

## Evaluation of results of combined Phacoemulsification and Pars Plana Vitrectomy

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### Abstract

The cataract and vitreoretinal disease commonly coexist in the elderly population and the presence of cataract hampers visualization in vitreoretinal surgery, thus concurrent removal of cataract helps in better visualization of retina during vitreoretinal procedures. With expanding indications of vitrectomy the need for vitreoretinal surgeries are increasing. The present study is carried out to assess the results of combined phacoemulsification with intraocular lens implantation and pars plana vitrectomy in eyes having coexisting vitreoretinal disorders with significant cataract. It is a prospective, non-comparative, consecutive, interventional study. Total 80 patients were operated for combined phacoemulsification with IOL and PPV from January 2011 to December 2013. All new cases of vitreoretinal disorders with significant cataract were included, whereas high risk diabetic retinopathy cases where two sequential surgeries were done and previous failed vitrectomy cases were excluded from study. Sixty seven followed up patients were analyzed for anatomical attachment of retina and visual acuity gain. Total 80 patients between 23 to 78 (mean age 54.22) years, 37 female and 43 male with significant operable cataract and variety of vitreoretinal disorder were operated. Out of 67 cases visual acuity improved in 43 (64.18%), deteriorated in 8 (11.94%), remained unchanged in 16 eyes (23.88%) and the anatomical attachment of retina was achieved in 59 eyes (88.06%). Postoperative complications were inflammation in 7 (10.45%) eyes and posterior capsular opacification (PCO) in 8 (11.94 %) eyes. Combined phacoemulsification with IOL and PPV is convenient, economical, single step method for treatment of coexisting cataract and vitreoretinal disorders. Phacoemulsification performed at the time of vitreoretinal surgery helps better visualization of posterior segment and facilitates surgery without added risk of complications.

**Keywords:** Phacoemulsification, Vitrectomy, Intraocular lens, Combined surgery, Cataract.

### Access this article online

#### Website:

www.innovativepublication.com

#### DOI:

10.5958/2348-7682.2016.00013.0

### Introduction

The cataract and vitreoretinal disease commonly coexist in the elderly population and the presence of cataract hampers visualization in vitreoretinal surgery, thus concurrent removal of cataract helps in better visualization of retina during vitreoretinal procedures. With expanding indications of vitrectomy the need for vitreoretinal surgeries are increasing. Development and progression of cataract is inevitable following vitrectomy, nearly 75% of eyes within a year and 95% eyes within two years needs cataract surgery<sup>(1)</sup>. Therefore Combined pars plana vitrectomy (PPV) with phacoemulsification and posterior chamber intraocular lens (PCIOL) implantation in eyes with vitreoretinal pathology and coexisting significant cataract is becoming increasingly common<sup>(2)</sup>. Doing phacoemulsification in vitrectomised eyes is difficult because of loss of vitreous support from posterior capsule and chamber fluctuations during surgery leads to various complications in such cases<sup>(2-4)</sup>. Both the

things, the higher incidence of cataract associated with post vitrectomy and increased risks of cataract surgery in vitrectomized eyes has lead to evolution of the combined phaco vitrectomy technique<sup>(5-6)</sup>. The results of combined surgery by proper selection are encouraging as it does avoid multiple surgeries and provides early visual rehabilitation<sup>(7)</sup>. The results of combined surgery and its complications primarily depend on posterior segment pathology and not on cataract<sup>(8)</sup>. The aim of this study is to assess the results of combined procedure of phacoemulsification with IOL and PPV in eyes with vitreoretinal diseases and coexisting significant cataract.

### Materials and Methods

This is a prospective, noncomparative, consecutive, interventional study done at our centre from January 2011 to December 2013 after obtaining permission from Institutional Ethics Committee. Total 80 patients were operated out of which 67 patients adhered to astringent one year follow up were included in the study and were analysed. All new cases with vitreoretinal disorders and significant cataract were included, whereas high risk diabetic retinopathy cases where sequential surgeries were done and patients already operated for vitreoretinal disorders and failed were excluded.

