Original article

Clinical profile and visual outcome following pars plana vitrectomy in acute post-operative endophthalmitis

Thapa R[1], Paudyal G[2]
[1]Assistant Professor, [2]Professor
Vitreo-retina Service, Tilganga Institute of Ophthalmology, Kathmandu, Nepal

Abstract

Introduction: Endophthalmitis following cataract surgery is a rare but devastating ocular complication where delay in treatment not only results in vision loss but also in difficulty to save the eye ball.

Objective: To explore the clinical profile and visual outcome following pars plana vitrectomy (PPV) in acute endophthalmitis after cataract surgery.

Materials and methods: This is a retrospective interventional case series study conducted at Tilganga Institute of Ophthalmology (TIO), Nepal. All consecutive cases of acute endophthalmitis following cataract surgery treated with PPV from January 2005 to August 2010 were included in the study.

Results: There were a total of 34 cases (34 eyes) treated with PPV. The age range was 8 - 93 years with mean age of 56.9 ± 19.5 years. The mean duration of presentation and duration following cataract surgery was 7.7 ± 8.1days and 13 ± 11.6 days respectively. Small incision cataract surgery was done in 75 % of cases followed by phacoemulsification (15.6 %). The mean duration of the last follow -up was 4.3 months. Vision was improved in two-thirds of cases (67.67 %) with a good vision of 6/18 or better in 17.6 %. Among the available vitreous samples of 22 cases, 36.36 % had an abnormality in Gram and Giemsa stains and culture was positive in 13.6 % of cases.

Conclusion: Despite the late presentation, the majority of eyes were salvaged with improvement of vision in 67.67 %, with a good vision of 6/18 or better in 17.6 4 % of cases following PPV in acute post operative endophthalmitis.

Key words: Endophthalmitis, vitrectomy, cataract surgery, visual outcome

Introduction

Endophthalmitis following intra-ocular surgery is a rare but devastating ocular complication where delay in treatment not only results in sight loss but also in difficulty to save the eyeball. The incidence of postoperative endophthalmitis has been decreasing during the past century, from approximately 0.58 % in the mid -1900s to the present estimate of 0.07-0.12 % (Eifrig et al 2002; American Academy of Ophthalmology 2009-2010). The advances in microsurgical and aseptic techniques and prophylactic broad-

Received on:12.12.2010 Accepted on:13.04.2011
Address for correspondence: Dr Raba Thapa, MD
Assistant professor, Tilganga Institute of Ophthalmology
Kathmandu, Nepal
Ph No: 977-1-4493775. Fax: 977-1-447493775.
Email: rabathapa@live.com

spectrum antibiotics, in combination with a better understanding of the pathophysiology of infection, may explain this positive trend (Eifrig et al 2002).

Many risk factors have been identified for underlying post-operative endophthalmitis. The potential sources include contaminated instruments or irrigation solutions, but the most common source is the patient's own ocular flora. Micro-organisms from the conjunctival sac can enter the eye during or after surgery through a wound and organisms responsible are often normal ocular surface floras (Speaker and Menikoff, 1993).

Prompt diagnosis and timely treatment with intravitreal medications with or without Pars Plana Vitrectomy (PPV) is the treatment of choice for post-operative endophthalmitis depending on the severity (Endophthalmitis Vitrectomy Study Group, 1995). Though the incidence of endophthalmitis has been decreasing worldwide over the years, there is still a challenge in managing endophthalmitis in developing countries like Nepal due to delayed presentation. The scarcity of trained manpower and the costly surgical setup necessary for vitrectomy also complicate the situation in the developing countries, including Nepal, leading to a delay in the urgent handling of such cases.

With the limited studies regarding visual outcome in cases with post operative endophthalmitis treated with PPV, we hope this study will be useful to know the visual outcome following PPV in such cases at a tertiary eye-care setting of Nepal.

