Comparison of Postoperative Complications of Pars Plana Vitrectomy with and without Silicone Oil in Treatment of Acute Endophthalmitis

Dr. Kanhaiya Lal[1§], Dr. Kamlesh Khilnani[2], Dr. Vishal Agarwal[3], Dr. Sandeep Parwal[4]

[1]Residents, Department of Ophthalmology, SMS Medical College, Jaipur (Rajasthan) India
[2]Professor, Department of Ophthalmology, SMS Medical College, Jaipur (Rajasthan) India
[3]Associate Professor, Department of Ophthalmology, SMS Medical College, Jaipur (Rajasthan) India
[4]Assistant Professor, Department of Ophthalmology, SMS Medical College, Jaipur (Rajasthan) India

Abstract—*Acute postoperative endophthalmitis is the most common form of endophthalmitis. Pars Plana Vitrectomy (PPV) is one of technique to manage endophthalmitis. Nowadays some additives are used to this technique. This study was conducted to compare postoperative complications of Pars Plana Vitrectomy (PPV) with and without Silicone oil endotamponade in treatment of acute endophthalmitis. Single prospective interventional study was conducted in upgraded department of ophthalmology, SMS Hospital Jaipur. It included 84 patients of acute endophthalmitis equally divided into two groups i.e. Pars Plana Vitrectomy Alone (PPV group) alone and Pars Plana Vitrectomy with silicone oil endotamponade (PPV+SOI group). Results were assess in the form of proportion of postoperative complications. It was observed that postoperative complications were significantly (p=0.007) more in Pars Plana Vitrectomy (PPV) alone (**33.33**%) than with Pars Plana Vitrectomy with silicone oil endotamponade (**7.14**%) group. Retinal Detachment was found in 14.29% in PPV alone group which was significantly more (P=0.034) from other group as no retinal detachment found in PPV+SOI group. No significant difference was observed in other complications in both groups. It was concluded that Pars Plana Vitrectomy with silicone oil endotamponade have significantly lesser postoperative complications than PPV alone.*

Keywords: Endophthalmitis, Postoperative Complications, Pars Plana Vitrectomy (PPV) Silicone oil endotamponade.

I. INTRODUCTION

Infectious endophthalmitis is one of the most serious complications of intraocular surgery and has a very poor prognosis if left untreated.[1,2] Endophthalmitis is defined as a purulent inflammation of intraocular fluids vitreous and aqueous usually due to infection.[3] Acute postoperative endophthalmitis is the most common form of endophthalmitis.

Highest risk of endophthalmitis is after secondary IOL (0.2-0.367%) and lowest after Pars Plana Vitrectomy (0.03-0.046%). Vitreous acts as a culture medium for micro-organisms, and hence after Pars Plana Vitrectomy, the rates of endophthalmitis is least.[4,5] The incidence of endophthalmitis after cataract surgery varies according to the surgical technique. But in recent large series, it has ranged from 0.02% to 0.09%.[6-8]

Endogenous endophthalmitis results from the introduction of organisms into the posterior segment of the eye as a result of hematogenous spread from a remote primary site of infection. Endogenous bacterial endophthalmitisis accounting for only 2 to 8% of all infectious endophthalmitis cases.[9]

The treatment of endophthlmitis has historically involved multiple routes of antibiotic administration, including intra vitreal, systemic, topical, and subconjuctival[10] with advent of Pars Plana Vitrectomy

(PPV) techniques, vitrectomy combined with injection of intravitreal antibiotics became the standard treatment for virtually all forms of endophthalmitis.

Various Endophthalmitis Vitrectomy Studies (EVS) [4,11] suggested that patients, with a visual acuity of light perception, have better prognosis if treated with immediate PPV. Nowadays some additives are used to this technique to have better results. This present study was conducted to compare postoperative complications of Pars Plana Vitrectomy (PPV) with and without Silicone oil endotamponade in treatment of acute endophthalmitis.

II. METHODOLOGY

This prospective interventional comparative study was conducted at Department of Ophthalmology, attached to S.M.S. Medical College, Jaipur (Rajasthan) in year 2016-2017 to compare postoperative complications of Pars Plana Vitrectomy (PPV) with and without Silicone oil endotamponade in treatment of acute endophthalmitis.

This study included all patients with acute endophthalmitis having vision perception of light and more attending eye OPD of SMS Hospital during the study period of Feb. 2016 till Jan 2017. Out of that patients with corneal dystrophy, corneal degeneration, optic atrophy and pregnant females were excluded from study. Patient who had not given written inform consent were also excluded from study. Finaly 84 patients of acute endophthalmitis were selected for this study.

