

## BACTERIAL ISOLATES IN TRAUMATIC GLOBE RUPTURED PATIENTS IN A PERIPHERAL TERTIARY MEDICAL COLLEGE AND HOSPITAL

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### ABSTRACT

**Background:** Ocular trauma can lead to access of bacteria to the intra ocular contents. So the information of the bacterial contaminants is crucial to institute empirical antibiotic therapy to prevent the development of endophthalmitis.

**Aims & Objectives:** To isolate the bacterial contamination following traumatic globe ruptured patients in a peripheral tertiary medical college and hospital.

**Materials and Methods:** This prospective study was conducted in the department of Ophthalmology, Burdwan Medical College, over a period of one year from April 2013- March 2014. A detailed history was taken and ophthalmological workup was done for each open globe injury cases. At the time of repair, we took three samples for bacteriological culture. Those samples were collected as conjunctival swab from inferior fornix, aqueous sample, and vitreous tap respectively. The collected samples were labeled properly and immediately sent to the department of microbiology for bacteriological culture and sensitivity. The culture report was studied and recorded.

**Results:** The study included 75 cases, of which, 57 were males, and 18 were females. Age of the study population was ranging from 18 – 54 years. Fifty seven (77.33%) study population belonged to rural areas, and eighteen (24%) were of urban area. Most common etiologic agent responsible for traumatic rupture of globe was stone chip followed by road traffic accident. Bacteria were isolated from 50 (66.66%) of the 75 eyes studied. Of these 50 eyes, a single isolate was detected in 39 (78%) eyes, while there were two isolates in 7 (14%) eyes, three and or more isolates in 4 (8%) eyes. In more detail, there were 33 strains of Gram-positive cocci, accounting for 66.0% of all isolates, of which most common was staphylococcus epidermidis (46%). Among 8 Gram-positive bacilli isolates (16%), all were of the genus Corynebacterium. There were 9 (18%) Gram-negative bacillary isolates, including 3 (6%) Escherichia coli; 2 (4%) isolates of Pseudomonas aeruginosa, and one isolate (2%) each of Proteus vulgaris, Enterobacter aerogenes, Klebsiella, and Haemophilus influenzae.

**Conclusion:** Isolation of bacteria from eyes with open globe injuries, and their subsequent antibiotic sensitivity pattern, provides an insight into selection of appropriate prophylactic drugs for prevention of development of endophthalmitis.

**Key Words:** Bacterial Isolates; Traumatic Globe Rupture; Endophthalmitis

### Introduction

The most common sight threatening complication of ocular surgery and/or trauma is endophthalmitis. In open globe injuries, the incidence of endophthalmitis varies from 2.4 % to 18.42%.<sup>[1]</sup> It has been found that the incidence is more in rural set up.<sup>[2]</sup> Previously published report has shown, that more than one-third of cases of open globe injuries were aqueous sample cultures positive.<sup>[3,4]</sup>

The microbial profile for traumatic endophthalmitis is different in the developed and the developing nations.<sup>[5]</sup> The knowledge of the bacteriological profile in the cases of traumatic globe rupture is crucial to institute empirical antibiotic therapy protocol. The aim of this study was to find out the bacteriological profile in traumatic globe rupture patients in a peripheral tertiary medical college hospital.

### Materials and Methods

This was a prospective study conducted in the department of Ophthalmology, Burdwan Medical College, over a period of one year, from April 2013- March 2014. A total of 75 cases of traumatic eye-globe rupture were included in this study. Only fresh rupture cases were included in this study, and informed consent was taken from the study population. A detailed history was taken regarding the demographic profile, nature of ocular trauma, any systemic or ocular disorder in the recent past, and was recorded. Assessment of visual acuity using Snellen's chart was tried in all cases. A thorough and gentle slit-lamp examination was done. All findings were recorded. Ultrasound B scan was done in select cases. Repairing of the globe was carried out under local anaesthesia. At the time of repair, we took three samples for bacteriological culture. Those samples were collected as conjunctival swab from inferior fornix, aqueous

sample and vitreous tap, respectively. Conjunctival swab was taken before antiseptic dressing aqueous; and vitreous sample were taken after repair of the wound. The collected samples were labelled properly, and immediately sent to the department of microbiology for bacteriological culture and sensitivity. In the microbiology department, the samples were inoculated into appropriate culture media and bacterial identification was done, following standard protocols. After identification of bacteria, antibiotic sensitivity pattern was determined by Kirby Bauer disc diffusion method, following clinical and laboratory standards institute 2013 guidelines (CLSI).<sup>[5]</sup> The culture report was studied and recorded. The patients were discharged after two weeks of repair and followed up to a minimum of twelve weeks to determine any signs of endophthalmitis.