The various vitreoretinal disorders included were vitreous hemorrhage with and without retinal detachment (27 cases-33.75%), rhegmatogenous detachment (14 cases-17.50%), combined detachment (11 cases-13.75%), macular hole (12 cases-12%) and epiretinal membrane (8 cases-10%) which are associated with significant cataract precludes visualization necessary for vitreoretinal procedures. Eight cases (10%) presented with traumatic cataract and vitreoretinal problems. All varieties of visually significant cataract like dense posterior sub capsular cataract, dense nuclear or total cataracts as seen on slit lamp were included. Detailed preoperative evaluation with ocular and systemic history, assessment of visual acuity, slit-lamp biomicroscopy, intraocular pressure (IOP) measurement by applanation and indirect ophthalmoscopic examination were done. B scan ultrasonography was performed to assess posterior segment when the fundus examination was not possible because of media haze. The IOL power was calculated using the SRK T formula and compared with the other eye IOL power. After detailed informed consent, combined phacoemulsification with IOL and standard 20G three port PPV under local anesthesia was done. Postoperative follow-up evaluation at each visit includes vision, IOP, details of anterior and posterior segments examination at one day, one week, four weeks, three months, and six months and finally at twelve months following surgery. The results were analyzed as anatomical attachment of retina and visual acuity gain at twelve months, with intraoperative and postoperative complications in 67 patients.

Detailed informed consent was taken after explaining detail of procedure and realistic results. Phacoemulsification was performed prior to PPV by anterior segment surgeon under peribulbar anesthesia. Routine phacoemulsification with scleral tunnel incision was performed, with 5.0 to 5.5 mm continuous curvilinear capsulorhexis, using stop and chop technique of phacoemulsification with due precautions followed by irrigation and aspiration of the cortex. These patients usually required posterior capsule polishing or plaque removal to prevent PCO in postoperative period and to enhance posterior segment visibility during surgery. Foldable acrylic lenses were implanted and incision was closed with a single 10-0 nylon suture to prevent wound opening during PPV. After successful completion of phacoemulsification with IOL by anterior segment surgeon, the standard 20-gauge 3-port PPV was performed by vitreoretinal surgeon. Three Sclerotomies were made 3.5 mm posterior to the limbus. The different vitreoretinal procedures depending on case were performed in combinations which include photocoagulation, cryotherapy, fluid-gas exchange, gas or silicone oil injection, peeling of the posterior hyaloid membrane and epiretinal membrane using wide-field fundus visualization lens. Postoperative local and systemic

steroids were used depending upon severity of inflammation along with antibiotic and cycloplegics drops for 4 to 6 weeks.

## Results

Total 80 eyes were included in study. Forty three were (53.75%) males and 37 (46.25%) females; between age group of 23 to 78 years (mean 54.22). The commonest indication for vitreoretinal surgery was vitreous hemorrhage with or without retinal detachment in (27 cases-33.75%). Out of 80 patients 22 were known diabetics, 16 patients were known hypertensive, 19 patients had both systemic diseases and in 23 patients no systemic illness was detected. For tamponade silicone oil was used in 30 eyes (37.50%) and intraocular perfluoro propane (C<sub>3</sub>F<sub>8</sub>) gas was used in 23 eyes (28.75 %). Silicone oil removal was done as and when needed depending upon case. Patients were followed up for 12 months, for the anatomical attachment of retina and visual gains. Retinal attachment was achieved in 59 (88.06%) eyes and 8 (11.94%) eyes had a re-detachment. Pre and postoperative visual acuity was noted. Preoperatively majority of patients (50.75%) presented with best corrected visual acuity of 1/60 to 6/60 and none had better than 6/24 vision. But after combined surgery there was improvement in vision and 14 (20.90%) patients showed more than 6/24 vision (Table 1).

**Table 1: Pre and post operative visual acuity (N=67)**

Visual acuity	Acuity at presentation	Acuity at final follow up
Perception of light	10 (14.92%)	04 (05.97%)
Hand movement	07 ((10.45%)	05 (07.46%)
Count fingers till 3 feet	09 (13.43%)	04 (05.97%)
1/60-6/60	34 (50.75%)	27 (40.30%)
6/36-6/24	07 (10.45%)	13 (19.40%)
>6/24	00 (00.00%)	14 (20.90%)

Visual improvement was observed in total 43eyes (64.18%), vision remained unchanged in 16 eyes (23.88%) and deteriorated in 8 (11.94%) eyes (Table 2).

**Table 2: Best corrected visual acuity among follow up cases (N=67)**

Status of vision	Number	Percentage
Improved	43	64.18%
Unchanged	16	23.88%
Deteriorated	08	11.94%

The causes of non-improvement of vision were progression of previous vitreoretinal disorders, secondary glaucoma and macular scars (Table 3).