Materials and methods

This is a retrospective, interventional case series study conducted at Tilganga Institute of Ophthalmology (TIO), a tertiary eye-care centre in Nepal. All the consecutive cases of acute endophthalmitis following cataract surgery who were treated with PPV during the period of January 2005 to August 2010 were included in the study. Cases excluded from the study were endophthalmitis other than the cataract surgery, chronic endophthalmitis which presented after 6 weeks of cataract surgery, and those with a follow-up period of less than six weeks' duration following PPV. Patients included in the study were those of acute endophthalmitis from the same institute as well as referred cases for PPV from the other eye hospitals. PPV was done in endophthalmitis having visual acuity of perception of light (PL) or worse (Endophthalmitis Vitrectomy Study Group, 1995). The aim of the study was to explore the clinico-microbiological characteristics, and visual outcome following PPV in cases with post operative endophthalmitis at a tertiary eye care setting of Nepal. The ethical approval was obtained from the Institutional Review Board of TIO, and the study was conducted according to the principles of the Declaration of Helsinki. The medical records were reviewed to evaluate the demographics, duration of decreased vision, duration since cataract surgery and the treatment details prior to the last visit to our hospital. Likewise, the details of intra-operative procedures of PPV and intra-vitreal injections were recorded. The results of the vitreous sample subjected for Gram staining, Giemsa staining, KOH wet preparation, and culture sensitivity reports from conventional culture media like blood agar, chocolate agar, nutrient agar and Sabouraud's dextrose agar were recorded. The intra-vitreal injections used were: Vancomycin (1 mg/0.1 ml), Amikacin (0.4 mg/0.1 ml), and dexamethasone (0.4 mg/0.1ml). The subconjunctival injections given during the surgery were Vancomycin 25 mg and Amikacin 25 mg. The topical therapy started was Vancomycin 50 mg/ml and Amikacin 20 mg/ml, Prednisolone acetate (1 %) one hourly to start with, and reduced to 2 - 4 hourly as per response. Likewise, the cycloplegic used was atropine 1 % eight hourly. Once the intraocular inflammation reduced markedly, the fortified antibiotic was replaced with topical Moxifloxacin 0.05 % for a total of 6 weeks' duration. The oral antibiotic used was Ciprofloxacin 750 mg twice a day in adults

for 2 weeks, and, in case of children, Cefadroxil (30 mg/kg/d in equally divided doses 12 hourly) for two weeks. An oral steroid in a tapering dose was also used in some selected cases as and when it was thought necessary. The doses of topical medications were reduced according to the response of individual patients and medications were changed as per the sensitivity pattern of microorganisms in culture-positive cases. None of the patients were admitted in the hospital but were treated at the outpatient department.

The details of the post operative course including the visual acuity were recorded from the documents.

Statistics: The visual acuity of better than 6/60 was taken as useful vision during statistical analysis (Carrim et al, 2009). The data was analyzed in the SPSS version 11.5 (SPSS Inc. Chicago, IL, USA). Chi-squared test and Fisher's exact test were used wherever appropriate for statistical analysis. P value of less than 0.05 was taken as significant in this study.

Results

A total of 34 eyes of 34 cases with acute post-operative endophthalmitis following cataract surgery were treated with PPV along with adjunctive topical and oral medications during the study period. The age range was 8 - 93 years with the mean age of 56.94 ± 19.54 years. The majority of cases (67.63 %) were of age groups 45 - 75 years. The pediatric age group (< 15 years) and elderly groups (>75 years) each comprised of 8.82 % and 11.76 % of the cases respectively. Males (23, 67.64 %) were more than females (11, 32.36 %). Nearly three-fifths (58.79%) of the patients had presented within a week of severe vision loss. 12.5 % of the cases presented after 2 weeks of symptoms. The right eye was affected more than the left eye comprising of 64.7% (22) and 35.3% (12) respectively **(Table 1)**.

The duration of endophthalmitis following cataract surgery ranged from 1 - 44 days with a mean duration of 13 ± 11.6 days. Endophthalmitis developed within a week after cataract surgery in one fifth of the cases (26.47 %). The majority of the patients developed endophthalmitis within 7 - 14 days (32.35 %). 17.64% of cases developed endophthalmitis after 4 weeks of surgery. The majority of cases (75 %) had been operated with small incision cataract surgery (SICS) whereas 15.6 % with phacoemulsification (PE) and 9.37 % with extracapsular cataract extraction (ECCE). Posterior chamber intra-ocular lens implantation (PCIOL) had been done in 94.11 % of cases. Both anterior chamber intraocular lens (ACIOL) and aphakia was found in 2.94 % of cases. Intra-vitreal medication was given to 11.7 % of the cases and the rest of the patients had been using topical antibiotics and steroids before PPV **(Table 2)**.

