· Clinical Research ·

# Comparison of postoperative anterior segment changes associated with pars plana vitrectomy with and without vitreous base shaving

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## Abstract
● **AIM:** To compare changes in anterior segment topography and axial length (AL) evaluated with Pentacam and IOL Master after pars plana vitrectomy (PPV) performed with and without vitreous base shaving.

● **METHODS:** This prospective study included patients who underwent PPV or phacoemulsification+PPV (Phaco+PPV) for various indications. Patients who underwent total posterior hyaloid detachment and excessive vitreous base shaving with scleral indentation were referred to as complete PPV (c-PPV). The patients whom posterior hyaloid was separated as far as the posterior arcades and vitreous base shaving with scleral depression was not performed were classified as the partial PPV (p-PPV) group. All patients underwent detailed ophthalmologic examinations preoperatively and 1wk, 1, and 3mo postoperatively. Changes in the anterior chamber depth (ACD), anterior chamber volume (ACV), iridocorneal angle (ICA), central corneal thickness (CCT), and keratometric measurements ($K_1$ and $K_2$) were evaluated with Pentacam HR. Changes in the AL measurements were analyzed with IOL Master.

● **RESULTS:** A significant increase in ACD was observed in c-PPV cases (*P*=0.02), but this increase was not significant in the p-PPV group (*P*=0.053). In contrast, ICA increased significantly in the c-PPV group (*P*=0.02) but decreased in the p-PPV group (*P*=0.09). BCVA was significantly improved in the c-PPV group from week 1 (*P*<0.001) while the increase in the p-PPV group reached significance at 3mo (*P*=0.035). CCT increased in the first week and later returned to baseline in both groups. No significant differences in the other parameters were observed between the groups, and there were no significant changes in intraocular pressure, ACV, AL, $K_1$ or $K_2$ values (*P*>0.05 for all).

● **CONCLUSION:** Incomplete posterior hyaloid excision and not removing the vitreous base in PPV surgeries may create a more stable anterior chamber, thus preventing the downward movement of the lens-iris diaphragm, and may cause ciliary body retraction, thereby reducing ICA. Awareness of these effects can provide some amount of guidance to physicians in selecting the appropriate PPV procedure and preempting surgical complications.

● **KEYWORDS:** anterior chamber depth; axial length; central corneal thickness; iridocorneal angle; pars plana vitrectomy; vitreous base

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## INTRODUCTION

The rapid development of anterior segment imaging technology in recent years has enabled the acquisition of vital information when evaluating ocular surgical outcomes and analyzing anterior segment changes. Among the major cornerstones of this advancement are the Pentacam HR (Oculus, Wetzlar, Germany), developed by adaptating the Scheimpflug imaging system to anterior segment imaging, and the IOL Master (Carl Zeiss Meditec, Jena, Germany), the first device to use partial coherence interferometry technology[1].

In parallel with these advances in anterior segment technology, pars plana vitrectomy (PPV) has become one of the most common intraocular procedures after cataract surgery in the 50y since Machemer developed closed vitrectomy instrumentation in the 1970s.

One of the main objectives of PPV is removing the vitreous from the globe completely. In this context, the ideal extent of vitreous removal during PPV has again become a topic of discussion due to the increasing popularity of surgeries performed with small sclerotomy entries. The narrow instruments used in small sclerotomy surgeries make it difficult to remove the vitreous base with an effective scleral indentation[2]. Authors have also described partial vitrectomy techniques which recommend separating the posterior hyaloid as far as the posterior arcades instead of the periphery in order to decrease the risk of peripheral retinal breaks during posterior hyaloid detachment, especially in macular surgeries[3-4].

Evaluating the results of vitreoretinal surgery with newly developed anterior segment imaging technologies has provided a new dimension to this issue in terms of analyzing functional outcomes and understanding the physiopathological mechanisms of potential complications such as angle closure, posterior synechia development, and increased intraocular pressure (IOP)[5-8].

Within this context, the aim of this study was to compare changes in anterior segment topography with Pentacam and IOL Master in patients who underwent PPV or combined PPV and phacoemulsification (phaco+PPV) with respect to whether vitreous base shaving was performed.

