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CLINICAL FEATURES AND VISUAL ACUITY OUTCOMES IN CULTURE-POSITIVE ENDOGENOUS ENDOPHTHALMITIS

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ABSTRACT

BACKGROUND: To report clinical features and treatment outcome in culture-positive endogenous endophthalmitis

METHODS: All medical records with a clinical diagnosis of endogenous endophthalmitis from January 2011 to December 2017 presented at CL Gupta Eye Institute, Uttar Pradesh (India) were reviewed. Patients were included in the study if they had evidence of endogenous endophthalmitis in either eye, defined as the presence of iritis and vitritis on ophthalmic examination, and one or more of the following: positive vitreous culture, positive blood culture, or positive urine culture.

RESULTS: Medical record of 41 patients diagnosed with EnE were reviewed. Mean follow-up of these patients was 17.9±7.5 months. Systemic disease preceded by EnE was present in 65.9% patients. History of Intravenous fluid administration was present in 19 (46.3%) patients. Mean duration of disease from the date of presentation was 11.6±17.4 days. All EnE eyes secondary to fungal isolate had improvement in visual acuity, 42% EnE eyes secondary to bacterial isolate showed improvement, and vision was not improved in one EnE eyes with mixed infection. The logistic regression model explained that duration of illness in days (p=0.04) was significantly associated with likelihood of favourable functional outcome.

CONCLUSION: The endogenous endophthalmitis is generally associated with poor outcome. The prognosis depends on initial VA, duration of illness, and type of pathogen. The visual outcome suggest that the timely medical and surgical intervention can prevent loss of vision in cases of endogenous endophthalmitis.

KEYWORDS : Anatomical outcome, Endogenous endophthalmitis, Functional outcome, Intravenous fluid administration, Prognostic factor, Visual outcome

BACKGROUND:

Endophthalmitis is the clinical term used to describe the inflammatory response of the eye to ocular infection.[1] It is defined as the intraocular inflammation of the inner coats of the eye with progressive vitreous inflammation with or without active infection. When the source of inciting infection is after the breach in the outer coats of eye, it is known as exogenous endophthalmitis (e.g. post traumatic / post-operative endophthalmitis). The terminology endogenous endophthalmitis (EnE) is coined if the infection has spread by hematogenous route from a distant source.[2-4] EnE in itself is quiet rare and accounts for about 2% - 8% of all the cases of endophthalmitis.[5-9] The outcomes of the disease are poor and can lead to phthisis bulbi and sometimes may require evisceration. Being a metastatic infection EnE is associated with a systemic cause which is not always identified. The risk factors associated with the disease are hospitalization, diabetes mellitus, urinary tract infection, immunocompromised patients (as in patients on immunosuppressive therapy especially for underlying malignancies, neutropenia and human immunodeficiency virus infection), intravenous drug abuse and indwelling catheters.[8] Apart from the above mentioned risk factors, there are reports of presumed fungal endogenous endophthalmitis after intravenous fluid (dextrose saline) injections also from Indian subcontinent.[10,11]

The literature from Indian subcontinent is sparse on EnE with only one long term study from south India.[12] With this study we try to highlight demographic profile, clinical features, predisposing factors and treatment outcomes of EnE along with microbiological spectrum of culture positive cases in a north Indian population.

METHODS:

The study was approved by CL Gupta Eye Institute Ethics Committee (ECR/1310/Inst/UP/2019) via approval number IEC/2019/18adhered to the tenets of the Declaration of Helsinki. Written informed consent was taken from patients at the time of medical management. All medical records with a clinical diagnosis of endogenous end ophthalmitis from January 2011 to December 2017presented at CL Gupta Eye Institute, Uttar Pradesh (India)were reviewed. Patients were included in the study if they had evidence of endogenous endophthalmitis in either eye, defined as the presence of iritis and vitritis on ophthalmic examination, and one or more of the following: positive vitreous culture, positive blood culture, or positive urine culture. Patients with endophthalmitis due to other causes were excluded. A detailed review of the history of presenting illness, medical history of any co-existing systemic diseases, history of previous medical treatment (oral or intravenous), surgical treatment or of any diagnostic interventional procedure was done. Best corrected visual acuity (BCVA), intraocular pressure by Goldmannapplanation tonometry, corneal clarity, anterior chamber reaction, iris and pupillary details, lens status, media clarity and fundus examination were noted. The records of investigative and laboratory procedures like B scan, complete blood counts, blood culture, urine culture, microbiological results of vitreous biopsy and ocular tissues (in case of evisceration) were appraised. B-scan findings were looked out for with a special emphasis on vitreous echoes and membranes, retinal status, choroidal thickness along with presence of a non-necrotizing or necrotizing choroidal mass lesion and presence or absence of T-sign.

