ORIGINAL

PROF-990

MICROBIAL KERATITIS

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ABSTRACT... Khalid102640@yahoo.com farooq_ahrana@yahoo.com. **Objective:** To find out the incidence of microbial keratitis in patients with red eyes. **Design:** randomized prospective study. **Period:** 07 months ranging from 1st Jun 2001 to 31st Dec 2001. **Place of study:** Eye Department, Military Hospital, Rawalpindi. **Results:** Out of 857 patients with red eye 32 cases were found to have Microbial Keratitis (3%). **Conclusion:** Preventive aspects of ocular infection should be taught to the people, like, proper washing of eyes, wearing of protective glasses. Patients coming with ophthalmic problems, i.e., red eye, photophobia, irritation and watering to the general practitioner should be referred as soon as possible to the ophthalmology department.

Key Words: Microbial Keratitis, Red eye, Photophobea, Chemosis, Iridocyclitis, Keratoplasty, Opacification.

INTRODUCTION

Microbial keratitis is defined as corneal inflammation due to the presence of replicating organisms. The differentiation between microbial and aseptic keratitis is essential because each disease requires a different course of management Aseptic keratitis is a diagnosis of exclusion.

The clinical criteria for presumed microbial keratitis are as follows:

* Lesions often central but can be in any location
* Lesions >1mm in diameter
* Epithelial defect
* Progressively deteriorating pain, sometimes severe
* Diffuse and/or severe progressive corneal suppuration
* Iridocyclitis

BACTERIAL KERATITIS

Gram Positive Organisms

The more common bacteria isolated from bacterial corneal ulcers are, Staphylococci and Streptococci. Less common gram-positive organisms include aerobic, spore forming bacilli Bacillus coagulans and B. brevis, as well as Corynebacterium diphtheriae.

Gram-Negative Rods

Common symptoms of corneal ulcers are decreased

visual acuity, photophobia, pain, redness and discharge.

Clinical Approach
A meticulous history, thorough clinical examination, and detailed microbiologic technique are vital steps in successful management.

Laboratory Diagnosis
Culture and sensitivity test.

Therapeutic Approach
The goals of therapy in a case of bacterial corneal ulcer are eradication of viable bacteria from the cornea and rapid suppression of the inflammatory response elicited by the causative microorganisms.

FUNGAL KERATITIS
Introduction
Fungal keratitis is due to corneal invasion by filamentous fungi, yeasts, and dimorphic fungi. The steps in the management of fungal keratitis are similar to other forms of infectious microbial keratitis.

Table

Smear Morphology	Topical	Subconjunctival	Intravenous
No organism	Cefazolin 33 mg/ml and gentamicin 9.1 mg/ml or tobramycin 9.2 mg/ml	Cefazolin 100 mg and gentamicin 20 mg or tobramycin 20 mg	Cerfazolin (0.5 g-1g/8 hr) and gentamicin (3 mg-7 mg/kg/day) or tobramycin (3 mg-5 mg/kg/day)
Gram-positive cocci	Cefazolin (33 mg/ml) or bacitracin (10,000 units/ml)	Cefazolin (100 mg) or methicillin (100 mg)	Cefazolin (0.5 g- 1g/8 hr) or methicillin (200 mg/kg/day)
Gram positive rods	Gentamicin (9.1 mg/ml) or tobramycin (9.1 mg/ml)	Gentamicin (20 mg) or tobramycin (20 mg)	Gentamicin (3 mg- 7 mg/kg/day) or tobramycin (3 mg-5 mg/kg/day)
Gram negative cocci	Penicillin G (10,000 units/ml)	Penicillin G (500,000 units/ml)	Penicillin G (2-6 million units/4 hr)
Gram negative rods	Tobramycin[51] (9.1 mg/ml) and ticarcillin (6.3 mg/ml)	Tobramycin (20 mg) and ticarcillin (20 mg)	Tobramycin (3 mg-5 mg/kg/day) or ticarcillin

Classification
Fungi of medical importance are classified into three types[58]:

a) Filamentous fungi (molds)
b) Yeasts
c) Dimorphic fungi

Filamentous fungi are further divided into

a) Septate (hyphate) organisms
b) Nonseptate organisms

More than 60 genera of fungi have been implicated in human keratitis. The main causes throughout the world are the septate filamentous fungi, most commonly Alternaria, Aspergillus, Curvularia, and Fusarium: and yeasts, most commonly Candida.

