

ORIGINAL ARTICLE

ENDOPHTHALMITIS: MAGNITUDE, TREATMENT AND VISUAL OUTCOME IN NORTHWEST FRONTIER PROVINCE OF PAKISTAN

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Abstract

Background Many cases of post-operative and posttraumatic endophthalmitis are being managed at the Khyber Institute of Ophthalmic Medical Sciences, Peshawar in Pakistan but no study has been done to ascertain the magnitude of the disease and to also evaluate the visual outcome after management.

Methods The case notes of 39 patients diagnosed with posttraumatic and postoperative endophthalmitis between May 2006 and April 2007 were analyzed and clinical characteristics obtained were documented and tabulated

Results During the study period, 2474 patients were admitted in both the male and female wards. Of these, 39 (1.6%) had endophthalmitis due to surgical and traumatic complications. In all, 6 (12.4%) patients had evisceration, while 21 (53.8%) patients who had topical antibiotics consisting of ofloxacin, 0.1% corticosteroids, fortified cetazoline and 1% atropine along with intravitreal antibiotics, a combination of 0.1mg vancomycin and 0.4mg amikacin, were discharged home with a visual acuity of counting fingers to light perception.

Conclusion Endophthalmitis is a serious ocular complication of open globe injury and intraocular surgery. The frequency in this center has been noted to be very high as compared to other places. Its management is very challenging and often leads to devastating structural and functional damage to the eye; causing severe frustration to both the patient and the attending physician. Efforts must be made to prevent the condition.

Key words: *Endophthalmitis, magnitude, visual outcome*

Résumé

Fond Beaucoup de cas de postopératoire et de poteau-traumatique endophthalmite sont contrôlés à l'institut de Khyber des sciences médicales ophtalmiques, Peshawar au Pakistan mais non étude a été fait pour s'assurer l'importance de la maladie et pour évaluer également les résultats visuels après gestion.

Méthodes Les notes de cas de 39 patients diagnostiqués avec l'endophthalmite poteau-traumatique et postopératoire entre mai 2006 et l'avril 2007 ont été analysées et des caractéristiques cliniques obtenues ont été documentées et tabulées

Résultats Pendant la période d'étude, 2.474 patients ont été admis dans les salles masculines et femelles. De ces derniers, 39 (1.6%) ont eu l'endophthalmité due aux complications chirurgicales et traumatiques. En tout, 6 (12.4%) patients ont eu l'éviscération, tandis que 21 (53.8%) patients qui ont eu les antibiotiques topiques se composer de l'ofloxacin, 0.1% corticostéroïde, cetazoline et atropine

enrichie de 1% avec les antibiotiques intravitreal, une combinaison du vancomycin 0.1mg et de l'amikacine 0.4mg, étaient maison déchargée avec une acuité visuelle de compter des doigts pour allumer la perception.

Conclusion L'endophthalmitis est une complication oculaire sérieuse des dommages ouverts de globe et de chirurgie intraoculaire. La fréquence à ce centre a été notée pour être très haute par rapport à d'autres endroits. Sa gestion est très provocante et mène souvent à dévaster des dommages structuraux et fonctionnels à l'oeil ; entraînant l'anéantissement grave au patient et au médecin étant présent. Des efforts doivent être faits pour empêcher la condition.

Mots clés: Endophthalmitis, grandeur, résultats visuels

Endophthalmitis describes the inflammatory response of the eye to intraocular infection and sometimes toxins from the organisms, which constitutes a true emergency. It is the most dreaded and devastating complication of intraocular surgery with a potential to lead to permanent and profound loss of vision.¹ Postoperative endophthalmitis is the most common form, comprising up to 70% of infective endophthalmitis. Posttraumatic endophthalmitis follows open-globe injuries and accounts for one-fifth of all cases.² The incidence of endophthalmitis from postoperative ocular complications is 0.07%-4%.³⁻⁶

Intraoperative posterior capsule rupture is associated with an 8 to 11 fold increased risk of acute endophthalmitis,³ while contamination of topical medications, patient's own flora, virulence of inoculated pathogens and immune status are recognized risk factors for endophthalmitis.⁷⁻⁹