In all patients, vitreous specimen were obtained at the time of vitreous biopsy or vitrectomy. For vitrectomy specimens, 1.0 ml of undiluted sample was taken and was directly plated upon the culture media, which included chocolate agar, blood agar, sabouraud dextrose agar (SDA), brain heart infusion broth (BHIB), and thioglycolate broth (THIO). Blood agar, chocolate agar, BHIB, THIO underwent incubation at 35°C, and SDA at 25 degree Celsius for a period of up to 1 weeks.

Blood, urine and vitreous biopsy culture and sensitivity reports were also reviewed to know the offending organism. Demographic details

like age, gender, socioeconomic background were also noted. The patients were grouped into positive, probable and possible endophthalmitis on the basis of clinical findings.[13] Anterior chamber (AC) cells and flare was assessed for each eye at each visit using the SUN scale scores.[14] Favourable anatomical outcome defined as an attached retina at the final follow-up.[12] Favourable functional outcome defined as final visual acuity of 20/200 or better at final follow-up.[12]

Statistical evaluation:

The statistical analysis was performed using SPSS 17.0 software (SPSS Inc, Chicago, IL, USA). Descriptive statistics were obtained to determine the frequency and proportions. Mean and standard deviation was calculated for continuous variables. For the purpose of comparison, all the patients were divided in to two groups. Group one of patients who were culture positive, and group two of patients with negative culture report. Chi square test, and t test were used to compare identified variables between two groups. A logistic regression analysis was performed to ascertain the effects of lens, age, gender, absence of corneal edema, Initial VA, absence of cilliary congestion, absence of hypopyon, Type of EnE, culture positivity, duration of illness (days), absence of chemosis, recent systemic disease, location of patient, and recent systemic treatment on the likelihood of favourable functional outcome.

Table 1: Demographic and clinical characteristics of EnE patients managed at our institute:

PATIENT	AGE/ GENDER	HISTORY	ORGANISM	DURATION (DAYS)	TREATMENT	NO OF INJECTION	INITIAL VA	FINAL VA		FOLLOW UP (MONTHS)
1	54/F	FIBROID UTERUS/ HYSTERACTOMY/ DM	*Candida albicans (Vitreous)*	13	PPV+IOAB	1	PL	20/2000	NA	10
2	35/F	FEVER/ IVF TREATMENT	*Candida albicans (Vitreous)*	30	PPV+IOAB	2	PL	20/2000	SCAR	30
3	30/M	DYSENTRY/ IVF TREATMENT	*Aspergillus Sp. (Vitreous)*	2	PPV+IOAB	1	PL	20/2000	NA	15
4	25/F	URINARY TRACK INFECTION/ IVF TREATMENT	*Aspergillus Sp. (Vitreous) Klebsella pneumonae (Urine Culture)*	21	PPV+IOAB	1	PL	NPL	TOTAL RD	18
5	25/F	LSCS/ IVF TREATMENT	*Aspergillus Sp. (Vitreous)*	7	PPV+IOAB	1	PL	20/100	NA	12
6	19/M	URINARY TRACK INFECTION	*Aspergillus Sp. (Vitreous)*	2	PPV+IOAB	4	PL	20/30	SCAR	9
7	35/M	NIL	*P. areuginosa (Vitreous) Staphylococcus hominis (Blood Culture)*	0	PPV+IOAB PPL+PPV (Repeate)	4	PL	NPL	SCAR	17
8	6/M	NIL	*P. areuginosa (Vitreous)*	0	PPV+IOAB	2	PL	20/50	WNL	22
9	72/M	URINARY TRACK INFECTION	*Enterococcus fecalis (Vitreous)*	7	IOAB	2	PL	20/20	WNL	30
10	50/F	FEVER	*Streptococcus viridans (Vitreous)*	10	PPV+IOAB	1	PL	NO PL	CLOSED FUNNEL RD	28
11	40/F	NIL	*Staphylococcus epidermidis (Vitreous)*	0	PPV+IOAB	1	PL	20/30	WNL	9
12	44/M	SEPTICEMIA/ CATHETER TIP INFECTION/ CAD/ CKD/ DM	*Strephylococus aureus* (Blood Culture)	30	IOAB	1	20/160 (OU)	20/160 (OU)	WNL	16
13	57/M	FEVER/ IVF TREATMENT	STERILE	4	PPV+IOAB	1	PL (OD)	20/2000	SCAR	24
14	55/M	ANGINA/ IVF TREATMENT/ CAD/HTN	STERILE	15	PPV+IOAB (REVIT)	1	PL (OD)	20/50	WNL	8
15	24/M	FEVER/ IVF TREATMENT	Staphylococcus hominis (Blood Culture)	30	PPV+IOAB	1	20/1250 (OD)	20/2000	SCAR	25
16	23/F	D&C/ IVF TREATMENT	STERILE	10	PPV+VB+IOAB	1	20/400 (OS)	20/200	WNL	16
17	59/F	DM	STERILE	0	PPV+IOAB (REVIT)	1	20/2000 (OS)	20/40	WNL	10
18	51/M	NIL	STERILE	0	PPV+IOAB	2	PL (OS)	20/2000	SCAR	18
19	40/M	NIL	STERILE	0	PPV+IOAB	2	PL (OS)	20/30	WNL	14
20	35/M	NIL	STERILE	10	PPV+IOAB	1	PL (OS)	20/200	WNL	17
21	34/M	NIL	STERILE	0	PPV+IOAB	1	PL (OD)	20/2000	WNL	17
22	22/M	FEVER	STERILE	5	EVICERATION	NA	NPL (OD)	NA	NA	7
23	13/M	NIL	STERILE	60	PPV+IOAB	1	20/2000 (OS)	20/2000	WNL	26
24	11/F	FEVER	STERILE	10	PPV+IOAB	1	20/2000 (OD)	UNCOOPERATIVE	WNL	18
25	44/F	RENAL STONE/ RENAL CALCULUS SURGERY	STERILE	10	PPV+IOAB (OU)	1	20/2000 (OD) 20/20 (OS)	20/400 (OD) 20/60 (OS)	WNL	32

Table 2: Comparison of variables between patients who underwent management at our institute versus patients who were lost to follow-up

Variable		Managed at our institute	Lost to follow-up	P-Value
Age		36.1±16.7 Years	36.3±22.0 Years	0.97
Duration of Symptoms		10.9±14.0 Days	12.7±22.2 Days	0.75
Gender				0.74
	Male	15 (60.0%)	11 (68.8%)	
	Female	10 (40.0%)	5 (31.2%)	
Place of residence				0.09
	Rural	13 (52.0%)	13 (81.2%)	
	Urban	12 (48.0%)	3 (18.7%)	
Recent Systemic Disease				1.00
	Yes	16 (64.0%)	11 (68.8%)	
	No	9 (36.0%)	5 (31.2%)	
Recent Systemic Treatment				1.00
	Yes	11 (44.0%)	7 (43.7%)	
	No	14 (56.0%)	9 (56.3%)	
Chemosis (At presentation)				0.74
	Yes	8 (32.0%)	6 (37.5%)	
	No	17 (68.0%)	10 (62.5%)	
Cilliary Congestion (At presentation)				1.00
	Yes	15 (60.0%)	9 (56.3%)	
	No	10 (40.0%)	7 (43.7%)	
Corneal edema (At presentation)				1.00
	Yes	6 (24.0%)	4 (25.0%)	
	No	19 (76.0%)	12 (75.0%)	
IVF History				0.73
	Yes	14 (63.6%)	8 (53.4%)	
	No	8 (36.4)	7 (46.7%)	
Type of EnE				0.75
	Positive	12 (54.5%)	9 (56.3%)	
	Possible	6 (27.3%)	3 (18.7%)	
	Probable	4 (18.2%)	4 (25.0%)	
VA at presentation				0.57
	No PL	1 (4.0%)	1 (6.3%)	
	PL	16 (64.0%)	8 (50.0%)	
	HM to 20/200	7 (28.0%)	6 (37.5%)	
	>20/200 to <20/60	1 (4.0%)	0	0
	>20/60	0	0	0
Not Recorded	0	1 (6.3%)		

