Clinico-microbiological Profile and Visual outcome in Traumatic Endophthalmitis following Pars Plana Vitrectomy at a Tertiary Eye Care Centre of Nepal

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ABSTRACT

Introduction: Endophthalmitis is a potentially devastating ocular complication of perforating eye injury (PEI) where prompt intervention can save some vision. This study aims to explore the clinico-microbiologic profile and visual outcome following pars plana vitrectomy (PPV) in traumatic endophthalmitis.

Methods: This is a retrospective interventional case series study conducted at a tertiary eye care centre of Nepal. A total of 49 consecutive cases (49 eyes) of endophthalmitis following PEI, who underwent PPV from January 2007 to June 2010 were included in the study.

Results: Mean age was 14.7 years (S.D. 14.27). Twenty seven patients (55%) were of age group below 10 years. Male to female ratio was 2.75:1. Mean duration of presentation was 8.9 days. Nineteen eyes (36.73%) had injuries with wooden sticks, followed by injury with metallic objects in 16 patients (32.56%). PEI involving zone I was found in 31 eyes (63.25%). The retained intraocular foreign body was found in seven patients (14.2%). The post operative vision improved in almost 24 cases (49%) with visual recovery of 20/200 and better in six cases (12.24%). The vitreous culture was positive in five cases (12.8%) with predominant streptococcus pneumonia in four cases (10.25%).

Conclusions: Children were the mostly affected group with males outnumbering females. Wooden sticks and metallic objects were the commonest insulting agents. Despite the late presentation and predominant zone I injury, eye could be salvaged in majority with visual recovery of 20/200 and better in six cases (12.24%).

Keywords: *endophthalmitis; intra-ocular foreign body; perforating eye injury; vitrectomy .*

INTRODUCTION

Endophthalmitis is a potentially devastating ocular complication of perforating eye injury where delay in treatment results in sight loss and also makes it difficult to save the eye ball. Incidence of post-traumatic endophthalmitis ranges from two to 17%.[1-2] Risk factors include delay in wound repair, ruptured lens capsule, dirty wound, wound at rural setting and retained foreign bodies.[2-3]

Traumas are among the common ocular morbidity both in the developing and developed world. Lack of awareness about the safety measures and delay in treatment further complicate the situation in developing countries. With limited studies on the post-traumatic endophthalmitis in developing nations like Nepal, we

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hope the study will be useful to provide the baseline data on clinico-microbiological characteristics, and visual outcome following PPV in such cases at a tertiary eye care setting of Nepal.

METHODS

This is a retrospective, interventional case series study conducted among the patients with endophthalmitis following PEI who were treated with PPV during the period of January 2007 to June 2010. All the consecutive cases with endophthalmitis following PEI were included in the study. Endophthalmitis other than PEI were excluded from the study. The endophthalmitis was diagnosed in cases with increased pain, intraocular inflammation (retinal peripheblitis), exudates in the vitreous and or hypopyon in the anterior chamber following the repaired or unrepaired cases of perforating eye injury.

Clinically the phacolytic uveitis was suspected in cases with perforating eye injury with ruptured lens exhibiting anterior chamber reactions with granulomatous or nongranulomatous keratic precipitates, posterior synechiae, inflammation limited to the anterior vitreous but without fundus lesions and often with raised intraocular pressure. Such cases were also excluded from the study.

The aim of the study was to explore the clinico-microbiological characteristics, and visual outcome following PPV in cases with traumatic endophthalmitis at a tertiary eye care setting of Nepal. The Ethical approval was obtained from the Institutional Review Board, and the study was conducted according to the principles of the Declaration of Helsinki. The medical records were reviewed to evaluate the demographics, duration at the time of presentation, agents of injury, visual acuity, site of perforation, treatment details prior to visit the study hospital. The anatomical location of open globe injuries was done according to the international Ocular Trauma Classification like Zone 1: isolated to cornea, Zone 2: 5mm posterior to Limbus, Zone 3: posterior to anterior 5 mm of sclera. Likewise, the details of intraoperative procedures like PPV, lensectomy, removal of intraocular foreign body (IOFB), and other surgical procedures like retinal detachment surgery besides the intravitreal injections were recorded. The vitreous tap with intravitreal antibiotics was given to those presented early with less severe intraocular inflammation and usually with visual acuity better than perception of light. Pars plana vitrectomy was done in cases with severe intraocular inflammation and with visual acuity of perception of light and worse and those not getting better with prior intravitreal medications.