The symptoms of endophthalmitis are blurred vision, redness and pain, while the signs include conjunctival hyperaemia, anterior chamber and vitreous cells, hypopyon, lid edema, chemosis, corneal edema, reduced red reflex and afferent pupillary defect.¹⁰ In endophthalmitis, the most common microorganisms cultured from the ocular surface and anterior chamber are *staphylococcal aureus* and *staphylococcal epidermidis*.⁸ Posttraumatic endophthalmitis associated with open globe injury represents a distinct kind of intraocular infection,¹⁰ and the risk factors include the presence of an intraocular foreign body, injury inflicted by organic material, delay in surgery and the type of wound involved.¹¹ The main treatment is intravitreal antibiotics used in conjunction with subconjunctival, topical and intravenous antibiotics and corticosteroids.¹² The Endophthalmitis - vitrectomy study concluded that routine immediate vitrectomy is not necessary in patients with better than light perception vision at presentation but of substantial benefit for those who have light perception only vision.¹³ Delay in primary wound closure or inadequate treatment worsens the visual prognosis,¹⁰ while removal of the intraocular foreign body within 24 hours of injury has been found to markedly reduce the risk of infectious endophthalmitis.¹⁴ We undertook this study to:

1. Determine the frequency of admitted cases of endophthalmitis in our center
2. Determine the visual outcome following treatment
3. Compare our results with those obtained in other parts of the world
4. Prospectively assess the etiology, and effect of management of endophthalmitis on patients, quality of life.

Patients and Methods

Hayatabad medical complex, Peshawar is one of the 3 major tertiary hospitals in the North West Frontier Province of Pakistan. The Khyber Institute of Ophthalmic Medical Sciences (KIOMS) serves as a referral center to the peripheral clinics, the district hospitals and parts of Afghanistan. From May 2006 to April 2007, 2474 patients were admitted in both the male and female eye wards. The case notes of thirty-nine patients diagnosed with endophthalmitis from postoperative and posttraumatic complications were retrieved. Information on age, gender, history of presenting complaints such as pains, poor vision and duration were obtained. Other information includes systemic illness, general and ocular examinations. The investigations, treatment and visual outcome on discharge were also noted. These were filled in a prepared proforma and analyzed. The results are presented in tables.

Results

During the period of study, 2474 patients were admitted. 1363 patients had cataract extractions, 154 had glaucoma surgery and 36 had vitreoretinal surgery. One hundred and eight patients were managed for open and closed globe injuries.

Thirty-nine (1.6%) were treated for endophthalmitis secondary to postoperative and posttraumatic complications. There were 31 (79.5%) males and 8 (20.5%) were females giving a male to female ratio of about 4:1. Children aged 1 to 10 years were mostly affected and this is closely followed by those between 11 to 20 years. Posttraumatic

endophthalmitis accounted for 27(69.2%) (Table 1), while postoperative endophthalmitis following cataract surgery occurred in 12 (23.1%) (Table 2).

Most of the specimens (vitreous tap) sent yielded no growth while staphylococcal aureus was isolated in 2 (5.1%), others were one case (2.6%) of *E coli*, *pseudomonas* and *septate hyphae*. All the patients had antibiotic treatment with ofloxacin, 0.1% corticosteroids, fortified cetalazoline and 1% antibiotics given topically, while 0.1mg vancomycin

and 0.4mg amikacin were administered intravitreally. Six (15.4%) patients had evisceration, while 2 (5.1%) had intraocular foreign bodies removed. The visual outcome on discharge was not too encouraging as 21 (53.8%) patients were discharged home with a visual acuity of counting finger to perception of light. Their visual acuities were either better or same on admission as shown on both tables. Twelve (30.8%) patients had no perception of light.

