difference in distance-corrected visual acuity after 6 months of either surgery (Kristianslund et al., 2017). This study will evaluate risk factors and surgical approaches for posterior intraocular lens dislocation into the vitreous requiring pars plana vitrectomy (PPV).
PCI patients**.**

Methodology

The retrospective study was conducted in the Department of Ophthalmology, Nishtar Medical Hospital, and Bakhtawar Amin Trust Hospital from January 2022 to January 2023. Patients with posteriorly dislocated IOL who were managed surgically were included in the study. The ethical board of the hospital approved the study. Patient details were recorded, including demographic data, information regarding vitrectomy and cataract surgery, ocular data, autorefraction, and pre- and post-operative visual acuity.

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As all the cases had posteriorly located IOL, thus anterior segment approach could not be used. Surgery was performed under general anesthesia. Standard PPV vitrectomy was performed in all patients. Triamcinolone-assisted vitreous staining was used to lift IOL after being detached from the surrounding vitreous. IOL was grasped at the optic-haptic junction using vitreoretinal forceps. The lens was bimanually placed at the anterior chamber by holding it with grasper in both hands and secured above the iris plane. All cases needed lens suturing due to insufficient anterior capsular support for sulcus placement.

The Iris fixation technique was used in patients having 3 piece lens design. Optic papillary capture maintained IOL stability in the anterior segment. Fixation was done by suturing each haptic using two 9-0 polypropylene sutures. The Optic was then gently pushed into the posterior chamber through the pupil. A sclera fixation technique was performed to secure the lens into place and prevent it from falling onto the retina.

IOL was exchanged in eyes in which it was previously damaged. IOL was fully placed in the anterior chamber, cut in half, and removed through a corneal incision. After iris fixation, a 3-piece hydrophobic acrylic IOL or anterior chamber angle supported PMMA lens was implanted. Post-operative instructions included antibiotic eye drops, NSAID drops, and steroidal drops. The surgery aimed to restore vision and place the lens in its correct anatomical position.

SPSS version 24.0 was used for distribution and matched pair analysis. Mann– Whitney U test and Fisher's exact test were used. P value < 0.05 was considered statistically significant.

Results

A total of 30 patients (20 male and 10 female) were included in the study (Figure 1).

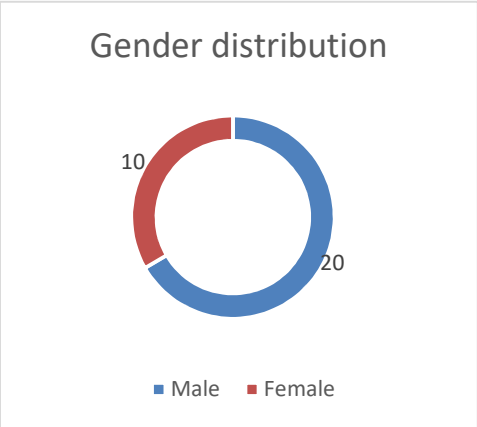

Figure 1 Distribution of gender in the study population

The mean age of the participants was 70.6 ± 15 years. The mean duration between cataract surgery and IOL dislocation was 6.5 ± 7.3 years, and patients were followed up for an average of 9 months after surgery. In 28 (93.3%) eyes, the original lens was conserved and positioned on the scleral wall, iris, or both. The existing lens could not be preserved in 2(6.6%) eyes. In 1 eye, anterior chamber IOL was placed, and the other received a 3-piece hydrophobic lens. 8 (26.6%) cases had early IOL dislocation, at the mean 0.66 ± 0.76 months after the cataract surgery. 22 (73.3%) cases had late dislocation at the mean 139 ± 74.1 months after surgery. 15 (50%) cases had in-the-bag IOL dislocation at 166.2 months after cataract surgery, compared to 48 months in cases with out-of-the-bag dislocation (P=0.015).In Table, I, different types of retrieved IOL are shown. IOL types in late and early lens dislocation were not significantly different.

92.1% of cases had a single risk factor for IOL dislocation. 12 (40%) patients had previous PPV for different reasons, mainly vitreous hemorrhage or retinal detachment. Various corticosteroid injections or intravitreal anti-vascular endothelial growth factors (VEGF) caused IOL dislocation in 11 (36.6%) eyes (Table II). The mean axial length was 25.78 ± 3.23 mm. The mean ocular length in cases with early dislocation was 23.92 ± 1.34 mm, while in late dislocation, it was 26.58 ± 3.48 mm (P=.019). Late IOL dislocation was significantly associated with longer axial length (P=.005) and ocular trauma (P= 0.007). 9 (30%) cases had pseudoexfoliation syndrome, and 9 (30%) had blunt trauma. These underlying causes were equally distributed in cases with late and early onset of dislocation (P=1.0).

