·Clinical Research·

Clinical outcomes of 25-gauge vitrectomy surgery for vitreoretinal diseases: comparison of vitrectomy alone and phaco-vitrectomy

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Abstract

• AIM: To compare the clinical outcomes of combined 25-gauge pars plana vitrectomy (PPV) and phacoemulsification/posterior chamber intraocular lens (PC-IOL) implantation with vitrectomy alone surgery in patients with various vitreoretinal diseases.

• METHODS: A total of 306 eyes (145 with PPV alone and 161 with phaco-vitrectomy) were enrolled in this retrospective analysis. The surgical approach was 25-gauge PPV combined with phacoemulsification and PC-IOL implantation at the same time in eyes in phaco-vitrectomy group and only PPV in eyes in vitrectomy alone surgery group. The main outcome measures were postoperative clinical outcomes included anterior chamber inflammation, changes in intraocular pressure (IOP) and best corrected visual acuity (BCVA).

• RESULTS: The most common postoperative complication was anterior chamber reaction which has higher incidence in phaco-vitrectomy group (P<0.001). The mean postoperative 1st day IOP of vitrectomy alone group was significantly lower than that of phaco-vitrectomy group (16.3±5.8 mm Hg *vs* 17.8±8.1 mm Hg, respectively, P=0.02). Hypotony (IOP≤8 mm Hg) was not different between groups in the postoperative 1st day (P>0.05). The mean preoperative visual acuity was not different between groups (1.6±0.9 logMAR *vs* 1.8±0.9 logMAR, respectively, P>0.05). However, the mean visual acuity was decreased in vitrectomy alone group at the final visit compared to phaco-vitrectomy group (1.2±0.8 logMAR, 0.9±0.7 logMAR, respectively P<0.05).

• CONCLUSION: Twenty-five gauge PPV combined with phacoemulsification surgery is a safe and efficient procedure, which can be preferred in phacic patients with a variety of vitreoretinal diseases compared to vitrectomy alone. Despite improved outcomes, this approach is not free of limitations as anterior chamber complications especially with combined surgery.

• **KEYWORDS:** pars plana vitrectomy; phacoemulsification; small gauge vitrectomy

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INTRODUCTION

Over the last few years, as modern cataract and vitreous surgical technique has progressed, combined cataract and vitreoretinal surgery has become a well-established procedure [1]. As the development of the phaco-vitrectomy technique, numerous surgeons prefer cataract surgery combined with pars plana vitrectomy (PPV) to avoid the need for subsequent cataract surgery[2]. Although combined surgery eliminates the need for second surgical procedure, provides earlier visual rehabilitation and avoid the difficulty due to subsequent surgeries[3]; some surgeons prefer only vitrectomy in their patients due to the thought that visualization is enough for the management of those patients` complaints.

Transconjunctival sutureless vitrectomy systems have expanded the treatment options available to surgeons and patients [4]. After the introduction of 25-gauge transconjunctival PPV system in 2002 by Fujii *et al* [5], the use of small gauge systems has grown steadily among vitreoretinal surgeons because of reduced mean surgical time, less postoperative inflammation and less patient discomfort[6-7]. In addition, with the development of new generation high-speed vitrectomy systems, vitrectomy time was reduced due to cute rate of 5000 cps per minute and duty cycle control, which increased the efficacy and safety of small-gauge vitrectomy surgeries[4]. Therefore 25-gauge PPV combined with phacoemulsification has gained a wide acceptance[6].

There are several studies in the literature regarding the use of combined surgery with a variety of techniques [8-10]. However there are very few reports using 25-gauge procedure in which the design of the study differs between each other with

relatively small patient populations [2,11-12]. In this study, we aimed to review our experience with a large group of combined cases and compare the results with patients who had only vitrectomy with 25-gauge high-speed PPV for the management of various vitreoretinal diseases.

SUBJECTS AND METHODS

Study Population In this retrospective analysis, we enrolled a consecutive subset of 532 patients with the diagnosis of vitreoretinal diseases following PPV, between April 2012 and September 2014 in our ophthalmology department. We included phacic patients who underwent 25-gauge high-speed PPV with an at least 6mo of follow up time. Patients were divided into two groups as PPV alone or phaco-vitrectomy.