## SUBJECTS AND METHODS

**Ethical Approval** Approval was obtained from the university's clinical research ethics committee prior to the study. Written informed consent forms were obtained from the patients. The study was conducted in accordance with the Declaration of Helsinki and the Guidelines for Good Clinical Practice.

**Subjects and Enrollment Criteria** This prospective study included patients who underwent PPV or phaco+PPV for various indications including retinal detachment (RD), proliferative diabetic retinopathy (PDR), epiretinal membrane (ERM) or macular hole (MH). Best corrected visual acuity (BCVA) on Snellen chart, IOP measured by Goldmann applanation tonometry, and slit-lamp anterior and posterior segment examination findings were recorded for all patients preoperatively and at postoperative 1wk, 1, and 3mo. BCVA values were converted to logMAR equivalents for statistical analysis.

**Exclusion Criteria** Patients under 18 years of age, those with a history of ocular surgery or trauma (except cataract surgery more than 6mo earlier), those with corneal opacity, those who used topical drops within the past 3mo due to chronic uveitis or glaucoma, and those with a systemic disease other than diabetes were excluded from the study. In addition patients who required scleral sutures at the end of surgery and those who were performed endolaser panretinal photocoagulation, which was thought to affect anterior segment parameters, were excluded from the study with the help of the information obtained from the literature[9-11]. Patients who developed intraoperative or postoperative complications [*e.g.*, pupillary synechia, pupillary block, fibrin membran formation, intraocular lens (IOL) dislocation, vitreous hemorrhage, IOP>30 mm Hg or <8 mm Hg] and those who received intraocular silicone tamponade were also excluded.

**Measurements** The Pentacam HR obtains a three-dimensional image of the area between the anterior surface of the cornea and the posterior surface of the lens, and measures parameters such as central corneal thickness (CCT), anterior chamber depth (ACD), iridocorneal angle (ICA), anterior chamber volume (ACV) and keratometric measurements. In contrast to the Pentacam, the IOL Master also provides information on axial length (AL) by using partial coherence interferometry at a wavelength of 780 nm[12-13].

In this study, we obtained ACD, ACV, ICA, CCT, and keratometric measurements with a Pentacam HR at the patients' preoperative and postoperative follow-up visits, and measured AL with an IOL Master 500 preoperatively and at postoperative 3mo. Measurements were performed in a dimly-lit room to ensure natural pupil dilation. The patients were seated with head and chin stabilized and both eyes open and 50 slit images obtained in approximately 2s. ICA values were obtained in a single measurement passing through the horizontal quadrant.

**Surgical Technique and Postoperative Care** All procedures were performed by the same surgeon (Koytak A) following the same protocol. PPV was performed for pseudophakic patients, while phaco+PPV was planned for all phakic patients. It was paid attention that the groups were matched in terms of those surgical procedures. Cyclopentolate hydrochloride 1% and tropicamide 1% eye drops were instilled 30min before surgery to induce pupil dilation. After administering retrobulbar local anesthesia (bupivacaine, Marcaine vial 0.5%, AstraZeneca, Istanbul, Turkey) or general anesthesia, sterilization procedures were carried out and standard 4-port PPV was performed (Constellation, Alcon Laboratories, Inc., Fort Worth, TX, USA). Sclerotomies were made 4 mm from the limbus in phakic eyes and 3.5 mm in pseudophakic or aphakic eyes using 23-gauge (G) valve trocars without conjunctival incisions. An infusion line was introduced in the lower temporal quadrant and balanced salt solution (BSS) was used as the infusion fluid. Entry sites for the vitrectomy and endoillumination probes were created in the superotemporal and superonasal quadrants (at about 2 and 10 o'clock). A fourth entry for the chandelier light was made in the superior quadrant with a 25-G valveless trocar. Triamcinolone was used to enhance the visibility of the vitreous, and core vitrectomy was performed.

Two divergent approaches were used after this stage. A cohort of patients who underwent total posterior hyaloid detachment and excessive vitreous base shaving with scleral indentation were referred to as complete PPV (c-PPV). The patients whom posterior hyaloid was separated as far as the posterior arcades and vitreous base shaving with scleral depression was not performed were classified as the partial PPV (p-PPV) group.