The intravitreal injection used were; Vancomycin (1mg/0.1 ml), Amikacin (0.4 mg/0.1 ml), and intravitreal dexamethasone (0.4 mg/0.1ml). The subconjunctival injections given were Vancomycin 25 mg and Amikacin 25 mg during the surgery. Topical therapy started was Vancomycin 50 mg/ml and Amikacin 20mg/ml, Prednisolone acetate (1%) one hourly to start with and reduced to two to four hourly as per response. Like wise, cycloplegics used was atropine 1% every 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 along with oral steroid in tapering dose as and when 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 and intravenous medications were not used in all the cases.

The details of post operative treatment, laboratory findings and post operative course including presenting and best corrected visual acuity (BCVA) were recorded from the documents. Visual acuity was assessed in Snellen's metric notation, which were later converted in to Snellen's fraction equivalent in feet. The data were analyzed in SPSS version 11.5.

RESULTS

There were total of 49 eyes of 49 cases with post traumatic endophthalmitis who were treated with PPV along with adjunctive intravitreal, topical and systemic medications during the study period.

The age range was 2-72 years with mean age of 14.7 years (S.D 14.27). Twenty seven patients (55%) were of age group below 10 years. It was followed by its occurrence in age group 10-20 years and 20-30 years comprising of eight cases each (16.3%). Males were more than females comprising of 36 (73.47%) and 13 cases (26.53%) respectively. Forty one cases (83.67%) were from the country side (rural area) and only six cases (12.2%) were from within the valley where the hospital is located. The mean duration of presentation was 8.8 days with range of one to forty five days. Sixteen patients (32.6%) presented to the hospital within 3-6 days and eight patients (16.3%) presented within 9-12 days following injury. Right eye was affected more than the left eye comprising of 29 (59.1%) and 20 (40.9%) respectively (Table 1).

Table 1. Demographic Characteristics of PEI cases.

		Frequency	%
Age group	< 10 years	27	55.1
	10-20 years	8	16.3
	20-30 years	8	16.3
	30-40 years	3	6.12
	40-50 years	2	4.08
	> 50 years	1	2.04
Sex	Male	36	73.46
	Female	13	26.53
Address	Valley	6	12.2
	Out of valley	41	83.67
	Out of country	2	4.08
Duration of presentation	< 1 day	3	6.1
	1-3 days	3	6.1
	3-6 days	16	32.6
	6-9 days	10	20.4
	9-12 days	8	16.3
	12-15 days	4	8.16
	> 15 days	5	10.2
Laterality	Right eye	29	59.2
	Left eye	20	40.8
Total		49	

The most common injurious agent for perforating eye injury was wood stick comprising of 19 patients (38.73%). It was followed by injury with metallic objects in 16 patients (32.56%), stone in four patients (8.16%), pencil and pen in 4 patients (8.16%), and even needle in two patients (4.08%). The PEI involving zone I comprised of 31 cases (63.25%) followed by zone II injury in 12 patients (22.4%). IOFBS was present in seven cases (14.28%), out of which two (4.08%) were in vitreous cavity, three (6.12%) lodged on peripheral retina and two (4.08%) on the posterior pole. All of them received prophylactic topical antibiotics. Eight patients (16%) had no history of prior medication before coming to the study hospital whereas 23 patients (46.9%) had history of prior topical medications and 18 cases (36.7%) had surgical repair done for the perforation elsewhere (Table 2).

Table 2. Clinical profile of patients.

