# Management of nucleus loss into the vitreous: long term follow up in 63 patients

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**Background:** The aim of present study is to determine the long-term results of patients who undergo pars plana vitrectomy after retained nucleus into the vitreous.
**Setting:** Service of Ophthalmology, Hospital Universitari St Joan, Reus (Barcelona), Spain.
**Methods:** Retrospective, noncomparative, consecutive case series. Medical records were reviewed of all patients who underwent pars plana vitrectomy for retained nucleus into the vitreous after complicated cataract surgery, over a 9-year period between August 1, 1997 and July 31, 2005.
**Result:** The incidence of retained lens fragments was 0.57% (63 patients), the postoperative visual acuity was higher than 20/40 in 59.60% and fell to 48.93% by the end of the study, and was related to the presence of CME and retinal detachment. The CME appeared in 31.91% of the patients and was related to preoperative uveitis an corneal edema. In the group of patients on whom the vitrectomy was performed at the time of cataract complication, visual acuity was higher than 20/40 in 77.77%, and no one developed secondary glaucoma or uveitis.
**Conclusion:** Being retrospective, our study was not result conclusive. Despite the initial good results of these patients after PPV surgery, follow-up should be accurate and over a long period of time in order to minimize postoperative complications such as retinal detachment, retinal breaks, secondary glaucoma and CME.
**Keywords:** Nucleus loss, retained lens fragment, incidence of retained lens fragments, pars plana vitrectomy, phacoemulsification, cystoid macular edema

## Background

Posterior dislocation of the lens into the vitreous cavity is a rare but major complication of cataract surgery. The presence of these retained lens fragments may create complications such as uveitis, corneal edema, cystoid macular edema (CME) and retinal detachment, resulting in a decrease in visual acuity (Monshizadeh et al 1999; Kim et al 2002; Yang et al 2002). The incidence of posterior dislocation of the lens ranges from 0.3% to 1.1% (Pande et al 1996; Stilma et al 1997; Leaming 2004). It has been shown that his rate is inversely related to the experience of the surgeon (Schwartz 2002); Aasuri et al (2001) found a rate of 0.2% for experienced surgeons against 0.65% for trainees.

Risk factors for lens loss into the vitreous include small papillary size, hard nucleus, traumatic cataract, deep-set eyes, pseudoexfoliation syndrome, and patients movement during surgery. Although capsular rupture, zonular dehiscence and dislocation of the lens into the vitreous can occur during any phase of cataract surgery, it occurs most often during grooving and cracking followed by lens emulsification (Monshizadeh et al 1999; Kim et al 2002; Yang et al 2002).

The primary cataract surgeon plays an important role in minimizing the secondary complications after lens loss, anterior vitrectomy and removal of residual cortical material is recommended. No traumatic maneuvers, such as insertion of lens loop, are

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indicated, and we prefer no implantation of intraocular lens to be inserted. Finally, tight closure of the corneal wound is necessary in order to prevent leakage during pars plana vitrectomy (PPV).

Numerous excellent studies have reported prognostic indicators and visual outcomes in eyes managed by pars plana vitrectomy (PPV). The aim of present study is to determine the long-term results of patients who undergo pars plana vitrectomy after retained nucleus into the vitreous.

# Methods

## Design

Retrospective, noncomparative, consecutive case series. Medical records were reviewed of all patients who underwent pars plana vitrectomy for retained nucleus into the vitreous after complicated cataract surgery over a nine-year period between August 1, 1997 and July 31, 2005. Surgery was performed at the Retina Unit of the Ophthalmology Service. There was a sample of 47 eyes from 47 patients who were referred to our hospital for nucleus loss into the vitreous after complicated cataract phacoemulsification (Table 1).

## Setting

Unidad de Ophthalmologia, Hospital Universitari de St Joan, Reus (Spain), which has a dependent population of 306,520 for vitreo-retinal surgery.

## Diagnostic criteria

The LOCS system III (Chylack LT Jr) was used in the classification of lens opacities. Corneal edema was considered significant when both stromal and epithelial edema were present. Anterior uveitis was graded by the number of cells in the anterior chamber (1+ = minimum cells and 4+ = marked cells) and the posterior uveitis was graded in order of the number of cells present into the vitreous cavity.