Table 3: Cross tabulation of Initial BCVA vs Final BCVA

		Initial BCVA							
		20/20	20/160	20/400	20/2000	20/1250	NPL	PL	Total
Final BCVA	20/20	0	0	0	0	0	0	1	1
	20/30	0	0	0	0	0	0	3	3
	20/40	0	0	0	1	0	0	0	1
	20/50	0	0	0	0	0	0	2	2
	20/60	1	0	0	0	0	0	0	1
	20/100	0	0	0	0	0	0	1	1
	20/160	0	2	0	0	0	0	0	2
	20/200	0	0	1	0	0	0	1	2
	20/400	0	0	0	1	0	0	0	1
	20/2000	0	0	0	1	1	0	6	8
	NPL	0	0	0	0	0	0	3	3
	EVICERATION	0	0	0	0	0	1	0	1
	UNCOOPERATIVE	0	0	0	1	0	0	0	1
Total		1	2	1	4	1	1	17	27
CHI-SQUARE TEST									
			Value	DF	Significance (2-sided)				
Pearson Chi-Square			115.7	72	0.001				

Table 4: Organism isolated

Organism		Frequency (n)	Percentage
Gram Positive		6	40.0%
	Streptococcus viridans	1	6.7%
	Staphylococcus aurens	1	6.7%
	Staphylococcus epidermidis	1	6.7%
	Staphylococcus hominis	2	13.3%
	Enterococcus fecalis	1	6.7%
Gram Negative		3	20.0%
	Klebsiella pneumoniae	1	6.7%
	Pseudomonas aeruginosa	2	13.3%
Fungus		6	40.0%
	Aspergillus sps	4	26.7%
	Candida albicans	2	13.4%

Table 5: Comparative analysis between culture positive EnE patients verses sterile EnE patients

Variable		Culture Positive	Sterile Culture	P-Value
Age	35.5±18.1 Years	36.5±16.0 Years		0.88
Duration of Symptoms	8.3±9.7 Days	12.9±16.8 Days		0.43
Gender				0.24
	Male	6 (54.5%)	4 (28.5%)	
	Female	5 (45.5%)	10 (71.5%)	
Place of residence				0.69
	Rural	5 (45.5%)	8 (57.2%)	
	Urban	6 (54.5%)	6 (42.8%)	
Recent Systemic Disease				0.67
	Yes	3 (27.3%)	6 (42.8%)	
	No	8 (72.7%)	8 (57.2%)	
Recent Systemic Treatment				1.00
	Yes	6 (54.5%)	8 (57.2%)	
	No	5 (45.5%)	6 (42.8%)	
Functional Outcome				0.69
	Yes	6 (54.5%)	6 (42.8%)	
	No	5 (45.5%)	8 (57.2%)	
Chemosis (At presentation)				1.00
	Yes	8 (72.7%)	9 (64.3%)	
	No	3 (27.3%)	5 (35.7%)	
Cilliary Congestion (At presentation)				1.00
	Yes	4 (36.4%)	6 (42.8%)	
	No	7 (63.6%)	8 (57.2%)	
Corneal edema (At presentation)				0.18
	Yes	10 (90.9%)	9 (64.3%)	
	No	1 (9.1%)	5 (35.7%)	
Hypopyon (At presentation)				0.04
	Yes	3 (27.3%)	10 (71.5%)	
	No	8 (72.7%)	4 (28.5%)	
Cataract				0.18
	Yes	1 (9.1%)	5 (35.7%)	
	No	10 (90.9%)	9 (64.3%)	
Anatomical Outcome				0.23
	Yes	7 (63.6%)	5 (35.7%)	
	No	4 (36.4%)	9 (64.3%)	
Type of EnE				0.10
	Positive	7 (63.6%)	8 (57.2%)	
	Possible	4 (36.4%)	2 (14.2%)	
	Probable	0	4 (28.5%)	
VA at presentation				0.26
	No PL	0	1 (7.1%)	
	PL	10 (90.9%)	6 (42.8%)	

