

Visual Outcome in Pars Plana Vitrectomy for Acute Postoperative Endophthalmitis after Cataract Surgery

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ABSTRACT

Purpose: To determine the visual outcomes in patients undergoing pars plana-vitrectomy (PPV) for acute post-operative endophthalmitis after cataract surgery.

Study Design: Quasi experimental study.

Place and Duration of Study: Isra Postgraduate Institute of Ophthalmology, Al- Ibrahim Eye Hospital, Malir, Karachi for a period of 2 years.

Material and Methods: Thirty-three patients were selected using non-probability convenient sampling technique. Patients with acute postoperative endophthalmitis after cataract surgery diagnosed clinically and on B-scan, with visual acuity of only perception of light were included while patients with better visual acuity and any other types of endophthalmitis were excluded. PPV was performed in all cases and the patients were examined post-operatively on 1st day, 3rd day, 1, 2 and 3 weeks after surgery. During these follow ups, visual acuity was recorded, detailed slit lamp and fundus examination was performed. Using SPSS version 20.0, chi-square test was applied to test for significance keeping p-value of < 0.05 as significant.

Results: Out of 33 patients 19 (57.6%) were males and 14 (42.4%) were females. Mean age of the patients was 54.50 ± 14.14 years. On 1st post-operative day 8 patients (24.2%) showed improvement of visual acuity from perception of light to finger counting while 02 (6.1%) patients reported visual acuity of 6/60. On final visit at 3rd week postoperatively, 19 patients (57.6%) had visual acuity of finger counting, 08 patients (24.2%) had hand movement and 06 (18.2%) patients reported a visual acuity of 6/60.

Conclusion: PPV for acute post-cataract endophthalmitis if performed at appropriate time can result in favourable outcomes in terms of visual acuity.

Key Words: Pars Plana Vitrectomy, endophthalmitis, Cataract surgery.

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INTRODUCTION

Endophthalmitis is a purulent intraocular inflammation

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of the eye (vitreous and aqueous) that affects the vision. Prevalence of clinical endophthalmitis ranges from 0.04% to 0.15%. The culture proven endophthalmitis 0.02% and 0.08% worldwide¹. However, the prevalence of endophthalmitis in Pakistan is 5.1 – 7.5%, according to various local reports^{2,3}. Endophthalmitis results from a rapidly growing infection or invasion of micro-organisms into

the eye often after intraocular surgery. Moreover, it may be caused by open-eye injury or by infection of cornea. Bacteria are the most common cause of endophthalmitis, followed by fungi and less commonly parasites⁴. The inflammatory response caused by microorganisms and their toxins lead to immediate and irreparable damage to photoreceptors or other retinal cells and may persist even after the infection has settled. Endophthalmitis is classified according to the duration, the way microorganisms enter the eye and the form of agents (e.g. bacteria, fungi) involved in the pathogenesis of the disease⁵. Two types of endophthalmitis can be differentiated depending on the route in which the microorganisms enter the eye: exogenous and endogenous⁶. Exogenous endophthalmitis can also be categorized as post-operative endophthalmitis or post-traumatic endophthalmitis, depending on the etiology. The most common form of endophthalmitis is postoperative endophthalmitis. This accounts for about 70% of all cases of endophthalmitis. It occurs when the whole thickness of the cornea or sclera is penetrated during intraocular surgery and occasionally after extraocular procedures such as suturing of a scleral buckle, strabismus surgery, pterygium surgery and corneal suture removal.

Approximately 90% of post-operative endophthalmitis occur after cataract surgery as it the most common intraocular surgery. Most common agents responsible for postoperative endophthalmitis are staphylococci and streptococci⁷. Incidence of endophthalmitis depends on risk factors, which include old age (> 85 years of age), rural living, male gender, and immunosuppressive conditions like diabetes mellitus. After infection, signs and symptoms appear rapidly, typically within one or two days, or sometimes up to six days after surgery. Clinical features include eye pain that gets worse after procedure or eye injury, reduced vision, redness, pus, swollen eyelids, blurred vision, discomfort and photophobia⁸.

Endophthalmitis is diagnosed by investigations such as vitreous culture and B-scan ultrasonography. Nearly 30% of post-operative endophthalmitis patients are culture-negative therefore, isolating the causative organism is the mainstay of treatment. For tests like gram staining, culture, polymerase chain reaction (PCR) analysis, sampling of aqueous or vitreous humor must be done at the first visit⁹.

Intraocular administration of antibiotic is regarded as the basic step in endophthalmitis management. Controversy exists regarding simultaneous use of intravitreal injection of dexamethasone. A wide spectrum of antibiotics such as vancomycin, ceftazidime and amikacin are administered intravitreally as treatment. However, in case of fungal endophthalmitis; amphotericin B, miconazole and voriconazole are the drugs of choice¹⁰.