Membrane Blue-Dual® (D.O.R.C International Zuidland, Netherlands) dye was used to enhance membrane visibility in patients with ERM and MH. The retina was attached when necessary with perfluorodecalin (Perfluoron; Alcon Inc, USA). When indicated, membranes were stripped with microsurgical instruments and tractions were released. Endolaser photocoagulation was applied only around tears and holes. The patients received 16% $C_3F_8$ (Meran, Istanbul, Turkey), air or BSS as a tamponade. Groups were also matched according to tamponade types. Cases requiring conjunctival or scleral sutures due to leakage after surgery were excluded from the study.

In patients scheduled for combined phaco+PPV, lens extraction was performed by standard phacoemulsification after placing the infusion trocar for PPV (Infinity, Alcon Laboratories, Inc., Fort Worth, TX, USA). Anterior chamber paracentesis was performed through a clear corneal incision made on the 9-10 o'clock line with a 2.4-mm crescent knife. Capsulorhexis was completed under the viscoelastic agent 1.4 sodium hyaluronate (Healon GV, Johnson&Johnson, USA). The nucleus and cortical material were removed by phacoemulsification and irrigation/aspiration. As standard procedure, all patients received a monoblock hydrophobic IOL (AcrySof SA60AT, Alcon Laboratories Inc., Fort Worth, TX, USA). The procedure concluded with intracameral injection of 0.1 mL moxifloxacin. Postoperative treatment consisted of topical ciprofloxacin 0.3% and topical dexamethasone 0.1% instilled 4 times daily.

**Statistical Analysis** Statistical analyses were performed using SPSS version 20.0 for Windows (SPSS Inc., Chicago, IL, USA) software. Variables were expressed as mean, standard deviation, and percentages. Chi-square and Fisher's exact tests were used to compare percentages between the groups. Data distribution patterns were determined using the Shapiro-Wilk test. The independent groups were compared using appropriate parameteric or nonparametric tests (independent samples *t* test for normal distributions, Mann-Whitney *U* test for nonnormal distributions). For repeated measures of dependent samples, the general linear model was used for groups with normal distribution and the Friedman test was used for those with non-normal distribution. Correlation analysis was performed with a Pearson or Spearman test according to the distribution pattern. Results with *P* values less than 0.05 were accepted as statistically significant.

## RESULTS

Eighty-eight eyes of 88 patients were included in the study. There were 44 patients in the c-PPV group and 44 patients in the p-PPV group. The mean age in these groups was 60.29±10.06 and 62.07±5.71y, respectively ($P$=0.23). No significant difference was found between the groups in terms of sex distribution, phaco+PPV rate, type of intraocular tamponade used and surgical diagnosis ($P$=0.52, 1.00, 1.00, and 0.47 respectively). The clinical and demographic characteristics of the patients are summarized in Table 1.

**Table 1 Clinical and demographic characteristics of the patients**

| Characteristics | Complete PPV (*n*=44) | Partial PPV (*n*=44) | *P* |
|---|---|---|---|
| Age (y) | 60.29±10.06 | 62.07±5.71 | 0.23[a] |
| Gender, *n* (%) | | | 0.52[b] |
| Male | 20 (45.4) | 17 (38.6) | |
| Female | 24 (54.5) | 27 (61.4) | |
| Diagnosis, *n* (%) | | | 0.47[b] |
| PDR | 24 (54.5) | 20 (45.4) | |
| RD | 6 (13.6) | 0 | |
| ERM | 10 (22.7) | 18 (40.9) | |
| MH | 4 (9.1) | 6 (13.6) | |
| Surgery, *n* (%) | | | 1.00[b] |
| PPV | 29 (65.9) | 29 (65.9) | |
| Phaco+PPV | 15 (34.1) | 15 (34.1) | |
| Tamponade, *n* (%) | | | 1.00[b] |
| Air | 26 (59.1) | 26 (59.1) | |
| BSS | 11 (25.0) | 11 (25.0) | |
| $C_3F_8$ | 7 (15.9) | 7 (15.9) | |

PPV: Pars plana vitrectomy; PDR: Proliferative diabetic retinopathy; RD: Retinal detachment; ERM: Epiretinal membrane; MH: Macular hole; BSS: Balanced salt solution. [a]Independent samples *t*-test; [b]Chi-square test.