Macular edema was defined as pseudophakic cystoid macular edema (CME) if the fluorescein angiogram revealed a typical petaloid pattern of foveal hyperfluorescence with associated typical cystoid pattern in the optical coherence tomography, and if no microaneurism or retinal exudates are seen in the macular region. From August 1, 1998 to January 1, 2001 the only diagnostic criteria was the fluorescein angiography, as the OCT has been incorporated as a diagnostic criteria since this data (Gass et al 1966; Tranos et al 2004). Patients included were those with nucleus lens loss into the vitreous cavity after cataract surgery performed by phacoemulsification and without intraocular lens implantation (Table 2).

**Table 1** Demographic data of the study

| | Number/Mean | Percentage/Range |
|---|---|---|
| Male/Female | 19/28 | 40.40%/59.60% |
| Age in years (mean ± SD) | 72.89 ± 9.91 | (57–86) |
| Duration of follow-up in months (mean ± SD) | 63.27 ± 23.08 | (22–106) |
| Presence of pseudoexfoliation syndrome | 19 patients | 40.40% |
| Presence of myopia | 13 | 27.70% |
| Presence of small papillary size | 6 | 12.76% |
| Presence of diabetes mellitus | 12 | 25.53% |
| Presence of arterial hypertension | 22 | 46.80% |
| Hard nucleus NC5 or NC6 of LOCS III | 22 | 46.80% |

No patients had had an intraocular lens implanted when they came to our Hospital with fragments of the lens nucleus that had been lost into the vitreous.

We excluded patients who presented only cortical fragments of the lens without nuclear material (8 patients), patients who were not visited in the correct order of visits after surgery (4 patients), patients with PPV previous to cataract surgery (3 cases), and patients with macular lesions such as myopic changes or age-related macular degeneration that affects the central visual acuity (1 case) (Table 3).

## Patient examination

Patients were referred at varying times after cataract extraction by the primary cataract surgeons and the vitrectomy

**Table 2** Inclusion and exclusion criteria

| |
|---|
| Inclusion criteria |
| Patients with nucleus lens loss into the vitreous cavity after cataract surgery made by phacoemulsification |
| |
| Exclusion criteria |
| Patients who present only cortical fragments of the lens without nuclear material |
| Patients who were not visited in the correct order of follow-up after surgery |
| Patients who died during the period of the study |
| Patients with macular lesions such as myopic changes or age-related macular degeneration that affect central visual acuity |
| Patients with previous PPV, before cataract surgery |
| Patients with rubeosis iridis or neovascular glaucoma previous to cataract surgery |
| Patients with previous chronic glaucoma, or optic disc atrophy |
| Patients with previous history of inflammatory episodes (uveitis) |

**Table 3** Best corrected visual acuity

| | Initial examination N (%) | 3-months postoperative visit N (%) | 6-months postoperative visit N (%) | Final examination N (%) |
|---|---|---|---|---|
| >0.5 | 0 (0) | 28 (59.6) | 19 (40.4) | 20 (42.6) |
| 0.1–0.5 | 13 (27.6) | 10 (21.3) | 16 (34.0) | 14 (29.8) |
| <0.1 | 34 (72.4) | 9 (19.1) | 12 (25.6) | 13 (27.7) |

was undergone within a few days. We measured the time between primary cataract surgery and vitreo-retinal intervention according to records in the patients' history.

A dilated fundus examination was performed preoperatively in order to identify the number and location of the lens fragments, and to rule out any retinal tears or breaks, in which case an argon laser photocoagulation was performed if the visualization of the retina was possible. In addition, an IOP was taken, and we noted if there were any other pathologies, such as vitreous or suprachoroidal haemorrhage, CME or previous glaucoma.

After the pars plana vitrectomy, there was a follow-up control of the patients at 1 week, 1 month, 3 months and every six months thereafter until the end of the study. The corrected visual acuity was measured at each control and included in the statistical study with the results obtained at three months, 6 months and at the end of the study.

If after January 2001 we observed cystoid macular edema in the macular area we did a fluorescein angiography and an optical coherence tomography (OCT). All colour photographs, fluorescein angiograms and OCT images were graded by an independent retina specialist, blind to patients identity.

At the end of the study all patients were submitted to an exploration that included corrected Snellen visual acuity, applanation tonometry, corneal pachimetry (with ORB-SCAN), fundus retinography, fluorescein angiography and OCT macular exploration.