## Results

The study included 75 cases of which 57 were males and 18 were females. The male: female ratio was 3.16:1. Age of the study population was ranging from 18 – 54 years. 57 (77.33%) cases belonged to rural areas, and 18 (24%) were of urban residency. Most common etiologic agent responsible for traumatic rupture of globe was stone chip followed by road traffic accident [Table-1]. Bacteria were isolated from 50 (66.66%) of the 75 cases studied. Of these 50 cases, a single isolate was detected in 39 (78%) cases, while there were two isolates in 7 (14%) cases, three and or more isolates were seen in 4 (8%) cases [Figure 1].

**Table-1: Etiologic agent of traumatic ocular injury (n=75)**

Etiologic Agent	Frequency (%)
Stonechip	41 (54.67)
Fall	3 (4.00)
Fire cracker	5 (6.66)
Iron rod	7 (9.33)
Road traffic accident	11 (14.67)
Fist or hand	3 (4.00)
Vegetative material	5 (6.67)
Total	75 (100.00)

**Table-2: Associated findings of traumatic ocular injury (n=75)**

Findings	Frequency (%)
Lid echymosis	66 (88.00)
Iris prolapse	46 (66.33)
Sub-conjunctival hemorrhage	42 (56.00)
Endophthalmitis	38 (50.67)
Uveal prolapsed	36 (48.00)
Hyphema	34 (45.33)
Traumatic cataract	24 (32.00)
Lid cut	12 (16.00)
Lower lacrimal system injury	4 (5.33)

Most common associated ocular finding was lid ecchymosis (88%), followed by iris prolapse (66.33%)

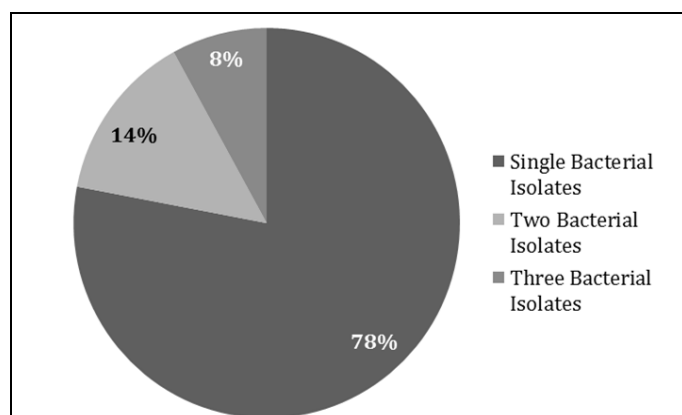
[Table 2]. There were 33 strains of Gram-positive cocci, accounting for 66.0% of all isolates, of which most common was staphylococcus epidermidis (46%). Among 8 Gram-positive bacilli isolates (16%), all were of the genus Corynebacterium. There were 9 (18%) Gram-negative bacillary isolates, including 3 (6%) Escherichia coli; 2 (4%) isolates of Pseudomonas aeruginosa, and one isolate (2%) each of Proteus vulgaris, Enterobacteraerogenes, Klebsiella, and Haemophilus influenzae [Table-3]. Initial and final visual outcome of the patients have been displayed in Table-4. The antibiotic sensitivity pattern of select bacterial isolates has been shown in Table-5.

**Table-3: Bacterial isolates and rates (n=50)**

Bacterial Isolates	N (%)	
Staphylococcus epidermidis	23 (46)	
Staphylococcus aureus	5 (10)	
Enterococcus spp	2 (4)	
Enterococcus faecalis	2 (4)	
Streptococcus pneumonia (PSSP)	1 (2)	
Total	33 (66)	
Gram-positive bacilli	Corynebacterium spp	8 (16)
	Escherichia coli	3 (6)
	Pseudomonas aeruginosa	2 (4)
	Proteus vulgaris	1 (2)
Gram-negative bacilli	Enterobacteraerogenes	1 (2)
	Klebsiella	1 (2)
	Haemophilus influenza	1 (2)
	Total	9 (18)