There was a significant increase in BCVA values after the surgery in both groups ($P$<0.001). However, while the increase in the c-PPV group was significant starting from postoperative week 1 ($P$<0.001), the increase in the p-PPV group reached significance at 3mo ($P$=0.035; Figure 1A, Table 2). No significant change in IOP was observed in either group ($P$>0.05 for all; Table 3, Figure 1B).

There was a trend toward increasing of ACD in both groups. This increase was significant in the c-PPV group ($P$=0.02; Figure 1C, Table 4).

ACV also increased in both groups but did not reach statistical significance ($P$=0.261 in c-PPV; $P$=0.509 in p-PPV; Figure 1D, Table 5).

ICA increased significantly in the c-PPV group, but tended to decrease in the p-PPV group ($P$=0.022 and 0.094, respectively; Figure 1E, Table 6).

CCT was significantly increased at postoperative 1wk in both groups ($P$=0.005 in c-PPV, $P$=0.016 in p-PPV), and returned to baseline at 3mo (Table 7, Figure 1F). No significant changes in $K_1$ or $K_2$ values were observed in either group ($P$>0.05 for all values, Figure 1G, 1H).

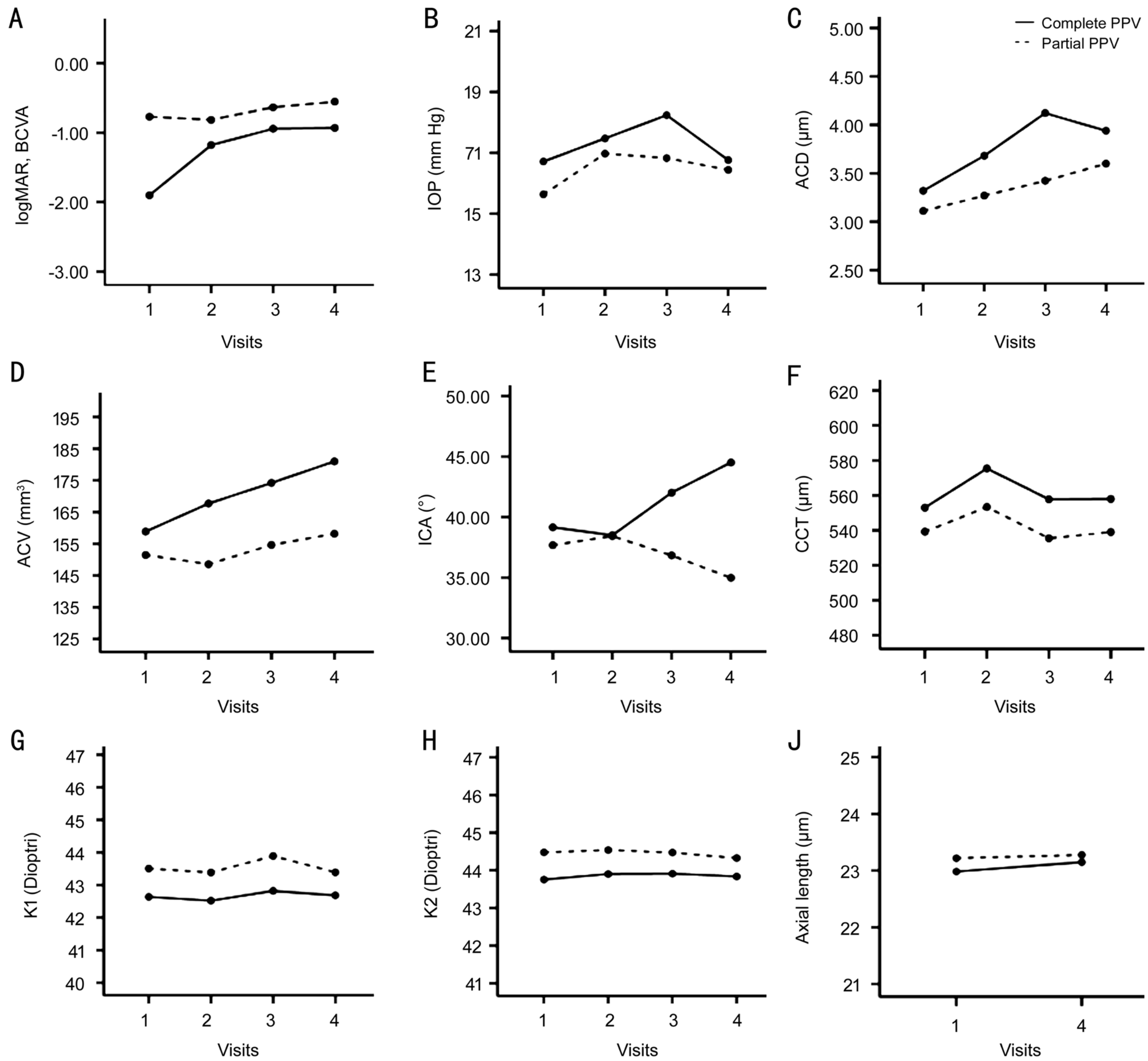


**Figure 1 Pentacam and IOL Master measurements in complete and partial PPV surgeries** BCVA: Best corrected visual acuity; IOP: Intraocular pressure; ACD: Anterior chamber depth; ACV: Anterior chamber volume; ICA: Iridocorneal angle; CCT: Central corneal thickness; $K_1$ and $K_2$: Keratometric measurements; 1: Preoperative visit; 2: Postoperative 1wk; 3: Postoperative 1mo; 4: Postoperative 3mo.

**Table 2 BCVA measurements in PPV procedures** mean±SD

| BCVA (logMAR) | Complete PPV | $^{a}P$ | Partial PPV | $^{a}P$ | $^{b}P$ |
|---|---|---|---|---|---|
| Preop. | 1.90±0.95 | - | 0.77±0.48 | - | <0.001 |
| Postop. 1wk | 1.18±0.84 | <0.001 | 0.81±0.50 | 0.658 | 0.038 |
| Postop. 1mo | 0.94±0.77 | <0.001 | 0.63±0.43 | 0.154 | 0.049 |