ACANTHAMOEBA KERATITIS
Introduction
Acanthamoeba is a ubiquitous, free-living organism that causes a severe ketatitis. High risk groups are contact lens wearers who use nonsterile solutions in their lens care regimen. Useful vision is frequently lost due to this infection.

Specific Antibiotics
Aminoglycosides, Cephalosporins, Fluoroquinolones, Erythromycin, Chloramphenicol and Vancomycin

Adjunctive Therapy
Corticosteroids, Cycloplegics, Enzyme Inhibitors, Therapeutic Soft Contact Lenses.

PURPOSE OF STUDY

To find out the incidence of microbial keratitis in patients with red eye reporting to eye department Military Hospital Rawalpindi during 07 months ranging from 1st Jun 2001 to 31st Dec 2001.

Important clinical signs in microbial keratitis		
Sign	**Improvement**	**Worsening**
Epithelial defect (size)	No change or smaller	Larger
STROMAL INFILTRATE		
Density	Decreased	Increase
Borders	More distinct	Less distinct
Depth	No change	Deeper
Size	No change or smaller	Larger
Stromal white blood cell reaction	Decreased (localized)	Increase
Anterior chamber reaction	Decreased	Increased

MATERIALS AND METHODS

This is a prospective study which included all (857) consecutive cases of red eye . Cases referred from other Military Hospitals and Field Medical Units were also included in the study. This was regardless of age, sex and socioeconomic status.

INCLUSION CRITERIA

- Serving Officers
  - Their family members including parents, wife, and children
- Retired Officers
- Serving JCOs/Other Ranks
  - Their family members including parents, wife, and children
- Retired JCOs/NCOs/Other Ranks

EXCLUSION CRITERIA

All cases of cataract surgery who had transient period of red eye were excluded from the study.

Solid culture media were used for the inoculation of the specimen. It was done immediately after taking the specimens.

The following media were used:

a). Dextrose-peptone agar (with yeast extracts, without cyclohexamide but with 50 ug/ml chloramphenicol)
b). Blood agar
c). Chocolate agar
d). MacConkey agar
e). Liquid media (brain heart infusion)

Smearing of the scrapings was done onto clean glass slides for Gram-staining and microscopy. The inoculation media were incubated at their respective optimal temperatures.

Blood agar dishes were incubated at 37^0C in aerobic as well as anaerobic atmosphere. Sabouraud's agar was placed at 28^0C in aerobic conditions. Chocolate agar dishes were incubated in CO_2-incubator with 5-10% CO_2. All other media were incubated at 37^0C in aerobic conditions. Fungi were identified by their hyphae or yeast pattern.

Acanthamoeba was identified by its amoeboid movements.

Exact pathogen responsible for keratitis was identified by performing the following tests of the colonies:

a) Gram staining
b) Motility test
c) Oxidase test
d) Catalase test
e) Biochemical profile with APS (Analytical profile index)

Corneal biopsy was taken in cases where no growth was seen.

The patients were admitted in eye ward and were subjected to the following treatment:

a) Intensive topical and systemic broad spectrum antimicrobial therapy
b) Sub-conjunctival injection of antibiotics (in severe cases)
c) Topical cycloplegics
e) Oral analgesics

RESULTS AND OBSERVATIONS

The study included cases of microbial keratitis selected according to inclusion criteria .Out of 857 patients who reported with red eye during 07 months 32 cases fulfilled the criteria for microbial keratitis. So, the incidence of microbial keratitis in our population sample is found to be 3.7 percent. Out of 32 patients of microbial keratitis predisposing factors were found in most of the cases. These included history of accidental trauma in 14 patients (43.75%), bullous keratopathy in 3 patients (9.37%), corneal exposure in 3 (9.37%), contact lens wear in 2 (6.25%), dry eyes in 2 (6.75%), and corneal graft in one patient (3.13%). 2 patients had history of excessive and prolonged use of topical steroids (6.25%).