Table 1
Age of patients and duration of decreased vision after cataract surgery

Parameters	Interval	Frequency	Percentage
Age groups	< 15 years	3	8.82
	15 - 30 years	1	2.94
	30 - 45 years	3	8.82
	45 - 60 years	10	29.4
	60 - 75 years	13	38.23
	>75 years	4	11.76
Duration of decreased vision after cataract surgery	< 3 days	12	35.29
	3 - 6 days	8	23.5
	6 - 9 days	6	17.64
	9 - 12 days	1	2.94
	12 - 15 days	3	8.82
	>15 days	4	11.76

The follow-up period of our cases ranged from 6 weeks to 24 months with mean follow up period of 4.42 ± 5.5 months. Three fifths of the cases were followed-up for up to 3 months whereas 11.76 % of cases were followed up for more than 12 months. The vision was improved in two thirds of cases (67.63 %) with visual acuity of 6/18 or better in 17.64 % of cases and better than 6/60 in 26.46 %.

Table 2
Duration of cataract surgery and treatment modality

Parameters		Frequency	Percentage
Duration of cataract surgery	< 7 day	9	26.47
	7-14 days	11	32.35
	14-21 days	5	14.7
	21-28 days	3	8.82
	>28 days	6	17.64
Status of IOL	PCIOL	32	94.11
	ACIOL	1	2.94
	Aphakia	1	2.94
Prior medications	Topical steroids+ antibiotics	30	88.23
	Intravitreal injections	4	11.77
Total		**34**	**100.00**

In almost all of the cases, the vitrectomy was combined with intravitreal injections of vancomycin, amikacin and dexamethasone. At the end of the procedure, subconjunctival injection of vancomycin, amikacin and dexamethasone was given. The intraocular inflammation was controlled in almost all cases but 11.76 % of cases developed retinal detachment and 1 case (2.94 %) had phthisis bulbi **(Table 3)**.

The Gram stain, Giemsa stain and culture report from the vitreous sample was available in only 22 cases (64.7 %). Out of this, nearly one third (36.36 %) of the cases had abnormality in the Gram and Giemsa stain. The culture was positive in only 13.6 % of cases **(Table 4)**.

In our series, we found no significant difference in visual outcome with visual acuity better than 6/60 among those who presented within 6 days or more (P value 0.83), duration of cataract surgery within 2 weeks or more (p value 0.73), positive vitreous smear (p value 0.64) and presence of microorganism in the vitreous (p value 1.00) (**Table 5**).

Table 3
Duration of last follow-up and visual acuity

	Duration	Frequency	Percentage
Duration of last follow up	6 weeks -3 months	21	61.76
	3-6 months	3	8.82
	6-9 months	2	5.88
	9-12 months	4	11.76
	>12 months	4	11.76
Best corrected visual acuity	6/6-6/18	6	17.64
	< 6/18-6/60	3	8.82
	<6/60-3/60	5	14.7
	<3/60-CFCF	9	26.47
	HM	6	17.64
	PL	2	5.88
	NLP	3	8.82
Ocular inflammatory status	Better without other complication	29	85.29
	Better but develop RD	4	11.76
	Phthisis bulbi	1	2.94

Table 4
Microbiology of the vitreous sample

Stain and culture	Result	Frequency	Percentage
Gram stain/Giemsa stain (n=22)	Pus cells	8	36.36
	No abnormality	14	63.6
Culture (n=22)	E coli	1	4.54
	S aureus	1	4.54
	Moraxella	1	4.54
	No growth	16	72.72
	Total	22	100.00

Table 5
Analysis of factors associated with visual outcome

Factors	VA (< 6/60)	VA (>/=6/60)	P value
Duration of presentation			
< 6 days	12	7	0.83
>/= 6 days	10	5	
Cataract surgery duration			
< 2 weeks	13	8	0.73
>/= 2weeks	9	4	
Gram stain/ Giemsa stain			
No abnormality	8	8	0.646
Pus cell	4	2	
Vitreous culture			
No organism	9	9	1.000
Microorganism	2	1	