| Postop. 3mo | 0.93±0.89 | <0.001 | 0.55±0.42 | 0.035 | 0.028 |
| $^{c}P$ | <0.001 | - | 0.006 | - | - |

PPV: Pars plana vitrectomy; BCVA: Best corrected visual acuity; SD: Standard deviation. [a]Adjustment for multiple comparisons: least significant difference *vs* preoperative; [b]Adjustment for multiple comparisons: least significant difference between groups; [c]Multivariate test. Wilks' lambda.

There was no significant difference between the groups in terms of change in AL at postoperative 3mo compared to baseline. AL increased from 22.98±1.81 to 23.14±1.16 mm in the c-PPV group and from 23.21±0.87 to 23.27±0.96 mm in the p-PPV group (*P*=0.07 and 0.74 respectively; Figure 1J).

## DISCUSSION

Considering the anatomical proximity of the vitreous to the posterior capsule and ora serrata, we designed this study to determine to what extent the vitreous impacts the outcomes of PPV surgery when not removed. We observed a significant increase in ACD in c-PPV eyes, which underwent vitreous base shaving, whereas this increase did not reach significance in the p-PPV group. In contrast, ICA increased significantly in the c-PPV group but showed a decreasing trend in the p-PPV group.

**Table 3 IOP comparisons between the PPV procedures** mean±SD

| IOP (mm Hg) | Complete PPV | $^{a}P$ | Partial PPV | $^{a}P$ | $^{b}P$ |
|---|---|---|---|---|---|
| Preop. | 17.71±4.25 | - | 15.63±3.21 | - | 0.267 |
| Postop. 1wk | 17.48±6.85 | 0.458 | 16.98±4.88 | 0.071 | 0.741 |
| Postop. 1mo | 18.24±7.79 | 0.157 | 16.83±4.28 | 0.122 | 0.360 |
| Postop. 3mo | 16.76±4.59 | 0.949 | 16.44±4.20 | 0.138 | 0.783 |
| $^{c}P$ | 0.332 | - | 0.241 | - | - |

PPV: Pars plana vitrectomy; IOP: Intraocular pressure; SD: Standard deviation. [a]Adjustment for multiple comparisons: least significant difference *vs* preoperative; [b]Adjustment for multiple comparisons: least significant difference between groups; [c]Multivariate test. Wilks' lambda.