		Frequency	Percent
Injurious agent	Wood stick	19	38.73
	Metallic injury	16	32.56
	Pencil/pen	4	8.16
	Stone	4	8.16
	Needle	2	4.08
	Tooth brush	1	2
	Fruit	1	2
	Umbrella	1	2
	Duck bite	1	2
Site of perforation	Central corneal perforation (zone I)	18	36.73
	Peripheral corneal perforation (zone I)	10	20.4
	Scleral perforation (zone II)	11	22.44
	Peripheral corneo-scleral perforation (zone I + II)	3	6.12
	Scleral perforation (zone III)	7	14.28
	IOFB*	7	14.28
Treatment prior to presentation	Topical antibiotics	23	46.9
	Topical +surgical repair	18	36.7
	No medication	8	16.3
Total		49	

***retained intraocular foreign body**

The vitrectomy was combined with lensectomy in 33 cases (67.3%) besides the intravitreal injections of vancomycin, amikacin, and dexamethasone for the concomitant cataract and subluxated lens. The IOFB was removed in all cases. The post operative visual acuity improved in 24 cases (49%) following vitrectomy with good visual recovery of 20/20 and better in three patients (6.12%) and 20/200 and better in six patients (12.24%). There was no light Perception in four cases (8.16%) preoperatively. The mean duration of follow up was 2.79 months with the range of one to 14 months. Twenty four patients (49%) were followed up for up to three months and seven patients (14.28%) for more

than 12 months (Table 3).

Table 3. Surgical procedures and visual outcome.

		Frequency	%
Presenting visual acuity	< 20/1200 to better than *LP	6	12.2
	LP	39	79.5
	†NLP	4	8.16
Best corrected visual acuity at last follow up	20/20-20/60	3	6.12
	< 20/60-20/200	3	6.12
	< 20/200-20/400	2	4.08
	< 20/400-20/1200	9	18.4
	< 20/1200 to better than LP	7	14.3
	LP	17	34.7
	NLP	8	16.3
Types of surgical procedure	‡PPV + §IVI	16	32.6
	PPV + ||L + IVI	20	40.8
	PPV + L + **IOFBR + IVI	7	14.2
	Repair + PPV + L + IVI	1	2
	PPV + L + ††RD Surgery + IVI	5	10.2
Duration of follow up	1-3 months	24	48.9
	3-6 months	9	18.3
	6-9 months	5	10.2
	9-12 months	4	8.16
	12-15 months	4	8.16
	> 15 months	3	6.12
Final Ocular Status (Intra- ocular inflammation)	Improvement	45	91.84
	Phthisis bulbi	3	6.12
	Evisceration	1	2.04

**Light Perception;†No Light Perception; ‡ Pars Plana Vitrectomy; § Intravitreal Injection; ||Lensectomy; ** Intraocular Foreign Body Removal; †† Retinal Detachment.*

Intraocular inflammation was improved in 45 cases (92%) after vitrectomy where as three cases (6.12%) had phthisis bulbi and evisceration was done in single case (2.04%). Likewise, five cases (10.2%) had concomitant retinal detachment which was treated with endolaser and silicon oil after vitrectomy. The result of vitreous and aqueous sample was not available in ten cases (20.4%). Among the remaining cases, abnormality was found in seven cases (17.9%) in Gram and Giemsa stain of the vitreous fluid. Likewise, five cases (12.8%) were found to have specific micro-organism in the vitreous culture. Streptococcus pneumoniae was found in four cases (10.25%) and klebsiella in one case (2.56%) (Table 4).

Table 4. Microbiology of the vitreous sample.

		Frequency	Percent
Gram stain/ Giemsa stain (n = 39)	Pus cells	7	17.9
	No growth	32	82.05
Culture (n = 39)	Streptococcus pneumoniae	4	10.25
	klebsiella	1	2.56
	No growth	34	87.1
Total		39	100.00

DISCUSSION

In our study, despite the late presentation of the patients, and perforating eye injury with predominant zone one involvement, majority of the eyes were salvaged.