Pars plana vitrectomy (PPV) is the standard treatment for refractory and fulminant acute post-cataract surgery endophthalmitis. Immediate vitrectomy is suggested in the cases of progressively deteriorating visual acuity or endophthalmitis induced by virulent bacteria¹¹.

The endophthalmitis vitrectomy study (EVS) considers pars plana vitrectomy only for patients with visual acuity of light perception whereas some studies suggest early pars plana vitrectomy for all patients with post-operative endophthalmitis¹². The purpose of our study was to determine the visual outcomes in patients undergoing pars plana-vitrectomy (PPV) for acute post-operative endophthalmitis after cataract surgery.

MATERIAL AND METHODS

A Quasi Experimental Study with non probability convenient sampling technique was conducted on 33 patients at Isra Postgraduate Institute of Ophthalmology, Al-Ibrahim Eye Hospital, Malir, Karachi during a span of 2 years to determine the visual outcome after pars plana vitrectomy in acute postoperative endophthalmitis following cataract surgery.

Patients with acute postoperative endophthalmitis after cataract surgery diagnosed clinically and on B-scan and having visual acuity of light perception were included in the study. Whereas, patients with any other endophthalmitis, traumatic or endogenous were excluded.

After taking consent, data of the patients was collected from Outpatient Department (OPD), cataract clinic and surgical retina clinic at Al-Ibrahim Eye Hospital. Patients were explained the method and significance of the research. Patients were asked about complaints, glaucoma history, night blindness, surgery, trauma, drugs, contact lens and history of taking medicines. Tests included visual acuity, slit

lamp biomicroscopy, regurgitation test, pupillary reactions and fundus examination.

Standard 3-port pars plana vitrectomy was performed and intravitreal injections of vancomycin and amikacin were administered. Patients were examined post-operatively on 1st day, 3rd day, 1, 2 and 3 weeks after PPV. During these examinations, visual acuity was checked with Snellen chart. Other tests included a detailed slit lamp and fundus examination.

Alcon Accurus Microtome Vitrectomy machine with endo-illumination, disposable suction cutting vitrectomy cutter, endodiathermy and infusion cannula were used. Laser was done with Alcon Ophthalas 532 Eyelite frequency doubled Nd: YAG laser photo-coagulator with disposable endolaser probe. Vitreous substitutes were Balanced Salt Solution, Perflouro carbon liquid (Octadecafluorodecahydronaphthalene 98% - Micromed) and Silicon oil (Polydimethyl Siloxane 100% – RS OIL) with viscosity of 1000 – 5000 CST.

Analysis of data was carried out using SPSS version-20.0. All categorical variables including pre-operative visual acuity, visual acuity on subsequent follow-up examinations, and early post-operative complications were identified by frequencies and percentages.

RESULTS

Out of 33 patents 19 (57.6%) were males and 14 (42.4%) were females. Mean age of the patients was 54.50 ± 14.14 years. Most of the patients 51.5% were 55-60 years of age. The mean time between endophthalmitis and PPV was 7.03 ± 1.97 days.

Table 1: Visual recovery according to time.

	Variable	n (%)
1 st Postoperative Day	Perception of light-Hand movement	23 (69.69%)
	Vision improvement	8 (24.24%)
	6/60	2 (6.06%)
1 st Week Postoperative	Perception of light-Hand movement	20 (60.60%)
	Vision improvement	6 (18.18%)
	6/60	7 (21.21%)
3 rd Week Postoperative	Perception of light-Hand movement	19 (57.57%)
	Vision improvement	8 (24.24%)
	6/60	6 (18.18%)

Out of 33 patients, 23 (69.7%) patients reported visual acuity between perception of light and hand movement

on the 1st postoperative day. Eight patients (24.2%) showed improvement of visual acuity from perception of light to finger counting while 02 (6.1%) patients reported visual acuity of 6/60. On the 7th postoperative day, 20 (60.6%) patients reported visual acuity of perception of light to hand movement while 06 (18.2%) patients reported improvements in their visual acuity and 07 (21.2%) patients reported a visual acuity of 6/60. On the final visit that is on 21st postoperative day, 19 patents (57.6%) had visual acuity of finger counting, while 08 patients (24.2%) showed visual improvement of only hand movement. Only 6 (18.2%) patients reported a visual acuity of 6/60 (Table 1).