**Table 4 ACD measurements in PPV procedures** mean±SD

| ACD (mm) | Complete PPV | $^{a}P$ | Partial PPV | $^{a}P$ | $^{b}P$ |
|---|---|---|---|---|---|
| Preop. | 3.31±0.97 | - | 3.11±0.92 | - | 0.487 |
| Postop. 1wk | 3.68±0.90 | 0.134 | 3.26±1.04 | 0.305 | 0.202 |
| Postop. 1mo | 4.12±0.69 | 0.003 | 3.42±1.03 | 0.059 | 0.025 |
| Postop. 3mo | 3.93±0.83 | 0.021 | 3.59±1.18 | 0.005 | 0.336 |
| $^{c}P$ | 0.020 | - | 0.053 | - | - |

PPV: Pars plana vitrectomy; ACD: Anterior chamber depth; SD: Standard deviation. [a]Adjustment for multiple comparisons: least significant difference *vs* preoperative; [b]Adjustment for multiple comparisons: least significant difference between groups; [c]Multivariate test. Wilks' lambda.

**Table 5 ACV measurements in PPV procedures** mean±SD

| ACV (mm$^3$) | Complete PPV | $^{a}P$ | Partial PPV | $^{a}P$ | $^{b}P$ |
|---|---|---|---|---|---|
| Preop. | 158.85±31.09 | - | 151.48±47.83 | - | 0.599 |
| Postop. 1wk | 167.71±21.51 | 0.398 | 148.57±46.91 | 0.669 | 0.152 |
| Postop. 1mo | 174.21±28.26 | 0.106 | 154.66±41.82 | 0.602 | 0.118 |
| Postop. 3mo | 181.00±44.56 | 0.051 | 158.18±45.67 | 0.356 | 0.122 |
| $^{c}P$ | 0.261 | - | 0.509 | - | - |

PPV: Pars plana vitrectomy; ACV: Anterior chamber volume; SD: Standard deviation. [a]Adjustment for multiple comparisons: least significant difference *vs* preoperative; [b]Adjustment for multiple comparisons: least significant difference between groups; [c]Multivariate test. Wilks' lambda.

**Table 6 ICA measurements in PPV procedures** mean±SD

| ICA (°) | Complete PPV | $^{a}P$ | Partial PPV | $^{a}P$ | $^{b}P$ |
|---|---|---|---|---|---|
| Preop. | 39.15±10.93 | - | 37.67±12.20 | - | 0.640 |
| Postop. 1wk | 38.48±10.51 | 0.769 | 38.42±11.89 | 0.644 | 0.983 |
| Postop. 1mo | 42.01±8.41 | 0.223 | 36.82±10.46 | 0.607 | 0.053 |
| Postop. 3mo | 44.50±8.34 | 0.020 | 34.96±8.34 | 0.094 | <0.001 |
| $^{c}P$ | 0.022 | - | 0.094 | - | - |

PPV: Pars plana vitrectomy; ICA: Iridocorneal angle; SD: Standard deviation. [a]Adjustment for multiple comparisons: least significant difference *vs* preoperative; [b]Adjustment for multiple comparisons: least significant difference between groups; [c]Multivariate test. Wilks' lambda.