The exclusion criteria are; operations with 20 or 23 gauge vitrectomy, history of previous vitrectomy, history of intravitreal injections of pharmacotherapeutics given at the end of the procedure, a lens status of aphakia or pseudophakia, surgery for penetration injury, endophthalmitis and dropped nucleus. The operations were performed by one experienced vitreoretinal surgeon (Toklu Y). All patients in combined phaco-vitrectomy group had clinically significant cataract that affect the visualization.

The medical records were reviewed for each patient with regard to the following data: age, gender, systemic diseases, lens status, best corrected visual acuity (BCVA), vitreoretinal disease, photocoagulation during surgery, intraocular tamponade usage, intraoperative and postoperative complications (such as anterior chamber inflammation, posterior synechiae, angle closure, hyphema, retinal detachment, retinal tears, vitreous hemorrhage), intraocular pressure (IOP) measurement with Goldmann applanation tonometry, slit-lamp biomicroscopy, fundus contact lens/indirect biomicroscopy. All postoperative examinations were performed by the operator. Anterior chamber reaction was accepted as more than +2 anterior chamber cell. Hypotony is defined as IOP≤8 mm Hg and severe hypotony defined as IOP≤5 mm Hg.

After the surgery, topical antibiotics and topical prednisolone acetate (1%) were used with the same dosage in both groups for one month. If there was an anterior chamber reaction topical prednisolone acetate was advised every two hours/day for the 1st week and the dose decreased progressively. Topical 1% cyclopentolate was advised for one week in all patients. After the macular hole and retinal detachment surgery, patients were advised to posture face-down for 8h per day for 3-7d.

The main outcome measures included anterior chamber inflammation, changes in IOP and BCVA. Secondary outcome measures included safety parameters, such as intraoperative and postoperative complications.

Informed consent was obtained from all patients and the study was approved by the Ethical Committee of our hospital, carried out in accordance with the principles of the Declaration of Helsinki.

Surgical Technique All surgical procedures were performed with the Constellation Vision System (Alcon Laboratories, Inc., Fort Worth, TX, USA), which were set at cutting speed of 5000 cuts per minute. Endo-ocular visualization is achieved with by means of a no contact visualization system (Eibos system, Moller-Wedel International). Retrobulbar anesthesia was received before surgery and none of patient had general anesthesia.

In vitrectomy alone group, three port 25 gauge-valved cannulas, located at inferior temporal, superior temporal, and superior nasal quadrants were placed at 4.0 mm following displacement of the conjunctiva. Vitreoretinal procedures performed included vitrectomy, detachment of the posterior hyaloid, peripheral vitrectomy, and vitreous base shaving with scleral indentation. In selective patients, vitrectomy was combined with other procedures, including dissection of membrane, scleral buckling encircling and usage of internal tamponade. Diluted triamcinolone acetonide was used for dye vitreous and Membrane Blue-Dual (DORC, Zuidland, Netherlands) was used for removing the epiretinal and internal limiting membrane for selective cases. Endolaser photocoagulations were performed if needed. Fluid-gas exchange and filtered air, 14% octafluoropropane, 20% sulfur hexafluoride, or silicon oil was applied as endotamponade according to the surgeon's choice for macular hole and retinal detachment surgery. At the end of the surgery, cannulas were removed and the sclerotomy sites were checked. If any leakage was observed, 7-0 vicryl suture was applied. Dexamethasone (4 mg) and gentamicin (20 mg) were injected in the subconjunctival space at the end of the surgery in all eyes.