**Table 3: Causes for non-improvement of vision (N=24)**

Cause	Number of patients
Recurrent retinal detachment	08
Progression or deterioration of previous vitreoretinal disorder	08
Secondary glaucoma with optic atrophy	03
Iatrogenic macular hole	01
Macular membranes and scar	04

Various early and late complications are enumerated in Table 4 and 5. Common complications noted were postoperative inflammation in 7 (10.45 %) eyes and PCO in 8 (11.94%) eyes and raised intraocular pressure was noted in 9 (13.43%) cases. For IOP control 2 cases required YAG laser peripheral iridectomy, silicone oil removal from anterior chamber in one case and in one early silicone oil removal through pars plana. IOL related complications like capture, decentration was not seen in our series but one patient developed anterior capsular phimosis that required YAG laser capsulotomy. Repeat vitrectomy was needed in 10 cases and out of which 5 cases recovered, 3 cases remained unchanged and 2 ended up with pthisis.

**Table 4: Early post operative complications (N=80)**

Complication	Number	Percentage
Hypotony	10	12.50%
SK/Corneal haze/Epithelial Defect	13	16.25%
Corneal oedema	11	13.75%
A/C reaction	17	21.25%
Hyphema	07	08.75%
Vitreous haemorrhage	05	06.25%
Transient rise in IOP	18	22.50%

**Table 5: Late post operative complications among followed up cases (N=67)**

Complication	Number	Percentage
Corneal haze	06	08.95%
Uveitis	07	10.45%
Rubeosis	05	07.46%
PCO	08	11.94%
Glaucoma	09	13.43%
Recurrent retinal detachment	08	11.94%
Phthisis	02	02.98%

## Discussion

Presence of cataract and vitreoretinal disorder together is common occurrence and this situation can be dealt with either two sequential surgeries or combined

cataract extraction and vitrectomy. Both the methods have their own merits and demerits. If two sequential surgeries are done, presence of significant cataract hampers required visualization for vitreoretinal procedures during vitrectomy. Similarly following vitrectomy cataract will progress and patients will not be visually satisfied in spite of successful vitreoretinal procedure. Senn<sup>(9)</sup> described two consecutive non randomised series and noted increased incidence of fibrinous uveitis in combined group as compared to sequential group. Combined cataract extraction and vitrectomy helps in dealing both problems together especially in elderly, but visual outcome are totally dependent on type of vitreoretinal problem. Vitrectomy can be combined with any cataract surgery like lensectomy, intra or extracapsular lens extraction or phacoemulsification. Blankenship<sup>(10)</sup> used pars plana lensectomy with PC IOL in ciliary sulcus along with diabetic retinopathy vitrectomy. Benson<sup>(11)</sup> used extracapsular lens extraction and phacoemulsification with posterior chamber IOL implantation along with vitrectomy. The intracapsular and extra capsular cataract extraction requires larger incision with increased risk of wound dehiscence and increased postoperative inflammation. Lahey<sup>(3)</sup> published the series of 89 cases of combined phacovitrectomy in cases of macular holes and been regarded as effective and safe method. Combined surgery is useful in patients with macular disorders with good results. Mamillies<sup>(12)</sup> reported his study of combined phacovitrectomy through scleral tunnel incision. Scharwey<sup>(13)</sup> described clear corneal phacoemulsification with vitrectomy in 38 cases and in his series IOL was implanted at the end of procedure and no IOL related complications were noted. The choice of incision for phacoemulsification depends on surgeon's preference. Clear corneal incision is preferred now a day as it has fewer incidences of postoperative inflammation and PCO although scleral wound gives better wound stability. Heiligenhaus et al<sup>(14)</sup> found in his study that both the incisions are equally safe. In our study we used scleral incision and 10 vicryl, to suture the wound to prevent wound dehiscence during vitrectomy and in postoperative period. IOL implantation in combined surgery can be done either before vitrectomy or after vitrectomy, some surgeons prefer after vitrectomy to maintain self sealing incision and to avoid prismatic effects of IOL. Demetriades<sup>(2)</sup> in his study of 122 patients of combined phacovitrectomy, the phacoemulsification with IOL implantation was performed before vitrectomy to make anterior segment surgeon free and then retinal surgeon completes the case. Phacoemulsification done simultaneously in such cases allows better visualisation of posterior segment structures and further management. In our series we also implanted IOL before vitrectomy to make anterior segment surgeon free and to have added advantage of stretching and better visualization of posterior capsule to reduce the

chance of capsule rupture during vitrectomy. We also found IOL insertion is easier in presence of vitreous in comparison to loss of vitreous support after vitrectomy. IOL before vitrectomy helps in preventing budging of posterior capsule during temopand due to stabilization of lens iris diaphragm by IOL. But some time there can be IOL decentration, pupillary capture or IOL dislocation following use of temopand in presence of IOL especially if vitreous cavity is overfilled, therefore caution to be taken.