**Table 7 CCT measurements in PPV procedures** mean±SD

| CCT (mm) | Complete PPV | $^{a}P$ | Partial PPV | $^{a}P$ | $^{b}P$ |
|---|---|---|---|---|---|
| Preop. | 553.00±41.63 | - | 539.20±33.65 | - | 0.233 |
| Postop. 1wk | 575.37±44.55 | 0.005 | 553.34±37.78 | 0.016 | 0.086 |
| Postop. 1mo | 557.75±37.50 | 0.554 | 535.48±37.26 | 0.532 | 0.062 |
| Postop. 3mo | 557.93±39.52 | 0.321 | 539.03±32.41 | 0.963 | 0.091 |
| $^{c}P$ | 0.036 | - | 0.028 | - | - |

PPV: Pars plana vitrectomy; CCT: Central corneal thickness; SD: Standard deviation. [a]Adjustment for multiple comparisons: least significant difference *vs* preoperative; [b]Adjustment for multiple comparisons: least significant difference between groups; [c]Multivariate test. Wilks' lambda.

One of the main objectives of PPV surgery is to remove the vitreous from the globe. In this respect, the question of to what extent the vitreous should be removed in PPV remains a current issue due to the increasing popularity of small sclerotomy procedures as well as surgeons' efforts to minimize the risk of peripheral retinal tear in macular surgeries[2-4].

For a brief anatomical review, the vitreous comprises three parts: the central vitreous, vitreous base, and cortical vitreous[14]. The vitreous base extends beyond the borders of the ora serrata 2 mm anteriorly and 4 mm posteriorly, and is the part of the vitreous containing very dense collagen fibers and adhering most strongly to the retina. With age, its boundaries widen and advance posteriorly[15].

After extending in the anterio-posterior direction in the central vitreous, collagen fibers insert anteriorly into the vitreous base. Although collagen fibrils in the vitreous base insert radially into the internal limiting membrane (ILM), they run parallel in other parts. The mechanism of adhesion between the vitreous cortex and ILM is not clear, but is believed to involve extracellular adhesion molecules[16-17].

Another site of tight attachment between the vitreous and retina is the posterior lens capsule. The anterior vitreous and posterior capsule are connected by the hyaloido-capsular ligament (Weigert's ligament). With age, a gap called Berger's space forms between the anterior hyaloid and the lens[18].

Considering the close anatomical relationship between the vitreous and the posterior capsule and ora serrata, we conducted the present study, which is the first study in the literature to the best of our knowledge, to investigate how the residual vitreous base affects anterior segment topography after p-PPV surgeries.

Corneal and anterior segment topography is undoubtedly an important parameter affecting the functional success of PPV and postoperative visual rehabilitation. Contradictory results have been reported in the literature regarding changes in ACD and ICA after PPV.

The first hypothesis was that PPV disrupts the blood-aqueous barrier and increases angiogenic factors, causing supraciliary effusion and resulting in a temporary decrease in ICA and ACD[6,19]. Park *et al*[9] also confirmed this hypothesis in their analysis of PDR cases and even reported that ACD and ICA decreased more after combined phaco procedures due to higher levels of inflammation. Park also stated that they did not remove the anterior vitreous in that study. However, the surgeries in their study were performed using a sutured 20-G technique, and they did not exclude patients with postoperative complications. Similarly, in a study of 238 RD cases, Huang *et al*[20] reported a decrease in ACD in the long term (6 and 12mo) and attributed this to ciliary body edema secondary to the sclerotomy entry sites. However, as that study does not include short-term results, we cannot compare it with the present study.

In contrast to earlier publications, recent studies have shown that PPV reduces ciliary body thickness[21-22]. In addition, unlike *et al*[9] and Watanabe *et al*[23] reported that ACD was increased in patients who underwent combined phaco+PPV because the IOL is thinner than the natural lens. Therefore, anterior segment changes due to ciliary body edema seem not to be a normal outcome of PPV surgery, but rather a special condition secondary to intense inflammation.

The intraocular tamponades used in surgery are another parameter suspected to have an effect on ACD change. Several studies have demonstrated that intravitreal gas causes a decrease in ACD during the first weeks[10,23-24]. This effect is also reported to be more common in monoblock lenses compared to three-piece lenses or IOLs with small optical diameters[7,23]. It has been proposed that the high surface tension between gas and liquid and the tendency of gas to rise due to its low specific gravity displace the lens-iris diaphragm anteriorly, with this mechanism explaining the anterior chamber collapse that occurs in aphakic eyes that receive gas[25].