Before surgery, 21 (70%) patients had dropped IOL and ocular comorbidity, mainly diabetic retinopathy and macular degeneration, which affected vision (Table II). Uncorrected visual acuity (UCVA) improved from 20/400 on the initial visit to 20/80 on the final (P=0.001). UCVA remained unchanged in 3 (10%) patients and improved in 27 (90%) patients.

After the procedure, 6 (20%) patients had a mild vitreous hemorrhage, which resolved spontaneously after a month. 2 patients had IOP elevation, which was well controlled in 1 case. In contrast, the other had previously advanced glaucoma, macular damage, and ocular trauma, due to which uncontrolled pressure was managed by cyclo photocoagulation. 5 cases had cystoid macular edema, which was treated with intravitreal triamcinolone or conservatively.

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Table I Various Types of Posteriorly Located IOLs

Lens material	Lens design	Number of lenses
Hydrophilic	1-piece	13
Hydrophobic	3-piece	9
	1-piece	5
Polymethylmethacrylate	1-piece	3
Total		30

Table II Surgical Interventions and Ocular Comorbidities in Patients Undergoing PPV for IOL

Variables	n (%)
Glaucoma	7 (23.3%)
Axial myopia	
≥26.0 mm	10 (33.3%)
≥29.0 mm	4 (13.3%)
Retinal pathology	
Proliferative Diabetic Retinopathy	4 (13.3%)
Diabetic Macular Degeneration	3 (10%)
Neovascular Age-Related Macular Degeneration	9 (30%)
Myopic Choroidal Neovascularization	2 (6.6%)
Surgical Intervention	3 (10%)
Previous PPV	12 (40%)
Glaucoma procedure	
Corticosteroid injection	4 (13.3%)
Anti-VEGF injection	7 (23.3%)

Discussion

Posteriorly dislocated IOL is difficult to manage and requires the vitreoretinal procedure for safe lens retrieval followed by lens fixation or IOL exchange if needed (Bieliński et al., 2019; Faria et al., 2017). IOL is exchanged for damaged haptics, unclearOptic, or incorrect lens power. In the current study, patients had different types of IOL preserved and fixed in most cases. Previous studies also show that preserving existing lenses is preferred over IOL exchange (Kokame et al., 2018; Yang et al., 2019). A surgical approach is determined by the clinclinician's preference and the existing capsule's integrity

While securing the lens is time-consuming, IOL exchange requires sclera or corneal incision and loss of endothelial cells. In a study conducted on PPV for posteriorly dislocated IOL, authors preferred suturing and securing the existing lens (Yang et al., 2019). The type of surgery did not impact on final visual acuity. Sella et al compared results of IOL exchange and IOL preservation in posteriorly dislocated IOL, and reported that there was no difference in post-operative DCVA with both methods (Sella et al., 2021). Hayashi et al. classified IOL dislocation based on the remaining capsular support or dislocation site (Hayashi et al., 2016). They reported that lens drop on the retina makes up 5.2% of all cases of IOL dislocations. However, there is an increasing incidence of in-the-bag dislocation. In this study, the mean age of the participants at the time of vitrectomy and lens dislocation was 70.6 years. It is younger than the general mean age (64.5 years) for cataract surgery(Sommer et al., 2017), indicating lens dislocation and cataract development have some common risk factors like axial myopia and prior ocular surgery.

In the current study, axial myopia and prior vitreo retinal surgery were major risk factors for IOL dislocation, consistent with the reports of a previous study(Lee et al., 2020). A study reported that axial myopia leads to coagulopathy and is a major risk factor and common comorbidity in patients with lens dislocation (Kristianslund et al., 2021). In the current study, 30% of cases had pseudo exfoliation syndrome, which is the cause of progressively weak zonules (Ozturk and Gunduz, 2021). Kim et al. reported that pseudoexfoliation is the most common cause of late dislocation (Kim et al., 2022). Visual outcomes after the successful PPV can be limited by ocular comorbidities, common in lens dislocation. In our study majority of the patient had ocular comorbidities, including macular disease, which was managed with intravitreal anti-VEGF injection.

Nonetheless, unaided visual acuity remained unchanged in 3 (10%) patients and improved in 27 (90%) patients. The most common complications were IOL decentration, CME, and transient vitreous hemorrhage, similar to those reported by a previous

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study(Riedl et al., 2022). The limitation of our study is a small sample size and short follow-up; a larger, more detailed study is recommended for further analysis.

Conclusion

The incidence of posterior IOL dislocation has been increasing. Intravitreal substance injections, myopia, and previous vitrectomy are the major risk factors. In most cases, existing lenses can be preserved and secured in the posterior chamber through PPV.

Conflict of interest

The authors declared absence of conflict of interest.

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