Combined cataract and vitreoretinal surgery is safe, effective, convenient and economical method offers many advantages over the sequential approach. It minimizes surgical trauma, allows faster visual rehabilitation, avoids needs of second surgery with reduces the risk of complications. Phacoemulsification in vitrectomized eyes is really difficult and associated with many complications. Combined phacovitrectomy is a challenging procedure needs more surgical time and skill with proper postoperative care. During combined phacovitrectomy there can be problems as cataract in such patients are usually very hard and leathery with

nondialating pupil. Difficulty encountered in capsulorhexis and nucleus removal may be difficult due to absent fundal glow. There could be problem during vitrectomy due corneal oedema, decements folds, small pupil and bleeding from anterior structures. A reflex from IOL with prismatic effect hampers retinal visualization during vitrectomy. As compared to phaco alone combined phaco vitrectomy eyes are at increased risk of postoperative complications like PCO (Incidence 2% to 28.4%) and raised IOP (incidence 4.4% to 23.8%)<sup>(2,15-16)</sup>.

Qin-Xiang (17) in his study of anterior segment complications after combined phaco vitrectomy reported uveitis in 4.9% cases. Leyland (18) in his study of 50 patients of phacovitrectomy, found 82% functional successes and 57% visual improvement. Yang (19) reported better results with 96.15% anatomical success with 88.05% cases with visual improvement. We compared our study with various studies available in literature and found comparable results which are tabulated in Table 6.

**Table 6: Review of literature**

Study	no.	main indication of surgery	anatomical success	vision improvement	vision unchanged	vision deteriorated	postoperative complication
Jain V et al 2007(7)	65	VH -19 (29.20%)	59 (90.70%) Recurrence -6 (09.30%)	48 (73.80%)	12 (18.50%)	5 (07.70%)	↑ IOP -2 (03.22%) PCO - 6 (09.23%) Inflam-10 (15.38%)
Qin Xiang zheng 2010 (17)	285	VH -58 (20.30%)	Not Available	245 (85.90%)	24 (08.40%)	16 (05.60%)	↑IOP -31 (10.80%) PCO- 50 (17.50%) Inflam.-14 (4.90%)
MD Leyland 1999 (18)	50	VH -20 (40.00%)	41 (82.00%) Recurrence -9 (18.00%)	26 (57.00%)	10 (22.00%)	10 (22.00%)	↑ IOP - 7 (14.00%) PCO -9 (18.00%) Inflam.- 6(12.00%)
Yang Chong Quing 2006 (19)	52	--	50 (96.15%) Recurrence -2 (03.85%)	46 (88.50%)	6 (11.50%)	Nil	↑ IOP- 1 (01.92%) PCO- 7 (13.46%) Inflam.- Nil
Demetriades AM 2003 (2)	122	VH- 35 (28.00%)	119 (97.50%) Recurrence- 3 (02.50%)	105 (86.06%)	7 (05.74%)	10 (08.20%)	↑ IOP -15(20.30%) PCO -21 (28.40%) Inflam. -3(04.00%)
Our Study	80/67	VH -27 (37.75%)	59 (88.06%) Recurrence 8(11.94%)	40 (62.50%)	16 (25.00%)	8 (12.50%)	↑ IOP- 9 (13.43%) PCO- 8 (11.94%) Inflam- 7 10.45%)

VH = vitreous haemorrhage, ↑ IOP = raised intra ocular pressure,  
PCO = posterior capsular opacification, Inflam = inflammation (uveitis)

Type of IOL in combined surgery used could be either PAMA or Acrylic IOL but Silicone lenses are avoided because of risk of condensation of silicone oil over IOL. Visual outcome and complications depends upon underlying vitreoretinal pathology and not related to combined procedure. In spite of greater surgical need the combined surgery is rewarding for both patients as well as for surgeon. By careful patient selection and with meticulous followup the need for multiple surgeries can be avoided to help early visual rehabilitation in combined surgery.

The limitations of our study are it is noncomparative and we included a variety of vitreoretinal disorders.

## Conclusion

Combined phacoemulsification with IOL and PPV is convenient, economical, single step method for treatment of coexisting cataract and vitreoretinal disorders. Phacoemulsification performed at the time of vitreoretinal surgery helps better visualization of posterior segment and facilitates surgery without added risk of complications.

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