## Surgery

PPV was performed as soon as a vitreo-retinal operating room became available. A standard three-port pars plana vitrectomy is the procedure of choice after stability of the cataract wound is ensured. Any residual lens material surrounding the iris area is carefully removed; care is taken to avoid breaking the capsular remains ready for the final intraocular lens implantation. A core vitrectomy was performed, followed by the removal of the softer cortical lens material and vitreous around the nucleus. A small volume of perfluorodecaline is injected over the optic nerve in order to protect the macular area against the ultrasonic energy and mechanical trauma from the lens fragments (Greve et al 1993; Movshovich 1994). The phacofragmatome tip was used to aspirate the nucleus material, assisted by the tip of the endoilluminator to keep the nuclear fragments near the phacofragmatome; we used low power settings in order to elude the propulsion of the lens fragments (Monshizadeh et al 1999; Kim et al 2002; Yang et al 2002).

After the vitrectomy and lensectomy is complete a peripheral examination with scleral depression is performed, and peripheral vitrectomy is performed in order to eliminate any peripheral vitreous traction. If there is any break or tear, an argon endolaser treatment is performed.

At the end of the surgery a placement of the IOL is performed. If a small intact capsulorhexis is present the IOL can be placed in the sulcus anteriorly. The type of lens used was a hydrogel foldable posterior chamber IOL model H60M Hydroview® (Bausch and Lomb®). An anterior chamber IOL is placed in patients who lack adequate capsular support. The type of lens used was an AC-IOL model 122UV (Bausch and Lomb®) performed by polymethylmethacrylate (PMMA) with flexible haptics, with an overall lens diameter of 12.5 mm.

## Variables introduced in the study

The following pre-PPV variables were assessed for their association with results: age, gender, time between cataract surgery and PPV. We also included in the analysis of risk factors the following findings on presenting clinical examination: presence of high IOP, corneal edema, uveitis, and retinal detachment.

In relation to the time between primary cataract surgery and PPV, we classified patients as those operated on within the first seven days after lens loss, and those on whom PPV was performed after seven days. In a second step we introduced the patients who underwent PPV at the time of cataract primary complicated chirurgical intervention (this group included only nine patients).

The statistical analysis to determine risk factors for final visual outcome was performed with all of these variables

plus the following post-operative variables: post-vitrectomy retinal detachment, CME at any time during the follow-up, post-operative inflammation, and type of intraocular lens implantation: anterior chamber lens (AC-IOL) or sulcus intraocular lens (SC-IOL).

### Statistical analysis

In this study, no all variables assessed as risk factors had data missing. If any variable was not recorded, the patient was excluded from the study.

Descriptive statistics were created using SPSS statistical software (version 13.0). Values are expressed as mean ±SD, and statistical significance was determined using the Student's t-test for paired data. We used the Student's paired test to compare the quantitative data. Best-corrected acuities were converted to Log-MAR values to allow for statistical analysis. The McNemar test was used for evaluating the qualitative data such as presence of the CME, corneal edema, retinal detachment, high IOP etc.

We did a logistical regression analysis to study the relationship between final visual acuity, considering the following risk factors: Gender, cystoid macular edema, corneal edema, presence of previous high IOP, uveitis, AC intraocular lens, and timing between the primary cataract surgery and the VPP.

In all cases, $p = < 0.05$ and the odds ratio had a confidence interval of 95%.

## Results

### Incidence of retained lens fragments

In the period of study the referral centres had performed 10,929 cataracts operations and 63 patients were referred to our centre after primary cataract surgery complications, an incidence of 0.57%.

### Demographic data

All 47 patients (28 (59.60%) women and 19 (40.40%) men) completed the study and the mean follow-up of the patients was 63.27 ± 23.08 (12.00 to 106.00) months after surgery. Mean age was 72.89 ± 9.91 (57 to 86) years, diabetes appeared in 12 patients (25.53%), and arterial hypertension was present in 22 patients (46.80%).

Pseudoexfoliation syndrome was present in 19 patients (40.40%), myopia in 13 patients (27.70%), and small pupillary size with bad midriasis was observed in 6 patients (12.76%). The presence of lens subluxation was observed in 4 patients (8.50%) during primary cataract surgery, and yatrogenic intraoperative maneuvers was reported in 10 patients (21.27%).

On the basis of the LOCS III classification system of cataracts, the presence of hard nucleus (NC5 or NC6) was detected in 22 patients (46.80%).