In phaco-vitrectomy group, firstly three port 25 gauge cannulas were placed at 4.0 mm. Cataract surgery was performed prior to the vitreoretinal surgery. Phacoemulsification was performed through 2.8 mm clear corneal tunnel with phaco-chop phacoemulsification technique and the residual cortex aspirated by irrigation and aspiration tips. After these procedures, anterior chamber was formed with viscoelastic substance and PPV was performed as the vitrectomy only group described above. A foldable one-piece hydrophobic acrylic intraocular lens (IOL), was implanted in the capsular bag using an injector system without enlargement of the corneal wound. In cases with posterior capsule break; an acrylic, foldable, 3-piece IOL was placed in the ciliary sulcus. IOL was implanted and viscoelastic removed with irrigation/aspiration (I/A) tips in the final phase of the phaco-vitrectomy surgery, just before fluid-air exchange in appropriate cases. However in retinal detachment surgery, we preferred to perform the fluid-air exchange prior to IOL implantation. After the retina was

flattened and the laser was completed, I/A was performed. After that, subsequent fluid-air exchange was performed in these eyes before using retinal tamponade. The corneal incisions were hydrated with balanced salt solution (BSS) after I/A completed and suture was not used in any case. The microcannulas were removed after the completion of whole surgery.

Statistical Analysis All numerical data were expressed as means and standard deviations (SD). Categorical variables were expressed as number and percentage. Categorical data are compared using Chi-square test or Fisher's exact test. An assessment of normality was done initially by using Kolmogorov-Smirnov test. In order to compare the time-based changes, the Paired simple *t* test was used. The comparison of follow-up after the operations and the relationship between the surgical approaches were evaluated using two ways ANOVA (repeated measures ANOVA) test. The stepwise regression analysis was performed using several variables to detect the factors affecting anterior chamber reaction. Statistical analyses are performed using SPSS statistical software (version 21.0; SPSS Inc., Chicago, Illinois, USA). A two-tailed $P<0.05$ is considered statistically significant.

RESULTS

Basal Demographic and Clinical Characteristics In this analysis, we included 306 eyes of 298 patients who fit the study criteria. One hundred and forty-five eyes received vitrectomy alone and 161 eyes received vitrectomy combined with phacoemulsification and IOL implantation. The mean age of the patients was 55.4 ±15.1 and 61.6 ±12.4y in vitrectomy alone and phaco-vitrectomy groups, respectively ($P<0.001$). The mean postoperative follow-up time of patients was 7.3 ±4.5mo (range 6-16). There were no statistically significant differences between the two groups in terms of preoperative BCVA, preoperative mean IOP, argon laser photocoagulation during surgery, internal limiting membrane peeling ($P>0.05$). The numbers of the patients having the diagnosis of diabetes mellitus are higher in phaco-vitrectomy surgery group (33.1% *vs* 61.5% in vitrectomy alone and phaco-vitrectomy groups respectively, $P<0.001$). The most common reason for the phaco-vitrectomy surgery was vitreous hemorrhage followed by retinal detachment. On the other hand, the most common reason for PPV alone was retinal detachment followed by vitreous hemorrhage. Most frequently used endotamponade after vitrectomy was BSS in study populations. C_3F_8 and silicone oil endotamponade were more common in vitrectomy alone group, however, BSS and air were more common in phaco-vitrectomy surgery group ($P=0.045$). Also, intraoperative decaline usage was more common in vitrectomy alone group ($P<0.001$). A comparison of the demographics and clinical data of the two groups are presented in Table 1.

Table 1 Basal demographics and clinical data of the study population *n* (%)

Characteristics	Surgery groups		*P*
	PPV alone (*n*=145)	Phaco-vitrectomy (*n*=161)	
Age	55.4±15.1	61.6±12.4	<0.001
Gender			0.009
M	85 (58.6)	70 (43.5)	
F	60 (41.4)	91 (56.5)	
Diabetes mellitus	46 (33.1)	96 (61.5)	<0.001
Hypertension	39 (27.9)	77 (49.0)	<0.001
Indications for vitrectomy			0.008
Epiretinal membrane	21 (14.5)	35 (21.7)	
Vitreus hemorrhage	43 (29.7)	67 (41.6)	
Macular hole	22 (15.2)	9 (5.6)	
Retinal detachment	53 (36.6)	45 (28.0)	
Vitreomacular traction	6 (4.1)	5 (3.1)	
Endotamponades			0.045
BSS	53 (34.1)	73 (45.3)	
Air	4 (2.9)	9 (6.0)	
SF_6	15 (10.8)	16 (10.7)	
C_3F_8	19 (13.7)	12 (8.1)	
Silicone oil	54 (38.8)	41 (27.5)	
Encircling scleral buckling	22 (15.1)	4 (2.4)	<0.001
Endolaser in vitrectomy	97 (67.8)	98 (61.3)	0.280
Decaline Usage	53 (36.8)	30 (18.8)	<0.001
Preoperative mean VA (logMAR)	1.6±0.9	1.8±0.9	0.272
Preoperative IOP (mm Hg)	15.4±4.1	15.1±2.4	0.345