RESULTS:

Medical record of 41 patients diagnosed with EnE at our institute during the study period were included in the analysis. The incidence of EnE among all cases of endophthalmitis was 21%.Twenty six (63.5%) of them were from rural location, and 15 (36.5%) of them were from

urban locations. Average age of patients was 36.2±18.7 years (range 3 to 77 Years). Of them, 26 (63.4%) were males and 15 (36.6%) were females. The disease was bilateral in 2 patients, and unilateral in 39 patients. Out of 43 eyes, right eye was involve in 22 (51.2%) patients and left eye in 21 (48.8%) patients. Systemic disease preceded by EnE was present in 27 (65.9%) patients. One patient had history of abortion, one had history of hysterectomy, and one had history of renal calculus surgery. No systemic predisposing disease was recorded in 13 (31.7%) patients. (Table 1). History of Intravenous fluid administration was present in 19 (46.3%) patients. Mean duration of disease from the date of presentation was 11.6±17.4 days. All patients were considered immunocompetent on the basis of their behavioural pattern. 24 (58.5%) of them were positive, 9 (21.9%) were possible, and 8 (19.5%) were probable endophthalmitis.

Chemosis was present in 14 (32.6%) eyes, cilliary congestion in 24 (55.8%) eyes corneal oedema in 10 (23.3%) eyes, and hypopyon was present in 21 (48.8%) eyes. Hypopyon of more than one mm was present in 7 (16.3%) eyes. AC cells were present in all patients ranged from 0.5+ to 4+. AC flare were present in 23 (55.5%) patients ranged from 1+ to 3+. RAPD was present in 3 (7%) eyes. Vitreous haze (up to 4+) was present in 21 (48.8%) eyes. Cataract was present in 12 (27.9%) eyes.

Sixteen patients (39%) were lost to follow-up. Nine (56.3%) of them were positive, 4 (25%) were probable, and 3 (18.7%) were possible cases of endophthalmitis. Twenty seven eyes of 25 patients were managed at our institute. The patients were symptomatic for a mean of 10.9 days (range, 0–60 days) before receiving appropriate therapy. Demographic and clinical characteristics of patients underwent management at our institute were presented in Table 1. Comparison of variables between patients who underwent management at our institute versus patients who were lost to follow-up was presented in table 2.

Of 27 eyes of 25 patients who were managed at our institute, initial visual acuity was no light perception in one eye, light perception in 17 eyes, 20/2000 in 4 eyes. Mean initial BCVA was 2.5±0.81 logMAR. At final follow-up BCVA was; no light perception in 3 eyes, 20/2000 in 8 eyes, 20/400 in 1 eye, 20/200 in 2 eye, 20/160 in 2 eyes, and >20/160 in 9 eyes. One eye was eviscerated. Final BCVA could not assessed for one uncooperative patient.The difference between presenting BCVA and final BCVA was found to be statistically significant (P=0.01, Chi-square test).(Table 3) Mean follow-up of these patients was 17.9±7.5 months.

Vitreous biopsy was done for all patients. Blood culture was taken for 14 patients, urine culture was taken for 11 patients. Positive culture from either ocular or other body fluids was obtained in 13 out of 25 (52%) patients. Vitreous was positive in 11 (44%) patients, blood culture was positive in 3 (12%) patients, and urine culture was positive in 1 (4%) patient. Vitreous was sterile in two patients whose blood cultures were positive. In one patient both vitreous culture and urine culture was positive. *Staphylococcus hominis* intwo patientsand *Staphylococcus aureus* in one patientwere isolated from blood culture. *Aspergillus* sp. was identified in vitreous of patient, whose urine culture was positive for *Klebsiella pneumoniae,* and *P. areuginosa*was identified in vitreous of patients whose blood culture was positive for *Staphylococcus hominis.*