### Preoperative PPV data

Six patients (12.80%) lost the nucleus into the vitreous at hydrodissection, 24 patients (51.10%) at grooving and cracking, and 17 patients (36.20%) at emulsification .

The IOP was high in 31 patients before PPV (66.00%), corneal edema was present in 28 patients (59.60%) and uveitis in 14 patients (29.80%). In one patient (2.12%) we observed anterior suprachoroidal hemorrhage. We did not observe any cases of retinal detachment or vitreous hemorrhage.

### Intraoperative data

We performed pars plana vitrectomy in all eyes and did not observe any intraoperative complications in any patient.

In 7 patients (14.89%) we observed retinal breaks or tears in the periphery, so we performed intraoperative argon laser photocoagulation. Between 3 and 9 hours five breaks were located in the inferior retina and 2 in the superior retina.

At the end of surgery we implanted an anterior chamber IOL into 21 patients (44.68%), and a sulcus IOL into 26 patients (55.32%).

### Postoperative complications data

We observed the presence of postoperative retinal detachment in 3 patients (6.40%) and all cases appeared within the first 2 months after PPV surgery. In the postoperative period we observed 6 patients (12.76%) who developed retinal breaks or tears 4.18 ± 1.33 months after PPV surgery. Between 3 and 9 hours five breaks were located in the superior retina and one in the inferior retina.

No postoperative complications, such as vitreous or suprachoroidal haemorrhage or fibrinous uveitis were recorded. One patient with sulcus IOL implantation presented a subluxation of the IOL 3 weeks after surgery and needed a new PPV and an exchange of the IOL for an AC-IOL.

Glaucoma persisted in 12 patients (25.53%) after PPV, and need antiglaucomatous topical treatment. Secondary glaucoma is more frequent in patients with AC-IOL (11/21 patients (52.38%)) than in patients with sulcus implanted IOL (9/26 patients (34.61%)). Two patients with AC-IOL developed bullous keratopathy after PPV, one patient three years and the other 4 years after surgery.

During the first 6 months after surgery, a CME appeared in 15 patients (31.91%), which was resolved in 13 of them with

topical treatment. Treatment was with topical prednisolone acetate and with topical cyclooxygenase inhibitor (COI). The COI used was diclofenac. The other two patients who had not recovered were given a sub-Tenon's triamcinolone injection, but both developed a chronic form of CME. In 6/13 patients who recovered after their first CME crisis, the CME relapsed during the six months follow-up. Treatment with prednisolone + diclofenac was initiated and three patients were given a sub-Tenon's triamcinolone injection. Of these six patients, two recovered and four developed a chronic CME. At the end of the study, we observed a chronic cystoid macular edema had formed in six patients (12.76%)

## Postoperative visual acuity

The mean corrected visual acuity in the Snellen chart, at three months after surgery was 0.63 ± 0.28 (0.05 to 1). At the end of the study the mean was 0,59 ± 0,29 (0.05 to 1).

At three months postoperatively, 28 patients (59.6%) had a corrected visual acuity of over 0.5, and 9 patients (19.1%) had vision ≤0.1.

Visual acuity was over 0.5 in 23 patients (48.93%) at the end of the study. In 13 patients (27.65%) visual acuity was ≤0.1 0,10,10.

## Statistical analysis of final visual acuity (Table 4)

In the univariate analysis of risk factors, we observed that final visual acuity under 20/40 is correlated to the presence of CME ($p < 0.001$), the postoperative retinal detachment ($p < 0.001$), surgery later than seven days ($p = 0.002$), the presence of corneal edema ($p = 0.005$), and high preoperative IOP ($p = 0.050$). In the logistical regression analysis, we may observe that only the presence of CME ($p = 0.003$) and retinal detachment ($p = 0.002$) were significant risks factors.

## Statistical analysis of the cystoid macular edema (Table 4)

In the univariate analysis only the time between the two operations ($p < 0.001$), the presence of uveitis in the preoperative period ($p = 0.001$) and corneal edema ($p = 0.005$) were statistically significant risk factors. In the logistical regression analysis only preoperative uveitis ($p = 0.011$) and corneal edema ($p = 0.034$) were significant risk factors.

Statistical analysis of results of PPV performed at the time of phacoemulsification (Table 5).

In nine patients, PPV was performed immediately after lens loss, with final visual acuity being better in this group of patients. Seven of the nine had a final visual acuity over 20/40 (77.77%). None of these patients had uveitis or high IOP, and no patients developed secondary glaucoma. Moreover, the development of CME post-operative appeared in only one patient (11.11%). The application of McNemar test is significant for all risk factors studied except. Gender, the presence of corneal edema and AC-IOL.

