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**Case Report**

# Three-Year Follow-Up of Results of Intraocular Lens Fixation in Patients with Retinitis Pigmentosa

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**Keywords**
Retinitis pigmentosa · Pars plana vitrectomy · Intraocular lens · Lens dislocation · Intraocular lens fixation

**Abstract**
This is a retrospective, consecutive, noncomparative case series of 6 eyes of 5 retinitis pigmentosa (RP) patients who had undergone pars plana vitrectomy (PPV) and intraocular lens (IOL) implantation. The aim of this case series was to report the long-term outcomes of PPV with IOL implantation in patients with RP). The surgical procedures, visual function, refractive error, corneal endothelial cell density, intraocular pressure, and retinal morphology were evaluated before and 3 years after the surgery. Six eyes of 5 RP patients that had undergone PPV and IOL implantation with or without suturing for lens dislocation were studied. The visual acuity was maintained or improved at 3 years after surgery in all 6 eyes. No intraoperative complications occurred in any of the cases. The mean deviation of the Humphrey Field Analyzer 10–2 program and the retinal morphology evaluated by optical coherence tomography did not show any abnormal changes before and after surgery. In two eyes, the postoperative refractive error was more myopic than the attempted refractive error. In conclusion, PPV with IOL implantation can be performed safely in RP patients, and the long-term visual acuity can be maintained.



## Introduction

It is known that patients with retinitis pigmentosa (RP) have a high incidence of zonular instability [1]. Therefore, there is a high incidence of dislocations of the crystalline lens or intraocular lens (IOL), and it is necessary to remove these lenses by pars plana vitrectomy

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(PPV) with IOL implantation in such cases. There have been several reports that showed that PPV is effective for RP patients with an epiretinal membrane [2] and macular hole [3]. However, to the best of our knowledge, there are no reports on the long-term results of PPV with IOL implantation in RP patients, therefore the long-term course of visual function and retinal morphology in eyes of RP patients that undergo PPV with IOL implantation was unknown.

Thus, the purpose of this study was to investigate the long-term effects of PPV with IOL implantation in RP patients. To accomplish this, we studied the medical records of 5 RP patients that undergone PPV with an implantation of an IOL. All patients had been followed for at least 3 years after the surgery.

## Case Report

This was a retrospective, consecutive, noncomparative case series of 6 eyes of 5 RP patients that had undergone PPV and IOL implantation at the Chiba University Hospital. A written informed consent was obtained from all of the patients for the surgery and the publication of this case series and any accompanying data. The CARE Checklist has been completed by the authors for this case report, attached as supplementary material (for all online suppl. material, see https://doi.org/10.1159/000532107).

The IOL was fixed with or without suturing. Flanged intrascleral fixation with the double needle technique was used for the sutureless IOL fixation [4], and the effects of the operative procedures were investigated. The best-corrected visual acuity, visual fields determined by the Humphrey Field Analyzer (HFA), corneal endothelial cell density, refractive error, and retinal morphology in the optical coherence tomographic (OCT) images before and 3 years after the surgery were evaluated. The average of the horizontal and vertical lengths of the ellipsoid zone and central fovea thickness was measured independently by two of the authors (G.M. and T.B.) in a masked way.

The operative procedures and surgical technics are shown in Table 1. Cases 1, 2, and 4 had pseudophakic eyes. The IOL was completely dislocated and dropped into the fundus in case 4. Case 3 was aphakic because the lens was dislocated and removed 4 months before the surgery. Case 5 had a Zinn's zonule tear during cataract surgery and was converted to PPV and intrascleral IOL fixation.

All surgeries were performed by two surgeons (A and B), and all were performed with 25-gauge instruments. Iridectomy was performed in all cases to prevent reverse pupillary block, and the site of sclerocorneal wound was in the area superior to the cornea. The size of the sclerocorneal incision was 7 mm for the sutured method and 4 mm for the sutureless method. Suturing of the sclerocorneal wound was performed in cases 1, 2, and 5. The position of the IOL haptics was at 2 to 8 o'clock for sutured method and 4 to 10 o'clock for the sutureless method. No intraoperative complications occurred in all cases.

The ocular and retinal morphological findings before and 3 weeks after the surgery are summarized in Table 2. The best-corrected visual acuity was maintained or improved for 3 years after surgery in all eyes. The mean deviation of the HFA10-2 program and the retinal morphology evaluated by OCT did not show any abnormal changes before and after the PPV. In two eyes, the postoperative refractive error was more myopic than the attempted refractive error.

**Table 1.** Operative characteristics and surgical technics

| Patient no. | Age/ gender | Lens status | Fixation method | Axial length | Surgical time | Surgeon | Model of IOL |
|---|---|---|---|---|---|---|---|
| 1R | 65/F | Pseudophakia | Sutured | 22.37 | 90 | A | CZ70BD |
| 1L | 68/F | Pseudophakia | Sutureless | 22.34 | 69 | B | NX70 |
| 2 | 52/M | Pseudophakia | Sutured | 23.02 | 66 | A | CZ70BD |
| 3 | 43/F | Aphakia | Sutureless | 25.24 | 38 | B | NX70 |
| 4 | 76/F | Pseudophakia | Sutureless | 25.09 | 60 | B | NX70 |
| 5 | 63/F | Phakia | Sutureless | 27.52 | 71 | B | NX70 |

Axial length is expressed in mm, and surgical time is expressed in minutes.