Most of the cases with traumatic endophthalmitis belonged to less than ten years of age. This may be due to the higher proportion of ocular injuries among the children and young people as in other studies.[4-6]

Males were affected four times more than the females. This disparity may be due to the fact that males are involved more in outdoor works than females and the trauma could have been resulted from their occupational work. Our finding of male predominance was consistent with other studies.[7-14]

The mean duration of presentation of our patients following the injury was 8.9 days. This is because majority of patients were from distant geographic area with poor transportation facilities and 18 cases came only after primary repair in other canters. The other factors could be due to lack of knowledge about the seriousness of the problem, late detection of the problem especially in children leading to delaying in repair, a major factor presumed for developing endophthalmitis.[11,15,16]

The injury with wood sticks was the predominant injurious agents in our study. This could be due to the fact that majority of the population are subsistence farmers and work in the farms; and also the young boys prefer to play with wood sticks and other wooden toys. Likewise, the second commonest agent for ocular injury was metallic objects. The resulting injury might be due to the practice of working without protective glass wares. So the higher proportion of cases with endophthalmitis

following injuries with metal and wooden sticks may be due to the contamination and also their higher rates for perforating eye injury as was the findings in other studies.[6,9,11,12]

The frequency of retained IOFB in our study was similar to the study by Alfaro et al.[8] although it was less than in the series by Al-omran et al.[7] and higher than in the series by Thompson et al.[16]

Injury with pen and pencil was the next commonest mode of injury in children of our series. This showed the need of careful watch by guardians or teachers during the handling of these sharp things by the children at home or school as they are unaware of the consequences of the events.

The perforating eye injury involved the zone one in predominant cases in our series. The cornea being vulnerable in ocular trauma may be due to its anatomical position of anterior most ocular structure as in the series by Alfaro et al.[8] The more cases with endophthalmitis with perforating eye injury with corneal perforation could be due to the concomitant lens rupture due to its proximity like in the studies by Essex et al. [3] and Schmidseder et al.[17] which was considered a risk factor for endophthalmitis. The other possible factor for endophthalmitis in our subjects could be due to late presentation and contaminated injurious agents.

The predominance of right eye in our patients may be related to right hand which is often dominant during work with injury in right eye due to close proximity. But unlike our findings, left eye was affected more in the series by Zhang et al.[14]

During the PPV, majority of the cases also needed lensectomy for the concomitant cataract. The higher proportion of cataract may be due to the perforating eye injury through the cornea that ruptured lens because of close proximity.

The BCVA as compared to pre-operative status improved in 24 patients following the PPV in our series. The reason for poor visual outcome despite resolution of intraocular inflammation in majority could be due to higher proportion of concomitant corneal scar in our patients involving the central visual axis and also could be due to pre-operative poor visual acuity and retained IOFB as was the significant risk factor for poor visual recovery in the series by Das et al.[18] The rate of visual recovery in our series was lower than the other reported similar studies.[7,13,16,19-22] The rate of retinal detachment was lower in our case series than that reported by Thordsen et al.[22] in his series. Like wise, the rate of phthisis bulbi following the vitrectomy was comparable to the series by Yang et al.[13] The rate of evisceration was quite less than the series with fungal endophthalmitis by Wykoff et al.[23]

The lesser follow up of our patients in our study was because of predominant patients from the distant geographic region who were then advised to consult at their nearby ophthalmic centers for their comfort.

The identification of microorganisms in our series was less than the other reported studies.[7,8,16,22,24] The reason may be due to prior use of topical and systemic antibiotics before coming to our center for further treatment. There could be some bias due to unavailable vitreous sample which may have possibility of presence of micro-organisms. The most common isolates in our study were streptococcus species like in other studies,[5,7] although few studies showed staphylococci as the predominat micro-organism,[8,16,24] Gram negative organisms,[13,24] and even bacillus species.[20]

The limitations of this study are relatively small sample size, lesser follow up period, and unavailability of vitreous samples in ten cases.

CONCLUSIONS

Children are the mostly affected group with predominant males. Injury with wooden sticks and metallic injuries are the commonest inflicting agents. Despite the late presentation, and associated cornel injuries leading to opacity in the visual axis, eye ball could be salvaged in 45 cases and visual acuity of 20/200 and better in six cases. Streptococcus species are the most common isolates in our series of post traumatic endophthalmitis.

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