Bacteria was isolated in 9 (60%) patient, and fungus was isolated in 6 (40%). Among the bacterial cases, 6 were Gram positive and 3 were Gram negative. Organism identified were *Aspergillus* sps. (4), *Candida albicans*(2), *Enterococcus fecalis*(1), *Streptococcus viridans*(1), *Staphylococcus aureus* (1)*, Staphylococcus hominis*(2)*, Staphylococcus epidermidis* (1), *Pseudomonas aeruginosa* (2), and *Klebsiella pneumoniae* (1)*.* Fungus was isolated in 4 (out of 8, 50%) patients with history of IVF treatment, bacteria was isolated in one (out of 8; 12.5%) patient.(Table 4)

Out of 8 EnE eyes (6 unilateral, and 1 bilateral) caused by bacteria, 2 eyes had initial visual acuities of 20/160, 1 eye had 20/1250, and 5 eyes had light perception. At final follow-up, 1 eye had 20/20, 1 eye had 20/30, 1 eye had 20/50, 2 eyes had VA of 20/160, 1 eye had 20/2000, and 2 eyes had no light perception. Similarly infiveEnE eyescaused by fungal isolate, all had initial VA of perception of light. At final follow-up 1 eye had 20/30, 1 eye had 20/100, and 3 eyes had 20/2000. In one case of mixed infection ("Fungus; vitreous", and "Bacteria; urine culture") initial VA was perception of light, and final VA was no perception of light.

All patients received intravenous antibiotics. Twenty-two eyes (82%) underwent pars plana vitrectomy (PPV) surgery, three eyes received appropriate intravitreous antibiotics and two eye needed evisceration. Repeated PPV combined with pars planalensectomywas done in two patients. Vancomycin [1.0 mg/0.1 mL, 13 patients], ceftazidime [2.25 mg/0.1 mL, 13 patients], amikacin [0.125 mg/0.1 mL, 5 patients], and dexamethasone-phosphate [0.4 mg/0.1 ml, 6 patients] were given as intravitreal antibiotics for bacterial EnE. Voriconazole [0.1mg/0.1 mL, 13 patients] was given in patients with fungal EnE. Eight patients (32%) received repeated dose of intravitreal antibiotics.

Out of 27 eyes managed at our institute, 12 (48%) eyes had normal attached retina with clear vitreous cavity at final follow-up. Total retinal detachment occurred in 2 (7.4%) eyes, and scarring in 6 (22.3%) eyes. Favourable functional outcome was achieved in 12 (48%) patients, and favourable anatomical outcome was present in 12 (48%) patients. The average age of patients with favourable functional outcome was 38.5±18.4 years as compared to 35.6±14.2 years in patients without favourable functional outcome (P=.68, independent t test). 10 patient achieved both functional and anatomical outcome, and 9 patients achieved neither functional nor anatomical outcome.

50% (8 out of 16) of patient having predisposing medical condition achieved favourable functional outcome as compared to 55% (5 out of 9) patients without any predisposing medical condition P=0.78, Chi-square test).Comparative analysis between culture positive EnE patients verses culture negative EnE patients has been presented in Table 5.

The logistic regression model explained 73.2% of the variance in favourable functional outcome. Age (p=0.2), gender (p=0.52) absence of corneal edema (p=0.09), Initial VA (p=0.56), absence of cilliary congestion (p=0.49), absence of hypopyon (p=0.37), type of EnE (p=0.28), culture positivity (p=0.43), history of recent systemic disease (p=0.22), and recent systemic treatment (p=0.83) were not associated with likelihood of favourable functional outcome. However duration of illness in days (p=0.04), and absence of chemosis (p=0.04) were significantly associated with likelihood of favourable functional outcome

DISCUSSION:

Endogenous endophthalmitis is a potentially devastating eye infection that usually have a poor visual outcome. Early diagnosis and treatment is important for visual prognosis. Its diagnosis often requires multiple examinations. Complete blood investigations, vitreous biopsy, blood culture, and urine culture along with comprehensive ophthalmic examination was done in this study. Higher incidence in males, and unilateral involvement was reported which is in agreement with previous studies.[12,15-17] The mean age of patients enrolled in this study was similar to the study reported by Ratra et al[12] from India, and significantly less than reported by Connell et al[8] from Australia, and Landre et al[15] from France, and Binder et al[17] from United States.