**Table-4: Showing initial and final visual outcome (n=75)**

Initial Visual acuity	Number of cases	Number of cases with final visual acuity of 6/60 or better
No perception of light	12 (16%)	00 (00%)
Perception of light	23 (31%)	08 (34.7%)
Hand Movement	24 (32%)	16 (66.66%)
Hand Movement to 3/60	09 (12%)	06 (66.66%)
3/60 or better	07 (9%)	05 (71.4%)



**Figure-1: Pie diagram showing bacterial isolate (n=50)**

## Discussion

Ocular infection is the major concern in traumatic globe rupture. Isolation of two or more microorganism, and instituting an appropriate antimicrobial therapy, is a

**Table-5: Antibiotic sensitivity pattern of bacterial isolates**

Organism	Drugs and their susceptibility to the organism										
	Moxi	Gati	Oflox	Cipro	Vanco	Chloram	Cefazo	Amik	Ceftazi	Genta	
Staph. Epid (n=23)	HS	20 (87%)	18 (78%)	10 (43%)	08 (35%)	21(91%)	20 (87%)	19 (82%)	20 (87%)	21 (91%)	19 (82%)
	IR	3 (13%)	5 (22%)	5 (22%)	7 (30%)	2 (9%)	3 (13%)	4 (18%)	3 (13%)	2 (9%)	3 (13%)
	R	0	0	8 (35%)	8 (35%)	0	0	0	0	0	1 (5%)
Staph. Aureus (n=5)	HS	4 (80%)	3 (60%)	2 (40%)	3 (60%)	5 (100%)	2 (40%)	5 (100%)	1 (20%)	4 (80%)	2 (40%)
	IR	1 (20%)	2 (40%)	0	0	0	3 (60%)	0	2 (40%)	1 (20%)	1 (20%)
	R	0	0	3 (60%)	2 (40%)	0	0	0	2 (40%)	0	2 (40%)
Enterococcus Spp (n=3)	HS	2 (67%)	2 (67%)	1 (33%)	1 (33%)	3 (100%)	3 (100%)	3 (100%)	1 (33%)	3 (100%)	1 (33%)
	IR	1 (33%)	1 (33%)	2 (67%)	2 (67%)	0	0	0	1 (33%)	0	1 (33%)
	R	0	0	0	0	0	0	0	1 (33%)	0	1 (33%)
Strepto. Pneumo (n=1)	HS	1 (100%)	1 (100%)	0	0	1 (100%)	1 (100%)	1 (100%)	0	1 (100%)	0
	IR	0	0	1 (100%)	1 (100%)	0	0	0	1 (100%)	0	0
	R	0	0	0	0	0	0	0	0	0	1 (100%)
Corynebacterium Spp (n=8)	HS	8 (100%)	8 (100%)	5 (63%)	4 (50%)	8 (100%)	4 (50%)	7 (87%)	5 (63%)	8 (100%)	1 (13%)
	IR	0	0	3 (37%)	3 (37%)	0	4 (50%)	1 (13%)	2 (24%)	0	2 (24%)
	R	0	0	0	1 (13%)	0	0	0	1 (13%)	0	5 (63%)
E. coli (n=3)	HS	1 (33%)	2 (67%)	0	1 (33%)	0	3 (100%)	3 (100%)	2 (67%)	3 (100%)	2 (67%)
	IR	1 (33%)	0	0	1 (33%)	0	0	0	1 (13%)	0	1 (13%)
	R	1 (33%)	1 (33%)	3 (100%)	1 (33%)	0	0	0	0	0	0
Pseudo (n=2)	HS	2 (100%)	2 (100%)	0	0	0	2 (100%)	0	1 (50%)	2 (100%)	1 (50%)
	IR	0	0	0	2 (100%)	0	0	0	1 (50%)	0	1 (50%)
	R	0	0	2 (100%)	0	0	0	0	0	0	0
Proteus (n=1)	HS	1 (100%)	1 (100%)	0	0	0	0	0	1 (100%)	1 (100%)	0
	IR	0	0	1 (100%)	0	0	1 (100%)	0	0	0	0
	R	0	0	0	1 (100%)	0	0	0	0	0	1 (100%)
Klebsiella (n=1)	HS	1 (100%)	1 (100%)	0	0	0	1 (100%)	0	0	1 (100%)	1 (100%)
	IR	0	0	1 (100%)	0	0	0	0	1 (100%)	0	0
	R	0	0	0	1 (100%)	0	0	0	0	0	0
Haemophilus (n=1)	HS	1 (100%)	1 (100%)	0	1 (100%)	0	0	0	1 (100%)	1 (100%)	0
	IR	0	0	0	0	0	1 (100%)	0	0	0	1 (100%)
	R	0	0	1 (100%)	0	0	0	0	0	0	0