Table 1. Posttraumatic endophthalmitis

No.	Sex	Age (years)	Type of injury	Offending object	TAP (days)	Intervention elsewhere	IVA	Investigations (B/scan + c/s)	Management	VAD
1.	M	60	OGI	Thorn	3	Not recorded	NPL	Not done	IV+ab + s	NPL
2.	M	7	OGI	Stick	7	ab + eye drops	PL	No aspirate	IV+ab + s	PL
3.	M	2	OGI	Stick	9	ab + eye drops	PL	E. Coli + S. Aureus	IV+ab + s	CF
4.	M	28	OGI	Thorn	11	ab + eye drops	NPL	Not done	IV+ab + s	NPL
5.	M	45	OGI	Thorn	6	ab + eye drops	6/12	No growth	IV+ab + s	PL
6.	M	75	OGI	Thorn	18	ab + eye drops	CF	No growth	IV+ab + s	HM
7.	M	12	OGI	Needle	1	Not recorded	PL	Infective process	PPV + IV + ab + s	PL
8.	M	35	OGI	Iron piece	6	ab + eye drops	PL	Infective process + IOFB	PPV + IV + IOFB removed	PL
9.	F	7	OGI	Needle	4	ab + eye drops	NPL	Clear with flat retina	IV+ab + s	NPL
10.	M	38	OGI	Bomb blast	90	Debridement	PL	No IOFB	IV+ab + s	PL
11.	M	10	OGI	Sick	7	ab + eye drops	PL	IOFB	IV+ab + s	PL
12.	M	5	OGI	Wood	5	ab + eye drops	Not recorded	No growth	IV+ab + s	NPL
13.	F	20	OGI	Umbrella	10	Corneal repair + ab	PL	Not done	Evisceration + ab	NPL
14.	M	5	OGI	Not stated	15	ab + eye drops	?6/18	Infective process	IV+ab + s	HM
15.	F	6	OGI	Needle	4	Not recorded	Not done	No growth	Evisceration + ab	NPL
16.	F	11	OGI	Needle	20	ab + eye drops	NPL	No result	IV+ab + s	NPL
17.	F	10	OGI	Pen	11	ab + eye drops	PL	No growth	IV+ab + s	PL
18.	F	70	OGI	Thorn	Not stated	Nil	PL	Fungal septate hyphae	IV+ab + s	PL
19.	M	4	OGI	Not stated	1	Nil	PL	No IOFB		PL
20.	M	30	OGI	Bomb blast	Not stated	Upper and lower eye lid repair	PL	Infective process	IV+ab + s	Not stated
21.	M	16	OGI	Hammering	3	ab + eye drops	PL	IOFB + RD	Removal of IOFB attempted	CF
22.	M	19	OGI	Not stated	6	Corneal repair + ab	PL	Nil	IV+ab + s	Not stated
23.	M	14	OGI	Nail	20	PPV	NPL	Nil	IV+ab + s	NPL
24.	M	6	OGI	Telephone wire	13	Not stated	PL	Infective process	IV+ab + s	Not stated
25.	M	20	OGI	Fist	4	Corneal repair + cataract extraction	NPL	Nil	Evisceration + ab	NPL
26.	M	50	OGI	Thorn	3	Not stated	PL	IOFB	IV+ab + s	NPL
27.	M	10	OGI	Pen	9	Corneal repair	PL	Scleral repair	IV+ab + s	HM

OGI: Open globe injury; PPV: Pars plana vitrectomy; PL: Perception of light; IV: Intravitreal injection; ab: antibiotic; s: steroids; CF: Counting fingers; HM: Hand movement; NPL: Non perception of light; ECCE: Extracapsular cataract extraction; PCOL: Posterior chamber intraocular lens; IOFB: Intraocular foreign body; TAP: Time at presentation; IVA: Initial visual acuity; VAD: Visual acuity at discharge