Many cases of EnE may not have any underlying predisposing medical conditions. The presence of underlying medical conditions predisposing to ocular infection in cases of EnE ranged from 56% to 68% of cases.[9] However, Annabelle et al[18]reported predisposing systemic conditions in90%,and Zenith et al[19] in 90.9% of cases. In the present study, the underlying predisposing conditions was present in 68.3% of patients. This incidence is higher than reported by Ratra et al (53.4%) from India.[12] There was no difference in functional outcome between patients with or without predisposing underlying medical condition. The culture positivity rate ranges from 33% to 94 % of EnE cases. [7-9,12,16-18,20] In this study, the culture was positive in 56% of patients. Blood culture was positive in 20% of cases, and urine culture was positive in one case.

Causative organisms vary geographically. Fungal organisms account for a potential causative agent for the majority of the EnE cases.[7,8,9] However, 60% bacterial vs. 40% fungal isolates were reported in this series. Keswaniet al[16] (50% bacterial vs. 50% fungal), and Binder et al[17](48% bacterial vs. 48% fungal) also reported similar incidence of bacterial and fungal organisms among EnE cases. Ratraet al[12] (85% bacterial vs. 15% fungal), Landre et al[15](80% bacterial vs. 15% fungal), and Wu et al[19](73% bacterial vs. 27% fungal) reported bacteria as the common cause for EnE.

In this study, *Pseudomonas aeruginosa*was isolated in two cases. *Klebsiellapneumoniae*was identified in urine culture of 25 year old

female, who had history of urinary tract infection and received intravenous fluids for the same. The presenting VA of the said patient was perception of light, and final VA was no perception of light. Patients with *Klebsiella* EnE has poor visual prognosis.[21,22]

Aspergillus species was the most common fungal identified, similar to other previous studies.[2,15,16,23]Fungal EnE was identified in 50% of patients with history of IVF administration, but the results were not statistically significant.

The visual outcome of EnE cases, where the etiology and pathogenesis are not fully identified is usually poor.[9,21-23]Most of the patients with EnE had presenting visual acuity less than 20/200.[8,22] In this study 95% of patients had presenting snellen visual acuity of less than 20/200. Sixteen patients were lost to follow-up for unknown reasons. 51.8% (14 out of 27) eyes who were treated at our institute regained visual acuity of more than 20/2000. All EnEeyes secondary to fungal isolate had improvement in visual acuity, 42% EnE eyes secondary to bacterial isolate showed improvement, and vision was not improved in one EnE eyes with mixed infection. Initiation of therapy in EnE cases are mostly delayed due to their association with severe underlying non-ophthalmological disease. Delayed presentation is also one of the major cause of poor visual prognosis. 25% patient in our series presented within 1 days, and 25% patients presented after 20 days. The patients who were presented within one day had better visual outcome as compared to the patients with delayed presentation. The visual outcome suggest that the timely medical and surgical intervention can prevent loss of vision in cases of EnE.

Vancomycin, ceftazidimeand amikacin are wide-spectrum antibiotics which cover most of gram positive and negative organisms.[9] Intravitreal injection of voriconazole (100 µg/0.1 ml) ensures immediate, adequate levels of antifungal agent in the posterior segment.[9] It has better coverage of *Aspergillus Sp*.[9]Twenty two eyes out of 27 (82%) underwent simple or combined PPV. PPV was an important management strategy for patients with EnE. Eyes undergoing pars plana vitrectomy have better visual prognosis than those who did not undergo vitrectomy.[9] After an early diagnosis interventions including vitrectomy can be carried out to improve the visual outcome in patients of EnE.[24]

Favourable functional outcome was achieved in 52% patients. Visual prognosis in in EnE cases does not depend on age of the patient. Though there are reports of presumed fungal endophthalmitis from the Indian subcontinent after intravenous fluids; our study did not find any statistical correlation between the two.This study tried to establish the microbiological correlation of clinical classification proposed by Sadiq et al[13]and found that, out 53% of positive EnE were culture positive, 66.7% possible EnE were culture positive, and 25% of probable EnE were culture positive.

Retrospective nature of the study, small sample size, attrition of patients are the limitations of the study. A larger study can be planned to look for the association of various parameters that have been analysed for the first time in this study.

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