Incidence of microbial keratitis in various groups was studied individually and it was found out that it is highest in retired army personnel and their wives (5.5%), almost equal in parents of serving personals and that of children (3.5&3.3 % respectively) and lowest in serving personals and their wives (2%). Out of all cases 623 were male and 234 were females. The incidence of microbial keratitis was found almost double in males (4.3%) as compared to females (2.1%). Majority of cases of red eye reported from urban areas (63.5%) but the incidence of microbial keratitis was much higher in rural population (6.09%) as compared to that of urban population (2.4%). 18 of 310 cases of red eye were between 40-60 years of age, suffered from microbial keratitis showing the highest incidence of all i-e 5.8%. 6 of 179 cases of red eye belong to age group bellow 20 years with incidence of 3.4 %. 7 out of 229 cases were from 60 and above age group with incidence of 3.1%.The lowest incidence of microbial keratitis was found to be in age group of 20-40 years with only one case out of 139 cases of red eye showing 0.7% incidence. Most of them were parents of soldiers and belonged to villages of Punjab, NWFP, and Azad Kashmir. 13 patients belonged to urban population which comprised soldiers, NCOs, JCOs, and their families living with them in the cities. Patients living in the urban areas reported early to the hospital/eye department. Most of them reported within a week's time. The rural population reported late, most of them in the second week. A few even reported later, i.e., in the third week.

Five (15.62%) out of 32 cases did not present with uncomfortable eyes, because of microbial keratitis in corneal dystrophy and exposure keratitis. Rest of the cases presented with photophobia, redness, and watering. Marked deterioration of the visual acuity was present in 29 cases. In 02 (6.25%) the visual acuity was already less than 6/60 because of advanced corneal dystrophy. All patients were put on broad spectrum antibiotics, topically, and systemically after taking the laboratory samples. 8 (25.00%) of them with history of injury to the eye with plants in the field or with tree twigs and excessive use of steroids, were put on broad spectrum antifungal drops i.e., nizoral, tablet ketoconazole 200 mg dissolved in 15 ml of artificial tears, along with the antibiotics. Antiviral eye ointment was also started in 3 (9.37%) of these cases with decreased corneal sensitivity along with broad spectrum antibiotics.

Table-I. Incidence of microbial keratitis in various groups (n=857)

Types of Personals	No of cases microbial keratitis	no of cases of red eye in specified group	Incidence
Serving personals & their wives	03	150	2%
Retired personals & their wives	12	218	5.5%
Parents of serving personals	11	310	3.5%
Children	06	179	3.3%

Table-II. Predisposing factors for cases of microbial		
Factor	**No. of Pts**	**% Age**
1. Trauma		
Accidental		
a) Foreign body	8	25.00%
b) Tree twigs	6	18.75%
Surgical	0	0
2. Within graft	1	3.13%
3. Contact lens wear	2	6.25%
4. Bullous keratopathy	3	9.37%
5. Corneal exposure	3	9.37%
6. Dry eye	2	6.25%
Excessive use of topical steroids	2	6.25%

Table-III. Incidence of microbial keratitis in different sexes			
Sex	**No. of Pts of red eye**	**No. of Pts of M. Keratitis**	**Incidence (%)**
Male	623	27	4.3
Female	234	5	2.1
Total	857	32	3.7

Table-IV. Incidence of microbial keratitis in different geographical areas (n = 857).			
Population	**No. of Pts of red eye**	**No. of Pts of M. Keratitis**	**Incidence (%)**
Rural	312	19	6.09%
Urban	545	13	2.4%
Total	857	32	3.7%

Treatment was restricted to one antibiotic in 6 (18.75%) of the cases, to antifungal drops and ointment in 4 (12.5%) of the cases, and continued with the same antibiotics covering gram negative and gram positive bacteria in 22 (68.75%) of the cases.

Conjunctival flap was applied in 4 (12.5%) cases with risk of perforation.