## Discussion

Earlier studies have reported significant improvements in the visual acuity, retinal sensitivity, contrast sensitivity, and the Visual Function Questionnaire after cataract surgery in RP patients [5–7]. However, despite the risk of IOL dislocation due to zonular instability after cataract surgery in RP patients, we are not aware of any reports of the surgical outcomes or the long-term prognoses of PPV and IOL implantation. Our results showed that the long-term course after PPV and IOL implantation was safe with good surgical results.

We have reported earlier on 2 cases of RP that underwent vitreous surgery for an epiretinal membrane and a macular hole, and both eyes developed an unexpected severe retinal atrophy [8]. However, the patients in this case series did not have any obvious progression of the retinal degeneration or decrease of visual function. The reason for this may be that there was no surgical invasion of the macula area such as with that during epiretinal membrane removal and internal limiting membrane peeling. In addition, all of the patients had long and intact ellipsoid zone preoperatively which meant they were not at the late stages of RP. A posterior vitreous detachment was present preoperatively in all cases (case 3 had already had PPV and was a vitreous), and the absence of complications after the vitrectomy may have contributed to the good postoperative course. Further studies are needed to determine more accurately the relationship between IOL dislocation and posterior vitreous detachment.

The decrease in the density of corneal endothelial cells was less in cases with sutureless IOL fixation than in cases with suturing. It has been suggested that sutureless IOL fixation for RP patients is safe for the corneal endothelial cells. None of our cases had a significant worsening of the postoperative visual acuity or visual field sensitivity of HFA10-2. There were no obvious changes in the OCT images after the surgery, and the effect of IOL fixation surgery on retinal morphology was also slight.

The difference between the attempted and achieved refraction was generally small, but myopic shift of greater than 1.5 diopters occurred in two eyes. Due to the small number of cases, it cannot be concluded whether this myopia tendency is common in RP patients.

In conclusion, we presented our findings in 6 RP cases with lens dislocation that underwent PPV with IOL implantation. The results at 3 years showed that these surgical procedures are safe and the prognosis is good. However, only six eyes were studied, and further studies with a larger number of RP patients are needed.

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**Table 2.** Ophthalmic findings and retinal morphology before and after surgery

| Patient no. | logMAR VA | | MD value of HFA10-2 | | Corneal endothelial cell | | Refractive error | | Astigmatism | | ASER | EZ length | | CFT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | baseline | 3 years after | baseline | 3 years after | baseline | 3 years after | baseline | 3 years after | baseline | 3 years after | | baseline | 3 years after | baseline | 3 years after |
| 1R | 0 | −0.08 | −0.65 | 1.13 | 2,712 | 1,604 | +13.0 | +1.0 | −0.5 | −1.75 | 0 | 6,171 | 6,010 | 208 | 200 |
| 1L | 1.1 | −0.08 | 0.22 | −0.27 | 2,620 | 2,495 | +1.75 | +1.5 | −1.0 | −3.0 | 0 | 6,721 | 6,601 | 208 | 202 |
| 2 | 0.5 | 0 | −4.36 | −4.34 | 1,646 | 1,189 | −3.5 | −3.0 | −9.0 | −2.0 | −2.5 | 5,859 | 5,188 | 185 | 180 |
| 3 | −0.08 | −0.08 | −4.01 | −4.98 | 2,838 | 2,681 | +9.75 | −1.75 | −0.25 | −0.75 | −2.0 | 2,567 | 2,550 | 228 | 219 |
| 4 | 0.05 | 0 | −22.30 | −23.45 | 2,141 | 2,101 | +8.25 | −4.75 | −1.25 | −0.5 | −3.5 | 1,890 | 1,869 | 212 | 201 |
| 5 | 0.3 | 0.22 | −26.86 | −27.52 | 3,182 | 3,014 | −18.75 | −2.25 | −2.75 | −0.5 | −2.0 | 434 | 389 | 147 | 132 |

VA, visual acuity; MD, mean deviation; HFA, Humphrey Field Analyzer; ASER, attempted spherical equivalent refraction; EZ, ellipsoid zone; CFT, central foveal thickness.

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## Statement of Ethics

This case series was conducted in accordance with the Declaration of Helsinki (1964). Ethical approval is not required for this study in accordance with national guidelines. Written informed consent was obtained from the patients for publication of the details of their medical cases and any accompanying images.

## Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this article.

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No funding was obtained for this case report.

## Author Contributions

G.M. attended to the patient, analyzed the data, and drafted and revised the manuscript. T.B. analyzed the data and revised the manuscript. G.M. and T.B. had full access to all the data used in this study and accepted responsibility for the integrity and accuracy of the data analysis. All the authors have read and approved the final manuscript.

## Data Availability Statement

All the data supporting our findings are contained within the manuscript and its supplementary material. Further inquiries can be directed to the corresponding author.

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