In the logistical regression analysis the postoperative uveitis, secondary glaucoma, CME development and retinal detachment benefit from PPV at the time of primary cataract surgery.

# Discussion

Several studies describing the clinical course of patients who had PPV for retained lens fragments show that most postoperative complications included glaucoma, retinal detachment, endophthalmitis and cystoid macular edema. Also, a lot of controversy persists in these studies about the timing of vitrectomy after the primary cataract surgery.

The visual acuity of eyes that have undergone PPV has improved since the earlier reports, which showed a final visual acuity better than 0.5 in 42% (Blodi et al 1992; Gilliland et al 1992; Kim et al 1994; Borne et al 1996). More

**Table 4** Statistical analysis of the final corrected visual acuity and cystoid macular edema in respect of the studied risk factors

| | **Final visual acuity** | | | | **Cystoid macular edema** | | | |
|---|---|---|---|---|---|---|---|---|
| | **Univariate analysis** | | **Logistic regression** | | **Univariate analysis** | | **Logistic regression** | |
| | P value | IC interval 95% | P value | IC interval 95% | P value | IC interval 95% | P value | IC interval 95% |
| Gender | 0.676 | 0.492–1.581 | 0.246 | 0.326–78.339 | 0.309 | 7.63 ± 0.92 | 0.483 | 0.240–20.463 |
| High IOP | 0.050 | 1.022–3.086 | 0.310 | 0.186–22.135 | 0.334 | 11/73 | 0.232 | 0.396–45.731 |
| Surgery timing | 0.002 | 1.318–5.120 | 0.628 | 0.023–9.646 | <0.001 | 6/38 | 0.259 | 0.380–36.458 |
| Corneal edema | 0.005 | 1.256–4.183 | 0.088 | 0.002–1.535 | 0.005 | 11/87 | 0.034 | 2.80–15.66 |
| Uveitis | 0.587 | 0.603–2.395 | 0.204 | 0.331–79.254 | 0.001 | 13/78 | 0.011 | 2.073–36.828 |
| Retinal detachment | <0.001 | 0.320–6.636 | 0.002 | 0.229–7.254 | 0.338 | 0.667–1.739 | 0.677 | 0.112–33.220 |
| Postoperative CME | <0.001 | 1.888–26.893 | 0.003 | 0.000–10.072 | | | | |
| AC-IOL | 0.671 | 0.492–1.577 | 0.104 | 0.623–66.834 | 0.093 | 0.667–1.739 | 0.719 | 0.203–10.092 |

**Table 5** Statistical analysis of the final corrected visual acuity in respect of the studied risk factors, in patients in who the PPV was performed at the time of the complicated primary cataract surgery

| | Univariate analysis | | Logistic regression | |
|---|---|---|---|---|
| | P value | IC interval 95% | P value | IC interval 95% |
| Gender | 0.676 | 0.034–2.133 | 0.295 | 0.026–3.027 |
| Surgery timing | <0.001 | 3.318–15.120 | <0.001 | 1.224–13.323 |
| Corneal edema | 0.465 | 0.355–1.893 | 0.609 | 0.067–2.658 |
| Uveitis | 0.002 | 0.936–1.986 | 0.022 | 0.988–11.232 |
| Postoperative CME | <0.001 | 2.599–28.781 | 0.031 | 1.233–10.761 |
| Secondary glaucoma | <0.001 | 4.718–30.138 | 0.024 | 1.221–9.223 |
| Retinal detachment | <0.001 | 0.983–27.331 | 0.002 | 0.877–11.225 |
| AC-IOL | 0.180 | 0.444–5.010 | 0.089 | 0.696–4.945 |

recently, studies have reported final visual acuity better than 0.5 in 60%–68% (Oruc 2001; Rossetti et al 2002; Scott et al 2003) of the patients. Our results show 59.60% of patients with vision 0.5 or higher, but we should take into account that we have seen changes over time. In the course of the study, visual acuity has decreased and the final visual acuity higher than 0.5 was achieved by only 42.60% of the patients. The major decrease was observed in the six months postoperative period, a possible explanation being that during the first six months postoperative period CME appeared and many patients suffered a decrease in their vision that many cannot recover. This finding is similar to Greven et al (2004).