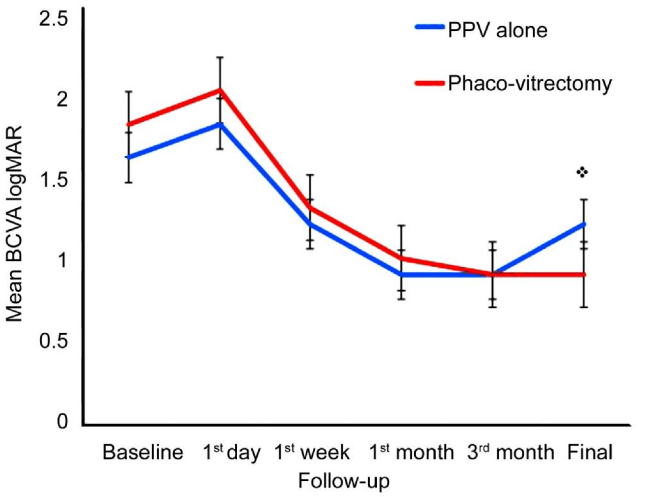

Figure 1 The changes in the mean best-corrected visual acuity (logMAR) from baseline at each follow-up.

Visual Acuity Figure 1 shows the changes of the mean visual acuity (logMAR) during following period in both groups. The mean preoperative visual acuity was not different between groups (1.6 ±0.9 logMAR *vs* 1.8 ±0.9 logMAR, respectively, $P>0.05$). Although the mean visual acuity was decreased at the 1st postoperative day; the values recovered through the 3-month period postoperatively in both groups. When the whole study population evaluated, mean BCVA was found to be significant decreased in patients with gas tamponade compared to the patients with BSS and silicon tamponade (1.2±0.8 to 2.7±0.5 logMAR in gas tamponade group *vs* 1.9±0.9 to 1.6±0.8 logMAR in BSS and silicon oil tamponade group, $P<0.001$) after surgery in both groups.

Table 2 Anterior chamber reaction, fibrinous reaction and posterior synechia of the iris in phaco-vitrectomy group and vitrectomy alone group *n* (%)

Diagnosis	PPV alone				Phaco-vitrectomy			
	Eyes (*n*)	Anterior chamber reaction	Fibrinous reaction	Posterior synechiae	Eyes (*n*)	Anterior chamber reaction	Fibrinous reaction	Posterior synechiae
Epiretinal membrane	21	1 (4)	1 (4)	0 (0)	35	11 (31)	1 (2)	1 (3)
Vitreous hemorrhage	43	3 (6)	1 (2)	1 (2)	67	22 (32)	2 (3)	1 (1)
Macular hole	22	1 (4)	1 (4)	0 (0)	9	0 (0)	0 (0)	1 (11)
Retinal detachment	53	2 (3)	2 (3)	2 (3)	45	8 (17)	1 (2)	6 (13)
Vitreomacular traction	6	0 (0)	0 (0)	0 (0)	5	1 (20)	1 (20)	0 (0)
Total	145	7 (5)	5 (3)	3 (2)	161	42 (26)	5 (3)	9 (6)

However, the mean visual acuity was decreased in vitrectomy alone group at the final visit compared to phaco-vitrectomy group (1.2±0.8 logMAR, 0.9±0.7 logMAR, respectively, $P<0.05$). Those results indicated a significant difference in terms of visual acuity in favor of phaco-vitrectomy group at the final visit.