DISCUSSION

Visual outcomes after pars plana vitrectomy (PPV) have been reported to vary in literature. Generally, outcomes have been found to be worse than that after cataract surgery, probably due to underlying retinal pathology and its association with a poor visual potential. Even though good visual outcomes have been observed in a few patients, but some large studies have shown poor post-operative visual improvement among these patients. In this study although slight but definite improvement in visual acuity was reported among 31 (93.9%) patients. The improvements were from perception of light and hand movement to finger counting.

In a study by Dave VP et al, the mean visual acuity at the time of presentation of endophthalmitis was 6/240 with mean duration of endophthalmitis being 4 ± 6.89 days. After treatment, slight but insignificant improvement in visual acuity was reported showing that in only 50% of the cases, mean visual acuity had improved to 6/90 having a p-value of 0.31¹³. In contrast, our study reported a visual improvement in 90% of cases. Higher mean age, duration of endophthalmitis and the poorer pre-operative visual acuity can explain this difference.

A study on 70 patients of acute endophthalmitis undergoing therapeutic PPV reported a significant improvement (p-value < 0.001) in visual acuity of patients from 6/120 at pre-operative stage to finger counting and hand movements. However, the significant improvement in visual outcomes was reported in only 33% of patients¹⁴. Similarly, a case series of 05 patients by Leng T et al also reported an improvement of visual acuity to around 6/30 in the

patients; nevertheless, the sample size was very small to comment further¹⁵.

A study by Kunimoto et al reported an improvement in visual acuity from perception of light to counting fingers, which was similar to our findings¹⁶. In contrast another study reported overall poor outcomes with final visual outcome being perception of light, no light perception or evisceration¹⁷. In another study by Maneschg OA et al, the mean visual acuity before PPV was hand movement (HM) and light perception (LP) which did not significantly improve after PPV¹⁸. Narsani AK in a study on 97 patients reported a visual acuity of 6/60 or worse in 80 (82.5%) patients at presentation and at post-operative follow up at 9th week found an improvement in visual acuity better than 6/60 in 75 (77.3%) patients. While 6 (6.2%) patients ended up in no perception of light¹⁹. On the contrary, Thapa R et al reported another study of 34 patients of acute endophthalmitis treated with PPV having a mean age of 56 ± 19.5 years and mean duration of endophthalmitis of 13 ± 11.6 days. After a mean follow-up duration of 4.3 months, visual acuity was found to improve in two-thirds (67.67%) of cases with a good vision of 6/18 or better in 17.6% of patients²⁰. Similarly, in our study, improvement in visual acuity was reported in 93% of cases, however improvement was limited and mean follow up time in our study was 3 weeks as compared to 4.3 months follow up time period in the above study. In another study by Park et al, on 28 patients, 29.6% eyes were eviscerated²¹. In a study investigating 250 patients of post-cataract surgery endophthalmitis undergoing PPV, 51.6% of patients reported to have a final visual acuity of 6/12²². Likewise, another study reported that 49% of patients showed visual acuities of 6/12²³. Among some other studies done in Asia, a study in India reported a final visual acuity of 6/12 in 29.41% patients while a study in Singapore reported a final best corrected visual acuity of 20/40 in 50.5% of the cases^{24,25}.

The reported visual outcomes of patients undergoing PPV for post-cataract surgery endophthalmitis have been seen to vary from study to study. Differences of mean age, gender, nationality, time and duration of diagnosis and presentation, surgical expertise all tend to have an effect on the final outcome of the patients. Globally, post-operative endophthalmitis remains one of the most serious complications of cataract surgery. Therefore, early

diagnosis and surgical intervention using PPV is a necessity in optimizing visual outcomes.

The limitations of the study include a limited sample size, short follow-up period where visual acuity might have been better or more improved in a longer follow-up. The study might not be immune from observer as well as selection bias. Further studies on a larger sample size and with prolonged follow-up time might help in estimating the improvement in visual outcomes of the patients. However, due to the condition's relative rarity, it is difficult to study large number of cases.

CONCLUSION

PPV for acute post-cataract endophthalmitis if performed at appropriate time can result in favourable outcomes in terms of visual acuity.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board.

Conflict of Interest

Authors declared no conflict of interest.

Authors' Designation and Contribution

Abdul Rafiq Soomro; Consultant Ophthalmologist: *study design, manuscript writing, final review.*

Fayaz Ahmed Soomro; Senior Consultant Ophthalmologist: *Concept, design & final approval of study.*

Munawar Hussain; Assistant Professor: *Concept, design & corrections of the study.*

Abdul Qadeem Soomro; Associate Professor: *Concept & design of study, final approval of study.*

Nazia Qidwai; Associate Professor: *Concept & final approval of study.*

Anas Bin Tariq; Lecturer: *Data collection, data analysis & write-up.*

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