Discussion

In our study, the mean age of our patient was 57 years which was nearly similar to that of another reported study from Nepal (Bajimaya et al 2010), but it was slightly lower than of the study reported from India (Malhotra et al 2005; Das et al 2005). The predominant age group for endophtahlmitis of our patients (45 - 75 years) correlates with the main bulk of people who usually undergo cataract surgery in Nepal. Although the elderly over 75 years and children below 15 years of age are not major groups for cataract surgery in our country, the proportionately higher number of cases of these groups with endophthalmitis could be because of their predisposition to infection due to many reasons like the children and the elderly not being able to take care of themselves. We have also observed in our series that congenital and developmental cataract cases usually are from the economically deprived groups with illiterate parents who usually have poor ocular hygiene. Our pattern of age groups for endophthalmitis was correlated with the study by Hatch et al (2009). Males were affected more than the females as in other studies (Das et al 2005; Hatch et al 2009). The possible reason behind this might be due to the higher proportion of cataract surgery in males during the study period. Unlike our findings, few studies during outbreaks of endophthalmitis have reported a female predominance in their series (Bajimaya et al 2010; Malhotra et al 2005). In our series, the mean duration of symptoms was 7.7 days and nearly two-fifths of the cases presented after six days of a decrease in vision. This duration of presentation of our patients was quite longer than of the study from India (Malhotra et al 2005). This might be due to our patients' lack of awareness of the seriousness of the problem, and to the difficult geography and the poor transportation facilities from the country side to the central referral hospital. The right eye was affected in two-thirds of our cases and this finding was consistent with other studies (Bajimaya et al 2010; Miller et al 2005). One reason for this disparity in the laterality in our series could be because of the right hand dominance in the majority of people that could result in a greater chance of right-hand-to-right-eye contamination. The majority of cases underwent small-incision cataract surgery. Unlike in the literature where endophthalmitis was found higher among the phacoemulsification group, this disparity in our study might be due to the higher volume of surgery with SICS than with the phacoemulsification; and almost one-third of cases were the referred cases for vitrectomy from other eye hospitals where cataract surgery was performed only by conventional extra capsular cataract extraction (ECCE) and SICS.

In our series, endophthalmitis was found to be common within the first two weeks of cataract surgery, though one-sixth of the patients had their cataract surgery done before more than a month. Only 4 cases had received prior intravitreal injections before the vitrectomy procedure. This might be due to the delayed presentation and the relative lack of intravitreal medications in the peripheral hospitals.

The shorter follow-up period of patients (4.3 months) in our series is due to the patients being from distant geographic areas, who were then advised, for patient comfort, to follow-up in the local eye hospital once the acute inflammatory process was resolved.

The improvement in vision in our series was 67.63 % with visual acuity of 6/18 and better in 17.64 % of cases and 6/60 and better in slightly more than one-fourth of the cases. The visual recovery in our series was similar to other studies (Malhotra et al 2005; Al Mezaine et al 2009). In our series, the lower rate of good visual recovery as compared to other studies (Kamalarajah et al 2004; carrim et al 2009; Somani et al 1997) may be due to the delayed surgical intervention because of late presentation in the hospital. There was no light perception in three cases preoperatively (9.37 %) where vision was not improved even after the surgery. The rate of retinal detachment following PPV in endophthalmitis in our series was nearly similar to the study by Altan

et al (2009). None of the cases were eviscerated during the treatment, unlike in the series by AI-Mezaine et al (2009).

In our series, there was no significant difference in visual outcome with visual acuity better than 6/60 among those who presented within 6 days or longer, with a duration of cataract surgery before two weeks or longer, with positive vitreous smear and with the presence of microorganism in the vitreous.