Anterior Chamber Reaction Anterior chamber inflammation was observed in 7 (5%) eyes in vitrectomy alone group and 42 (26%) eyes in phaco-vitrectomy surgery group on the postoperative 1st day ($P<0.001$). The stepwise regression analysis was performed using several variables including hypertension, DM, age, scleral buckle surgery, posterior capsule rupture, intraocular tamponade, endolaser photocoagulation, decaline usage, subtypes of vitreoretinal disease and surgery groups to detect the factors affecting anterior chamber reaction. The stepwise regression analysis revealed that, among those variables, only phaco-vitrectomy predicted anterior chamber reaction significantly; indicating a 5.5 times increased risk for anterior chamber reaction after vitreoretinal surgeries (OR=5.518, 95% CI=2.327 to 13.083, $P=0.001$).

Postoperative fibrin reaction in the anterior chamber was observed in 5 (3%) eyes in vitrectomy alone group and 5 (3%) eyes in phaco-vitrectomy group ($P>0.05$). Fibrin reaction was resolved with topical steroid treatment in all of the eyes. These eyes were recovered without any sequela except one patient who was in the phaco-vitrectomy group.

Formation of the posterior synechiae of the iris (PSI) was observed in 3 (2%) eyes in vitrectomy alone group and 9 (6%) eyes in phaco-vitrectomy group ($P=0.003$). PSI was found to be significantly lower in patients with BSS tamponade compared to the patients with gas and silicone tamponade [2 (2%) eyes in BSS tamponade group, 5 (7%) eyes in gas tamponade group and 5 (5%) in silicone tamponade group, $P=0.02$]. Rubeosis iridis was not observed in any patient. Table 2 shows the anterior chamber reactions in different surgery groups.

Postoperative Complications The preoperative IOP was 15.4±4.1 mm Hg and 15.1±2.4 mm Hg, in vitrectomy alone and phaco-vitrectomy group, respectively ($P>0.05$). However, the mean postoperative 1st day IOP of vitrectomy alone group was significantly lower than that of phaco-vitrectomy group (16.3±5.8 mm Hg *vs* 17.8±8.1 mm Hg, respectively, $P=0.02$). Hypotony (IOP≤8 mm Hg) occurred in 4 (2.7%) eyes in vitrectomy alone and 3 (1.8%) eyes in phaco-vitrectomy surgery group in the postoperative 1st day ($P>0.05$), whereas none of them had severe hypotony (IOP ≤5 mm Hg). The hypotony in these eyes were not persistent and improved spontaneously within 1wk. Twenty-three eyes (15%) in vitrectomy alone group and 41 (25%) eyes in the phaco-vitrectomy group had increased IOP (>21 mm Hg) on the postoperative 1st day, which is statistically significant between groups, mandating topical treatment ($P=0.02$). Additionally, we observed an IOP value of >40 mm Hg in 6 eyes only in combined group and viscoelastic in anterior chamber in 5 of those eyes. In the remaining 1 eye, high IOP was observed due to silicon oil filling which did not give enough response to medical treatment and remained high. Two days later, we removed some of the silicone oil from the affected eye and the IOP decreased dramatically to the normal levels. At the postoperative 1st week, 1st, 2nd, 4th, and 6th months, there were no statistically significant differences in mean IOP between the groups ($P>0.05$).

There was no significant difference in the incidence of postoperative vitreous hemorrhage between the two groups [5 (3.4%) in vitrectomy alone group, 8 (4.9%) in phaco-vitrectomy group; $P>0.05$]. There were no reports of retinal detachment or retinal tear during the follow-up periods in either group. In the study period, clinically significant cataract was developed in 22 patients of vitrectomy alone group.