In all published studies, the most serious threat to vision is retinal detachment. An extensive study by Moore et al (2003) described a preoperative rate of RD of 7.3%, contrary to the results of this study, which had no patients with RD before PPV. This finding is not exceptional and in the literature there are other authors with similar findings (Kapusta et al 1996; Stilma et al 1997). Preoperative RD is a major risk factor related to the manipulation of vitreous during the primary cataract surgery, therefore correct postoperative care of cataracts may decrease the risk. In our study, RD after PPV appeared in 6.40% of patients, and appeared within the two months after surgery. These findings were similar to those of other authors, who found a 3.5%–9% rate of RD (Borne et al 1996; Kapusta et al 1996; Olsson et al 2000; Oruc et al 2001; Moore et al 2003).

The authors think that the scrupulous exploration of the periphery during vitrectomy and in the postoperative follow-up is important. In fact, we encountered breaks and tears in 7 patients (14.89%) during the PPV surgery, and in the postoperative follow-up in 6 patients (12.76%) who needed argon laser photocoagulation, appearing 4.18 ± 1.33 months after PPV surgery. We should, therefore, observe the patients carefully in the postoperative period because the rate of new retinal breaks or retinal detachment is high in this type of patient. It is interesting that in the preoperative period the majority of breaks are located inferiorly, opposite to the limbal incision at the cornea, a finding which suggests that the etiology may be related to the vitreous traction on the peripheral retina during removal of dislocated fragments toward the corneal incision.

In the postoperative period a major visual decrease is attribute to the cystoid macular edema (Cohen et al 2006). In the present study CME is the major cause of visual impairment, but there are several important considerations when studying eyes with CME after PPV for retained lens nucleus. Because CME can occur several months after surgery, adequate follow-up is important (Nelson 2003; Tranos et al 2004). In our study fifteen patients (31.91%), suffered CME in the first six months of the PPV, and we should take into account that in six patients (12.76%) the CME has still not been resolved 4.56 ± 1.34 years later and continues as a chronic problem.

The appearance of postoperative secondary glaucoma in the present study (25.53%) is similar to other studies (Vilar et al 1997; Yang et al 2002; Hansson et al 2002). It is worth noting that in patients with AC-IOL, the rate of glaucoma is higher than in those with sulcus implanted IOL. Also, secondary complications to the implantation of AC-IOL included two patients who presented bullous keratopathy that needed IOL exchange. We are not surprised by these complications because these types of patients had suffered traumatic primary cataract surgery, which decreases the rate of endothelial cells in the cornea. An alternative to CA lens implantation may be the scleral-sulcus sutured lens, but we have never performed this type of lens implantation in our centre.

Many authors have reported that the time between lens loss in the vitreous and the vitrectomy surgery is not a risk factor to final visual acuity (Monshizadeh et al 1999; Scott

2001; Kim et al 2002; Kwok 2002; Yang et al 2002). In the present study, we have classified those patients who had PPV within seven days of the primary cataract surgery, and those who were operated on after seven days, and the results of the Logistic Regression analysis show that timing is not a risk factor, despite the fact that the univariante analysis by applying the McNemar test shows that it is.

In spite of having a small group of patients (nine) on whom we could perform the PPV at the time of primary cataract surgery, final visual acuity in this group is better than in the others patients, with 77.77% of patients having vision higher than 0.5. Also this group developed CME in only one case (11.11%) and secondary glaucoma did not appear after surgery. These findings are similar to Kageyama et al (2001) and Kim et al (Kim JE et al 1994). The clinico-pathological correlation by Yeo et al (1999) found a significant correlation between the number of the inflammatory cells in the vitreous and the timing of the vitrectomy.

The few cases in this group does not allow us to recommend definitively PPV in the event of cataract surgery complications, and we should take into account that informed consent of cataract surgery does not ordinarily include the consent for PPV, so the surgeon would have to inform the patient while in the operating room, and familiarize the patient of the procedure. Furthermore, anesthesia used in the primary cataract surgery may make the PPV difficult, particularly with topical anesthesia.

Being retrospective, our study was not result conclusive, despite the initial good results of these patients after PPV surgery, so follow-up should be accurate and continued, in order to minimize postoperative complications such as retinal detachment, retinal breaks, secondary glaucoma and CME.

## Reports of clinical studies

None of the authors has a financial or proprietary interest in any material or method mentioned.

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