In our series, the vitreous sample was available only in 62.5 % of cases, out of which only one-fifth of the cases had positive intraocular cultures though abnormality in Gram and Giemsa stain was found in nearly one-third of the cases. Our rate of isolation of micro-organism was lower than that of other reported studies (Carrim et al 2009; Bajimaya et al 2010, Malhotra et al 2005; Kamalarajah et al 2004; Somani et al 1997; Khan et al 2005). The lower identification of micro-organism may be because of our patients having had prior intravitreal medications (11.7 %) and the unavailablity of vitreous samples (37.5 %). Staphylococcus aureus, E coli and Moraxella were the single isolates in the vitreous culture of our patients, and we didn't find any multiple pathogens and a predominance of a pathogenic organism like in other studies (Carrim et al 2005; Bajimaya et al 2010, Malhotra et al 2005; Khan et al 2005).

The limitation of this study is a short follow-up period of the patients where visual acuity could have been better in a longer follow-up and the unavailability of vitreous samples, which did not allow an assessment of the total scenario of the microorganisms.

Conclusion

Endophthalmitis following cataract surgery is common in both children and adults with predominance in males. The improvement in vision after PPV is significantly high with visual recovery of 6/18 or better despite the delayed presentation of the patients.

References

AI-Mezaine HS, Kangave D, AI-Assiri A, AI-Rajhi AA (2009). Acute-onset nosocomial endophthalmitis after cataract surgery: Incidence, clinical features, causative organisms and visual outcomes. *J Cataract Refract Surg*; 35(4):643-649.

Altan T, Acar N, Kapran Z, Unver YB, Yurttaser S, Mer YC et al (2009). Acute-onset endophthalmitis after cataract surgery; Success of initial therapy, visual outcomes, and related factors. *Retina*; 29(5):606-612.

American Academy of Ophthalmology (2008-2009). Intraocular inflammation and Uveitis, Basic and Clinical Science Course, Section 9. San Francisco, CA: American Academy of Ophthalmology; 293-310.

Bajimaya S, Kansakar I, Sharma BR, Byanju R (2010). Outcome of cluster endophthalmitis in western plain region of Nepal. *Kathmandu University Medical Journal*; 8(29): 102-108.

Carrim ZI, Richardson J, Wykes WN (2009). Incidence and visual outcome of acute endophthalmitis after cataract surgery-the experience of an eye department in Scotland. *Br J Ophthalmol*; 93(6):721-725.

Das T, Kunimoto DY, Sharma S, Jalali S, Majji AB, Nagaraja Rao T, Gopinathan U, Athmanathan S (2005). Relationship between clinical presentation and visual outcome in postoperative and posttraumatic endophthalmitis in South Central India. *Indian J Ophthalmol*; 53(1):5-16.

Hatch WV, Cernat G, Wong D, Devenyi R, Bell CM (2009). Risk factors for acute endophthalmitis after cataract surgery: a population-based study. Ophthalmology; 116(3):425-430.

Kamalarajah S, Silvestri G, Sharma N et al (2004). Surveillance of endophthalmitis following cataract surgery in the UK. *Eye*; 18(6):580-587.

Khan RI, Kennedy S, Barry P (2005). Incidence of presumed postoperative endophthalmitis in Dublin for a 5-year period (1997-2001). *J Cataract Refract Surg*; 31(8):1575-1581.

Malhotra S, Mandal P, Patanker G, Agrawal D (2008). Clinical profile and visual outcome in cluster endophthalmitis following cataract surgery in Central India. *Indian J Ophthalmol*; 56(2):157-158.

Miller JJ, Scott IU, Flynn HW, Smiddy WE, Newton J, Miller D (2005). Acute- onset endophthalmitis after cataract surgery (2000-2004): Incidence, clinical settings, and visual acuity outcome after treatment. *Am J Ophthalmol*; 139(6):983-987.

Results of the Endophthalmitis Vitrectomy Study (1995). A randomized trial of immediate vitrectomy and of intravenous antibiotics for the treatment of postoperative bacterial endophthalmitis. Endophthalmitis Vitrectomy Study Group. *Arch Ophthalmol*; 113(12):1479-1496.

Somani S, Grinbaum A, Slomovic AR (1997). Postoperative endophthalmitis: incidence, predisposing surgery, clinical course and outcome. *Can J Ophthalmol*; 32(5): 303-10.

Speaker MG, Menikoff JA (1993). Postoperative endophthalmitis: Pathogenesis,prophylaxis, and management. *Int Ophthalmol Clin*; 33(1):51-70.

Source of support: nil. Conflict of interest: none