Although gas is associated with reduced ACD, silicone was reported to cause no change[10,24]. In a study using 5000 cSt silicone, it was reported that silicone tends to increase ACD and ACV by reducing supraciliary effusion via its cohesive strength and by applying pressure to the ciliary body[26]. Huang *et al*[20] on the other hand, concluded that there was no difference between cases in which silicone and $C_3F_8$ were used. However, since their study analyzed 6- and 12-month results, the long-term comparison of silicone versus $C_3F_8$, which provides short-term tamponade, may have introduced bias. The literature also indicates that no significant difference is observed in ICA after PPV[22,26].

In the present study, ACD and ACV increased in both groups, but the increase in ACD was only significant in the c-PPV group. A more pronounced result was that ICA increased significantly in the c-PPV group but decreased in the p-PPV group. It is irrefutable that phaco surgery also contributed to the increase in ACD and ACV in both groups, but we predicted that these parameters would not affect between-group comparisons because there was no difference between the two groups in terms of phaco rate, IOL type, or use of tamponade. Therefore, if the anterior hyaloid and vitreous remaining at vitreous base are regarded as the only factor responsible for the differences between our groups, we can speculate that the residual vitreous may create a more stable anterior chamber, thus preventing the downward movement of the lens-iris diaphragm, and may also cause ciliary body retraction, thereby reducing ICA. Also another reason for the contradictory results in the literature may be the different grades of vitreous base shaving.

Preoperative visual acuity was lower in the c-PPV group and we observed significant improvements in BCVA in both groups postoperatively. While this occured in the first week in the c-PPV group, the increase in the p-PPV group became significant after the first month. Baseline BCVA difference in favor of the p-PPV group was not surprising, as the c-PPV group included the cases such as vitreous hemorrhage and RD, which decrease visual acuity more than ERM, at higher rates than the p-PPV group. In addition as the c-PPV group included patients with vitreous hemorrhage, we expected to see functional outcomes earlier compared to ERM and MH surgeries.

Consistent with the literature, AL did not change significantly in either group[20,27]. CCT values also increased in the first week in both groups and returned to baseline at 1 and 3mo, as reported in the literature. The early increase in CCT due to postoperative inflammation was also an expected outcome based on the literature[20,26], and various PPV procedures did not affect this change.

Conflicting results have also been published regarding postoperative changes in IOP. Park *et al*[9] reported that angle narrowing secondary to supraciliary effusion may cause an increase in IOP and that ciliary body failure may lead to hypotonia. It was also reported that silicone may cause IOP elevation in the early postoperative period[26]. Data regarding the effect of gas tamponade on IOP are also contradictory[28]. Hasegawa *et al*[8] conducted an analysis based on indications and reported that IOP was low on the first day after ERM and MH. In the present study, PPV had no significant effect on postoperative IOP changes, and there was no significant change in IOP in either group.

Another parameter affecting postoperative quality of vision after PPV is change in corneal keratometric values. It has been reported that in sutured 20-G surgeries, there was an increase in postoperative astigmatism and this increase was permanent in some cases. An analysis of patients with over 4.5 diopter postoperative astigmatism suggested that this difference was due to the healing pattern and suturing of the sclerotomy sites[29]. However, it was later shown that there was no significant difference in corneal keratometric values in surgeries performed using 23-G, 25-G, and 27-G techniques[28,30-34]. Similarly, we observed no significant change in keratomy values in either group in the present study.

A limitation of our study is the heterogeneity in terms of type of tamponade used and phaco/phaco+PPV surgery, although those parameteres were matched between the groups. In addition, it was not possible to perform statistical subgroup analyses for all parameters due to the small number of patients. Therefore, studies including larger, more homogeneous patient groups are needed.

In conclusion, whether or not vitreous base shaving is done may lead to some differences in the anterior segment due to the anatomical relationship between the vitreous and the posterior lens capsule and ciliary body. In patients that undergo partial vitrectomy, the anterior chamber appears more stable, while the angle may narrow over time in the early period. These findings may provide foresight in the analysis of potential risks for patients with shallow anterior chambers who may be more susceptible to complications after gas injection. To a certain extent, they may guide physicians in choosing a PPV procedure and preempt surgical complications.

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