Table-V. Incidence of microbial keratitis in various age groups (n = 857).			
Age group yrs	**Red eye**	**Microbial keratitis**	**Incidence (%)**
0-20	179	06	3.4%
20-40	139	01	0.7%
40-60	310	18	5.8%
60 & above	229	07	3.1%

Table-VI. Various types of microbial keratitis (Total No. of Pts = 32).		
Causative organisms	**No. of Pts**	**% Age**
Bacterial	24	75%
Fungal	04	12.5%
Parasitic	00	00
Undiagnosed	04	12.5%

Table-VII. Bacterial keratitis (Total No. of Pts = 24).		
Types of bacteria	**No. of Pts**	**% Age**
Staph aureus	11	45.83%
Strep Pneumoniae	08	33.33%
Pseudomonas aeruginosa	04	16.67%
Haemophilus SPP	01	4.167%

Table-VIII. Fungal keratitis (Total No. of Pts = 04).		
Types of fungi	**No. of Pts**	**% Age**
Fusarium SPP	02	50%
Candida albicans	01	25%
Aspergillus species	01	25%

Penetrating keratoplasty was done in 7 (21.87%) of the patients, courtesy of Srilankan association of cornea donation. 5 (71.43%) of these cases took up the graft

well, but 2 (28.57%) grafts failed. Regrafting was planned for them.

Retrobulbar injection of alcohol was given to 3 (9.37%) of the patients with persistently intolerable painful eye, with no chance of useful vision.

Evisceration/enucleation has been planned for 1 patient (3.13%) in which all treatment modalities have failed.

DISCUSSION

This study is part and continuation of the research work going on in research wing of department of ophthalmology, Military Hospital, Rawalpindi. Work was previously being done on microbial ocular infection as a whole and on fungal keratitis in part.

During the specified time frame 857 consecutive cases of red eye were studied in detail and 32 cases met the criteria of microbial keratitis.The over all incidence of microbial keratitis was calculated to be 3.7 percent. The most affected group of persons involved was fathers of serving soldiers, JCOs and other ranks, most of them falling between the ages of 51-60 years (pentagenarian) this shows increased incidence of microbial keratitis in the elderly. 25 out of 32 patients were over 40 years of age. Amongst the group of patients less than 40 years of age, the most affected were less than 10 years .

27 out of 32 cases had a predisposing cause in which the commonest was trauma to the eyes. 84% of the subjects were male and 15% female, 19 (59.375%) belonged to rural population while 13 (40.625%) belonged to urban areas.

19 (56.25%) of subjects belonged to lower middle class.

The group most affected or at higher risk in our setup came out to be pentagenarian males, belonging to lower middle class of rural population having trauma to the eye while working outdoors, in the fields, or otherwise. Another large group consists of preexisting corneal diseases like degenerations, dystrophies, bullous keratopathy, corneal exposure and dry eyes. Use of contact lenses by females in our polluted atmosphere is yet another cause of microbial keratitis. Another important cause leading to microbial keratitis is inadvertent use of topical medication like steroids, antibiotics and anaesthetics.

Incorrect and inappropriate treatment by general practitioners, late reporting or referral to eye specialist, inability to diagnose properly, lack of laboratory facilities, and poor compliance of patient/attendants leads to complications of the disease and visual loss. Each case of microbial keratitis should be taken as an ophthalmic emergency and must be admitted so that proper diagnosis, thorough investigations and correct treatment should be given because the end result of any microbial keratitis can be panophthalmitis, and orbital cellulitis, as well as cavernous sinus thrombosis which can ultimately lead to death.

Good nursing care, timely instillation of topical medication, daily review and change of medicine as per laboratory results is the key to successful management. In pacification some patients require surgical intervention, such as

* keratoplasty in cases of permanent pacification
* conjunctival flap/tarsorrhaphy in cases of impending perforation and even retrobulbar alcohol injections
* evisceration/enucleation in cases of painful blind eye.

CONCLUSION

Preventive aspects of ocular infection should be told to the people. They should be educated about proper washing of eyes, wearing of protective glasses while working in the factories, and conditions leading to ophthalmic trauma. Patients coming with ophthalmic problems, i.e., red eye, photophobia, irritation and watering to the general practitioner should be referred as soon as possible to the ophthalmology department.

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