In the present study, some rare complications were observed only in phaco-vitrectomy group. Silicone oil prolapse in anterior chamber was observed in 1 eye and posterior capsular opacifications in 2 eyes. Posterior capsular tear occurred in 5 eyes and sulcus IOL were implanted in these eyes. In-the-bag IOL was implanted for the remaining eyes. IOL related complications like IOL decentralization and pupillary capture by IOL did not occur in any eye. Postoperative mild transient corneal edema was observed

only in 6 eyes of combined phaco-vitrectomy procedure due to high IOP; those eyes improved after the decrease in IOP.

DISCUSSION

In the previous studies, favorable and comparable results were reported with combined phaco-vitrectomy surgery [2,13]. To the best of our knowledge, our study is one of the largest study investigating the postoperative clinical outcomes of phaco-vitrectomy surgery using 25-gauge high-speed vitrectomy in comparison with vitrectomy alone, in phacic eyes. Our findings illustrated that combined phaco-vitrectomy surgery in safe and efficient compared to vitrectomy alone, in patients undergoing 25-gauge high-speed vitreoretinal surgery.

In the phacic patients, progression of cataract is a common postoperative complication of PPV with a high incidence (79% -84%) and these patients need a second surgical procedure approximately within 2y of vitrectomy [14]. The complications and difficulties related to the subsequential phacoemulsification surgery in the vitrectomized eye were described before [15]. However, performing combined phaco-vitrectomy surgery prevents the phacic patients from probable complications related to subsequential surgery and allows making the peripheral vitrectomy easier without unintended damage to the crystalline lens [10]. Moreover, this approach provides more clear visualization during surgery and reported to be more cost effective [12]. Despite these advantages, combined surgery is not without limitations including increased surgical time, more postoperative inflammation and difficulty of phacoemulsification at the time of phaco-vitrectomy surgery[16].

Recent years witnessed the development of several phaco-vitrectomy technics and small-gauge transconjunctival PPV systems [2,4]. Therefore, phaco-vitrectomy surgery can be achieved with a better patient compliance and decreased postoperative complications [2-3]. However, there is still a controversy regarding the choice of adequate surgery according to the clinical situation and patients' complaints[7]. Several previous studies focused on the issue, however there were some important limitations in those studies including small size of the study population and lack of a control group [2,11-12]. In a recent study, Savastano *et al* [2]. reported favorable results with 25-gauge high-speed combined PPV compared with PPV alone in pseudophacic patients in which they focused on postoperative complications among patients with epiretinal membrane, vitreomacular traction and macular hole. Different from all those studies, we aimed to directly compare the clinical outcomes of 25-gauge high-speed transconjunctival vitrectomy as a combined procedure in phakic patients with vitrectomy alone, in various vitreoretinal diseases including a large patient group.

In our study, anterior segment reaction was the most common anterior segment complication. The frequency of anterior chamber reaction after phaco-vitrectomy surgeries were reported between 3.7% and 30% in the previous studies[17-18]. We found a relatively high rate of anterior chamber reaction in phaco-vitrectomy surgery group; specifically in 26.1% of the eyes on the 1st postoperative day. It was known that anterior chamber reaction is more common in patients with DM, uveitis, retinal detachment, endolaser photocoagulation and usage of gas and silicone tamponade [19-20]. However, our findings revealed that anterior chamber reaction was only associated with phaco-vitrectomy in multivariate analysis. Although small gauge vitrectomy technics are associated with decreased inflammation, this result might be due to the phacoemulsification procedure itself as a major source of inflammation outweighing the effects of other aforementioned risk factors. We think that increased surgery time and manipulations in the anterior chamber due to phacoemulsification most probably contribute to the increased ratio of anterior chamber reaction in the combined surgery group.