Before commencing the study each patient was acquainted with the investigative nature of study, the advantages and potential risks. Patients were told about surgery but not about the type of surgery done.

These 84 selected patients of acute endophthalmitis were divided into two groups through alternate allocation after signing an informed consent prior to participation in study.

Group A - Pars Plana Vitrectomy (PPV) alone group

Group B - Pars Plana Vitrectomy with silicone oil endotamponade i.e. PPV+SOI Group.

4.1 Surgical Technique

Group A - All patients have undergone a standard 3 port 23 gauge Pars Plana Vitrectomy using a non contact wide angle viewing system combined with an image inverter.

Anterior chamber was washed +23G Pars Plana Vitrectomy + fluid air exchange+ endolaser of suspicious area/ breaks/foreign body impaction site+ intravitreal injection of vancomycin 1mg /0.1cc, ceftazidime 2.25mg/0.1cc and in case of vegetative matter injury voriconazole 50microgram/0.1cc done in pars plan vitrectomy group.

Group B - Silicone oil injected manually in vitreous cavity of all patients of PPV+SOI group in addition to above proceedure. In aphakic silicone oil filled eyes a prophylactic six o'clock iridectomy is performed before closure.

Modification in the dose of intravitreal antibiotics required in eyes with silicone oil to account for the reduction in vitreous fluid. Half dose of intravitreal antibiotics injected. In all cases where Silicone Oil injected were explained prone position postoperative.

Post operatively patients were prescribed fortified ceftazidime and vancomycin eyedrop 2 hourly tapered 2 weekly in case of vegetative matter injury or culture proven fungal endophthalmitis voriconazole eye drop 2 hourly, cmc 0.5% eye drop 2 hourly tapered 2 weekly, prednisolone acetate 1%

eyedropqid tapered weekly, atropine 1% eye drop tds stopped after one month, timo + brimo eye drop bd for post operative IOP rise and oral steroids if not contraindicated.

Follow up was done at day 1, day 7, 28 days, 2 months, 3 months, 6 months for BCVA, IOP rise, any other complications and Silicone Oil removal was done after 2- 3 months.

Statistical analysis: Categorical data was expressed as proportion and difference in proportion was analyzed using Chi square test. Statistical significance was kept at $p<0.05$. All statistical analysis was done using Epi info version 7.2.1.0 software.

III. RESULTS

Out of all 82 cases, 42 were in group 'A' i.e. PPV Group and 42 in group 'B' i.e. PPV+SOI Group**.** No significant difference was observed according to age and sex groups among the groups i.e. groups were comparable according to age groups ($p>0.05$). (Table 1)

Total no. of males in group 'A' were 30 (71.43%) & females were 12 (28.57%) and in group 'B' total no. males of 26(61.90%) & females were 16 (38.10%). No significant difference was observed according to gender among the groups i.e. groups were comparable. (Table 1)

Table 1
Comparison of Age and sex wise distribution in both groups

Variables		PPV alone Group 'A' (N=42) No %		PPV+SOI Group 'B' (N=42) No %	
Age group (in Years)	**5 to 15**	13	30.95	10	23.81
	16 to 25	2	4.76	5	11.90
	26 to 35	3	7.14	7	16.67
	36 to 45	4	9.52	5	11.90
	46 to 55	6	14.29	6	14.19
	>55	14	33.33	9	21.43
	Chi-square = 4.475 with 5 degrees of freedom; P = 0.556 LS=NS				
Sex	Females	12	28.57	16	38.10
	Males	30	71.43	26	61.90
	Chi-square = 0.482 with 1 degrees of freedom; P = 0.487 LS=NS				

No significant difference was observed according to duration among the groups i.e. groups were comparable according to duration of disease. (P=0.537NS). Likewise, no significant difference was observed according to mode of infection among the groups i.e. groups were comparable. (P = 0.180NS). (Table 2)

Table 2
Comparison of Duration of Disease and Mode of injury wise distribution in both groups

Variables		PPV alone Group 'A' (N=42) No %		PPV+SOI Group 'B' (N=42) No %	
Duration of disease (in Years)	**2 to 5**	19	45.24	15	35.71
	6 to 10	16	38.10	23	54.76
	11 to 15	3	7.14	2	4.76
	15 to 20	3	7.14	2	4.76
	>20	1	2.38	0	0
	Chi-square = 3.127 with 4 degrees of freedom; P = 0.537 LS=NS				
Mode of injury	Postoperative	20	47.62	13	30.95
	Post-traumatic	22	52.38	29	69.05
	Chi-square = 1.790 with 1 degrees of freedom; P = 0.180 LS=NS				