Table 2. Postoperative ondophthalmitis

No.	Sex	Age (years)	Systemic illness	Type of surgery	Time to onset (days)	Initial VA	Investigations (B/scan + c/s)	Treatment	Final VA
1	M	65	Hypertension	ECCE + PCIOL	1	CF	No growth	IV + ab + s	HM
2	M	60	-	ECCE + PCIOL	2	HM	Echogenic vitreous No growth	IV + ab + s	PL
3	M	30	-	ECCE + PCIOL	7	6/18	Not done	IV + ab + s	6/18
4	M	35	-	Trab + ECCE + PCIOL	5	PL	Pseudomonas	IV + ab + s	PL
5	M	20	-	PPV	2	PL	vitreous hemorrhage, PVD, evisceration	IV + ab + s	NPL
6	M	60	-	ECCE + PCIOL	6	HM	Not done	IV + ab + s	HM
7	F	45	Diabetes	ECCE + PCIOL	6	HM	Not done	IV + ab + af	PL
8	F	70	Hypertension	ECCE + PCIOL	12	NPL	No aspirate	IV + ab + s	NPL
9	M	35	-	ECCE + PCIOL	12	PL	No result	IV + ab + s	CF
10	M	70	-	ECCE + PCIOL	7	NPL	Not done	Evisceration + ab	NPL
11	M	60	-	ECCE + PCIOL	20	PL	No growth	IV + ab + s	NPL
12	M	21	-	ECCE + PCIOL	4	HM	Not done	IV + ab + s	CF

PPV: Pars plana vitrectomy; PL: Perception of light; IV: Intravitreal injection; ab: antibiotic; s: steroids; CF: Counting fingers; HM: Hand movement; NPL: Non perception of light; ECCE: Extracapsular cataract extraction; PCIOL: Posterior chamber intraocular lens

Discussion

Endophthalmitis is a tragic occurrence, be it after an intraocular surgery or following trauma, and with this event the hopes of the patient is vanished, while the confidence of the ophthalmologist is shattered.¹⁴ Efforts must be made as much as possible to prevent its occurrence.

Endophthalmitis accounted for 1.6% of all cases seen within the study period with posttraumatic endophthalmitis being higher, seen in 27(1.6%) patients than postoperative complications occurring in 12(0.5%) cases. These values are higher than most values seen in the literature. Mollar et al⁵ had an incidence of 0.099% endophthalmitis following cataract surgery in Birmingham, so also Lautha et al⁶ in South India, a similar Asian population recorded an incidence of 0.05% cases secondary to cataract surgery. Other workers^{3, 15, 16} also recorded lower values than seen in this study. Successful cataract surgery restores failing eyesight, and is also responsible for permanent and significant loss of vision resulting from severe endophthalmitis in upto 0.1% patients.¹⁷ There is a need therefore, in our prospective study to identify the reason for the high values obtained in this center.

Posttraumatic endophthalmitis is a complication of penetrating eye injuries that results in blindness in potentially salvageable eyes.¹⁸ Of the 154 patients treated for trauma during this period 27(17.5%) had endophthalmitis. Other similar studies^{13, 19} had lower figures of 6.8% and 5.0% respectively, while the study in Vietnam¹⁰ recorded a much higher value of 11.8% but still lower than that obtained in our study. The risk factors identified were dirty wounds, retained

intraocular foreign bodies; lens capsule breach, delayed wound repair and rural address.¹⁹ Most of the cases of posttraumatic endophthalmitis were either referred from district or peripheral hospitals or the patients have attempted self medication before presentation. Only one patient reported within 24 hours of injury. Nine (33.3%) patients with posttraumatic endophthalmitis had thorn or stick injuries. This is due to the fact that this is a farming community and the injuries occurred on the farms. Children pick dirty needles thrown around to play with and this accounts for the 4(14.8%) cases seen. These instruments carry along organisms as they penetrate the eye at the time of injury causing devastating effect. Narang et al²⁰ in India have attributed the high risk of posttraumatic endophthalmitis to bow and arrow, and household injuries.