In our study, we observed very low fibrin reaction rate which was not statistically different between groups. However, Treumer *et al* [10] reported more frequent fibrin reaction in combined surgery (15.3% of eyes in combined group, in 4% of eyes in the sequential group after vitrectomy). Further studies mentioned fibrin reaction as a frequent postoperative anterior segment complication ranging from 2.2% to 28.4% in eyes treated with combined surgery [10,21-22]. In combined anterior and posterior segment surgery, the occurrence of fibrin reaction may be greater due to the longer duration of surgery, increased manipulation, instability or collapse of anterior chamber during surgery. We think that the low incidence of the fibrin reaction in our phaco-vitrectomy group may be related to stability of anterior chamber all during the surgery by means of small gauge valve incision and 2.8 mm leak proof corneal incision. Also, the trochar remained stable until the end of whole surgery and we did not observed any hypotony due to leakage from scleral incision. In addition, there was not any iris prolapse or leakage disturbing the stability of anterior chamber. All patients with fibrin reaction were treated with increased dose of steroid medication and all of them recovered without any sequela except one who developed posterior synechiae. In addition to fibrin reaction, posterior synechiae has been described as a complication of phaco-vitrectomy procedure with an incidence of 7% [22]. In our study, we observed posterior synechiae more frequently after phaco-vitrectomy surgery especially in cases of using gas and silicon oil tamponade with a similar incidence using 25-gauge vitrectomy.

Elevated IOP is a frequent complication of vitrectomy, especially 1st day after surgery, which was reported to appear most commonly after combined surgery with an incidence of

4.4% to 23.8%[20,23]. The results of our study were similar to the published studies and there was a statistically significant increase in IOP in the combined group on the postoperative 1st day. This situation may be related to the retained viscoelastic in anterior chamber or due to anterior chamber inflammation. More inflammation of anterior chamber with deterioration of the blood-aqueous barrier by phaco-vitrectomy may lead to IOP elevation[24].

In our study, the frequency of transient ocular hypotony was similar in both groups, which is compatible with previous studies [25-26]. Although small gauge vitrectomy technics provided many advantages to the surgeons, postoperative hypotony related to potential wound leakage is still a problem [27]. In small gauge phaco-vitrectomy, increased intraocular manipulation might cause wound extension and leakage. However, 25 gauge vitrectomy using valved cannula system combined with 2.8 mm clear corneal incision decreases the intraocular manipulation. In addition, we preferred to remove the cannulas at the end of the whole surgery and placed suture to the wound in case of any leakage. The lower levels of hypotony in the whole study population including phaco-vitrectomy group might be due to those precautions taken during the procedure.

During the follow up period, the mean visual acuity was similar between the groups. This might be due to the severity of baseline vitreoretinal disease in both groups. Additionally, cataract extraction did not accentuate the improvement in visual acuity in the early period. This might be due to the lack of significant macular improvement in vitreoretinal procedures. On the postoperative 1st day, visual acuity decreased in both groups and improved at the 1st month which is attributed to the deleterious effects of intraocular gas tamponade used during the surgery. However, after 6mo, visual acuity in only surgery group began to decrease which might be due to development of clinically significant cataract in 22 patients.

There are some limitations regarding our study. First, although a large number of patients included, our study is a retrospective analysis. Second, the study populations was not homogeneous relevant to the indications of surgery, prevalence of diabetes mellitus and age of the patients. In addition, we only performed phaco-vitrectomy in case of significant cataract in all types of vitreoretinal disease, which can affect the visualization of surgeon during the operation, and this tendency caused a difference in lens condition between groups. Because of the higher incidence of cataract in elderly and diabetic patients; the combined surgery group were older and had a higher prevalence of diabetes. However, in this paper we primarily aimed to report our single center experience in patients who underwent vitrectomy only with 25-gauge PPV for the management of several vitreoretinal diseases. Moreover, the age and DM were evaluated in multivariate analysis, which did not reveal statistically significance affecting the complications of surgery in both groups.

In summary, our study findings demonstrated that 25-gauge high-speed PPV combined with phacoemulsification surgery is a safe and efficient procedure, which can be preferred in patients with both vitreoretinal disease and cataract compared to vitrectomy only. Despite the higher ratio of postoperative anterior chamber inflammation and increased IOP in combined surgery group, these complications were easily managed in our patient population. Additionally, combined procedure can obviate the deterioration in visual acuity in the near future due to cataract development. Larger, prospective studies with longer follow up in variety of vitreoretinal diseases are needed to clarify the long term efficiency of 25 gauge vitrectomy with or without phacoemulsification.

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