When proportion of cases with postoperative complications where analysed it was found that PPV alone group 'A' had significantly more (P=0.007) proportion of cases with postoperative complications than PPV+SOI Group 'B'. (Table 3)

Table 3
Comparison of Postoperative complications among study groups

Postoperative complications	PPV alone Group 'A' (N=42) No %		PPV+SOI Group 'B' (N=42) No %	
Present	14	33.33	3	7.14
Absent	28	66.67	39	92.86
Chi-square = 7.375 with 1 degrees of freedom; P = 0.007 LS=S				

When various types of postoperative complications where observed in both the groups it was found with significant variation (P=0.035). In PPV alone group 'A' **Retinal Detachment** was most common complication whereas it was not present in PPV+SOI Group 'B'. Likewise In PPV alone group 'A' **Phthisis Bulbi** & **Reinfection** were found in 7.14% cases whereas it was not present in PPV+SOI Group 'B'. PPV+SOI Group 'B' had minor complications in **Macular Scar, ERM & Subretinal Gliosis in only one (2.38%) for each case.** (Table 4)

Table 4
Comparison of Various types of Postoperative complications among study groups

Type of Postoperative complications	PPV alone Group 'A' (N=42) No %		PPV+SOI Group 'B' (N=42) No %	
ERM	0	0	1	2.38
Macular Scar	1	2.38	1	2.38
Phthisis Bulbi	3	7.14	0	0
Reinfection	3	7.14	0	0
Retinal Detachment	6	14.29	0	0
Subretinal Gliosis	0	0	1	2.38
Uncontroled Infection	1	2.38	0	0
Chi-square = 13.560 with 6 degrees of freedom; P = 0.035 LS=S				

IV. DISCUSSION

It was observed in the present study that postoperative complications were significantly (p=0.007) more in Pars Plana Vitrectomy (PPV) alone (33.33%) than with Pars Plana Vitrectomy with silicone oil endotamponade (7.14%) group. Retinal Detachment was found in 14.29% in PPV alone group which was significantly more (P=0.034) from other group as no retinal detachment found in PPV+SOI group. No significant difference was observed in other complications in both groups. It was concluded that Pars Plana Vitrectomy with silicone oil endotamponade have significantly lesser postoperative complications than PPV alone.

Kuhn[11] in 2005 concluded that better visual outcomes with broader use of a full vitrectomy in postoperative endophthalmitis cases, including those presenting with better than LP visual acuity (91%≥20/40 final visual acuity, vs 53% in the EVS).[11]

Intravitreal antibiotics ceftazidime 2.25mg/0.1cc and vancomycin 1mg/0.1cc consider reducing the antibiotic dose in gas/air filled eyes or silicone oil filled eyes to reduce the risk of retinal toxicity. Especially for ceftazidime.[12]

Endophthalmitis is suspected to increase the risk of retinal detachment. EVS reported 20 cases of retinal detachment in a series of 420 patients, 6 in the vitrectomy group (2.8 % of 218 patients) and 14 in the

non vitrectomy group (6.9 % of 202 patients). *Nelsen* and co-workers described retinal detachment to occur in 21 % (7/34) of endophthalmitis patients treated with vitrectomy and intraocular antibiotics.[4,13]

In this study only complication found with silicone oil filled eye is increased intraocular pressure (4 patients or 9.52%) which was managed with topical antiglaucoma drugs and not responsive to topical antiglaucoma drugs undergone oil tap (1 patient), and patient having well settled retina undergone silicone oil removal after 2 or 3 months postoperative.

No significant difference was observed according to number of cases of No perception of Light, Phthisis bulbi (7.14% patients in PPV alone, Not found in PPV+SOI group), and Reinfection / uncontrolled infection.

The potential antimicrobial properties of silicone oil in vitro have been reported by *Özdamar et al* in 1999 have shown, in culture media, that silicone oil decreases the proliferation of the most common pathogens responsible for endophthalmitis.[14]

In human eyes, action of silicone oil could be explained by different mechanisms. First, silicone oil could be toxic for bacteria, as suggested in vitro. Silicone oil is known to be highly hydrophobic with a high interfacial tension and consequently impervious to cells and bacteria.[8]Therefore, it limits space for free movement of infectious agents and maintains them in close contact with the ciliary body and retinal vessels, which might improve the efficacy of human defense mechanisms, with higher concentration of biochemical mediators, antibodies and inflammatory cells within the limited aqueous phase of the vitreous cavity.

V. CONCLUSION

This present study concluded that Pars Plana Vitrectomy with silicone oil endotamponade group have significantly lower rate of postoperative complications than Pars Plana Vitrectomy alone.

CONFLICT OF INTEREST

None declared till now.

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