Postoperative endophthalmitis remains a serious clinical problem in ophthalmology, and prognosis is largely determined by the virulence of the offending organisms.²¹ Only 1(8.3%) vitreous aspirate in patients with postoperative endophthalmitis yielded *pseudomonas specie*. Others in South India²² cultured *norcadia species* in 60% of cases and *coagulase negative* and *E. coli* were also isolated. Ng et al²³ had 84% *gram positive cocci* and *streptococci*, while *enterococci* and *staphylococci* were isolated in 19.1% and 18.3% respectively. Other studies^{15, 16} identified *coagulase negative cocci*, *S. epidermidis* and *S. aureus* in their various studies. Postoperative endophthalmitis caused by organisms other than *coagulase-negative staphylococcus* or *P. aureus* carries a poor visual prognosis.²⁴

The low rate of culture positivity in this study

could be due to poor sampling technique, the use of antibiotics postoperatively or simply sterile endophthalmitis. Endophthalmitis following open-globe injuries is caused by a specific range of microorganisms of which bacillus specie and coagulase negative staphylococcus are the most frequent.²⁵ The vitreous aspirate of only 1 (3.7%) patient yielded fungal *septate hyphae*, while *E coli* and *Staphylococcus aureus* were cultured in the specimen of one (3.7%) patient, though the B-scan showed infective process in 7 (25.9%) patients' vitreous cavities. Davey et al²⁶ have reported far less cases of fungal infection, but found *bacillus species* as increasingly major causes of posttraumatic ocular diseases. Other studies^{18, 27} also found the bacillus species to be the most important cause of posttraumatic endophthalmitis.

Current recommended approach to suspected posttraumatic infection involves early diagnostic vitrectomy and intraocular culture, use of intravitreal antibiotics and combination of treatment with systemic and periocular antibiotics.²⁶ In this study patients were treated with intravitreal antibiotics using a combination of 0.1mg vancomycin and 0.4mg amikacin. Topical eye drops included ofloxacin, 0.1% corticosteroids, fortified cefazoline, and 1% atropine. Four (10.3%) patients had pars plana vitrectomy as an adjunct to treatment. No oral, intravenous or subconjunctival injections were given. Ng et al²³ had poorer visual outcome without antibiotics than with oral antibiotics, while Cuila et al¹⁵ found that use of subconjunctival antibiotic in routine intraocular surgery received a clinical recommendation of "C", indicating that it may be relevant but cannot be definitely related to clinical outcome.

Only the visual outcome on discharge could be obtained from the files as patients follow up were not recorded. One (8.3%) patient with postoperative endophthalmitis had a pretreatment visual acuity of 6/18 and was subsequently discharged on same visual acuity. Nine (75.0%) patients had pretreatment visual acuity of counting fingers to light perception, out of which 2(16.7%) patients had non-perception of light as 1(8.3%) one was eventually eviscerated.

The visual outcome in those due to posttraumatic endophthalmitis were also similar with 2(7.4%) patients presenting with pretreatment visual acuity of 6/12 and 6/ 18 but were discharged with visual acuities of light perception and hand movement respectively. Seventeen (63.0%) cases had visual acuity of counting fingers to light perception on admission but only 12(44.4%) patients were discharged with same visual acuity. Four (14.8%) eyes were eviscerated. Visual outcome in posttraumatic endophthalmitis is generally poor as recorded by other workers,^{21,25}but Brimton et al²⁸ had 26% of patients with final visual acuity of 6/9 (20/30) and 42.1% had 6/60(20/200) or better.

Endophthalmitis, be it due to postoperative or posttraumatic complications have a very devastating effect. The frequency of endophthalmitis in this center has been noted to be very high as compared to other studies. Effort must be made to identify the cause in order to find an optimal management option.

Recommendations

1. There is need to have a continuous medical education program for general practitioners and primary eye care providers on the devastating effect of endophthalmitis.
2. Health education to all patients at the outpatient clinic on the dangers of self-medication and the need to seek immediate attention in cases of eye injuries.
3. Parents should be involved in the management of their children's condition
4. The eye wards, operating theaters, instruments and consumables must be kept clean and sterile.
5. More research is indicated to find out the causes of the high prevalence and incidence, poor yield of microorganisms on microscopy and culture and the poorer outcome of treatment in the department.

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