Abbreviations: Moxi: moxifloxacin, Gati: Gatifloxacin, Oflox: ofloxacin, Cipro: Ciprofloxacin, Vanco: Vancomycin, Chloram: Chloramphenicol, Cefazo: Cefazolin, Amik: Amikacin, Ceftazi: Ceftazidime, Genta: Gentamycin, Staph epid: Staphylococcus epidermidis, Staph Aureus: Staphylococcus Aureus, StreptoPneumo: Streptococcus Pneumoniae, Pseudo: Pseudomonas spp

challenge in itself. In traumatic open globe injuries, polymicrobial infections appear to occur more frequently, because ocular trauma occurs in the non-sterile conditions.<sup>[6]</sup> Endophthalmitis is the most dreaded complication to the eye, and it has been seen that the incidence of endophthalmitis still high after traumatic rupture of globe, despite empirical use of topical broad spectrum antibiotic.<sup>[7]</sup> Microbial isolation from the intraocular tissues does not always lead to endophthalmitis.<sup>[8]</sup>

The development of endophthalmitis, most likely, depends on the load of the organism. However, empirical use of broad spectrum antibiotics along with natural host defense mechanisms prevents subsequent development of clinical infection.<sup>[7]</sup> In this current study, 38 eyes had endophthalmitis. These findings do not correlate with the previous study of 10 cases of open globe injuries, among whom, none developed endophthalmitis, in spite of having positive microbial cultures.<sup>[9]</sup>

The microbial existence favors gram positive organisms in traumatic endophthalmitis.<sup>[10,11]</sup> Gram positive cocci are the most common isolates in the current study. The

source of infectious organisms is either exogenous organism introduced into the eye during trauma, or the patient's own ocular microbial flora.<sup>[12]</sup> This ocular microbial flora may also be responsible for the contamination of intraocular fluids during intraocular surgeries. In our study, Staphylococcus epidermidis is the most common isolate, but in a study from Pakistan, author reported that staphylococcus aureus, followed by staphylococcus epidermidis, was the main organism causing endophthalmitis in children with penetrating ocular injury.<sup>[13]</sup>

The incidence of post-traumatic endophthalmitis is higher in the subjects living in rural areas.<sup>[14]</sup> In this study 77.33% patients with traumatic ocular injury had rural residency, which correlates with another Indian study where rural victims were 84.29%.<sup>[15]</sup>

Gram-positive bacteria were most sensitive to vancomycin, moxifloxacin, gatifloxacin and ceftazidime. Gram negative bacteria were most sensitive to moxifloxacin, gatifloxacin and ceftazidime. However, another study on polymicrobial endophthalmitis showed, that gram positive bacteria were most sensitive to

vancomycin, whereas gram negative bacteria were most sensitive to ciprofloxacin and ofloxacin.<sup>[16]</sup>

Delayed primary repair of traumatic rupture of globe is among the major risk factors for development of infective endophthalmitis.<sup>[16,17]</sup> In this study, majority of the subjects reported after first 24 hours of injury, which is quite congruent with the study from North India where 48.62% sufferers reported after first 24 hours of injury, and had delayed primary repair.<sup>[17]</sup>

Aggressive management in the form of vitrectomy along with intra-vitreous antibiotics in post-traumatic endophthalmitis cases, is coupled with a better clinical outcome.<sup>[18]</sup> Intra-vitreous antibiotics alone have limited role to control post traumatic endophthalmitis.

## Conclusion

Isolation of bacteria from eyes with open globe injuries, and their subsequent antibiotic sensitivity pattern, provides an insight into selection of appropriate prophylactic drugs for prevention of development of endophthalmitis. In situations like that of the tertiary hospital, where this study has been conducted, if no separate operation theatre for septic cases is available, and if further study of bacteriological profile of post-cataract endophthalmitis cases shows similar pattern, it will help in planning for prevention of endophthalmitis.

## Limitation of the Study

Majority of the traumatic open globe injuries has mixed flora contamination including fungi. But in this study we have investigated only the bacteriological profile.

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