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Comprehensive study of corneal ulcer.

Ophthalmology

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ABSTRACT

Background- Corneal ulceration can progress rapidly, threatening the integrity of eye and producing significant visual impairment.
Aims and Objectives- To study risk factors, causative organism and the outcome of treatment in corneal ulcer.
Materials and Methods- Total 64 patients of corneal ulcer, who attended the Out-door patient from November 2011 to October 2013 were studied. Ophthalmological evaluation and microbiological investigations were done followed by treatment outcome analysis.
Result- 43(67%) patients were between 21- 60 year age , male: female ratio was 1.5:1, 51(80%) belonged to low socio-economic group. 56% patients were either farmer or labourer. 24(37.5%) patients had history of ocular trauma. 39% bacteria, 28% fungus, 6 % mix (bacterial + fungal) keratitis were isolated. Staphylococcus aureus (16%) was most common gram positive organism and Pseudomonas aeruginosa (16%) was the most common gram negative organism isolated in culture. For gram positive organism, vancomycin was 100% sensitive drug. 20(80%) cases of Bacterial, 17 (100%) cases of viral and 8(56%) cases of fungal keratitis improved with medical treatment. Surgical intervention required in 17(26%) cases. 43(67%) cases developed healed scar formation at the end of the treatment, 3(5%) cases developed adherent leucoma, and 4(6 %)cases underwent evisceration.
Conclusion- Corneal ulcer seen in working age group, mostly. Farmers, labourer and person with history of trauma are more prone to have corneal ulcer. Staphylococcus aureus and pseudomonas aeruginosa were most common organism. Majority patients responded to medical therapy and healed by corneal scarring.

KEYWORDS:

corneal ulcer, risk factor, microbiology, outcome

Introduction:
Microbial keratitis is a common, potentially sight threatening ocular infection that may be caused by bacteria, fungi or viruses. However, predisposing factors such as trauma, contact lens wear, dry eye, glaucoma, epithelial defect, systemic disease and immunosuppressant may alter the defence mechanisms of the eye and permit bacteria to invade cornea [1][2]. Bacterial and fungal infections of cornea are the major causes of blindness in developing countries like India. Corneal ulceration can progress rapidly, threatening the integrity of the eye and producing significant visual impairment.

A wide spectrum of microbial organisms can produce corneal infections and consequently the therapeutic strategies may be variable. One of the key elements in this effort is a proper understanding of the microbiological and clinical characteristics of this disease. If appropriate and vigorous therapy is not started at the earliest possible time, the ulcer takes longer time to respond to treatment and ulcer heals with sequel like adherent leucoma, perforation of the corneal ulcer, iris prolapsed and infection leading to endophthalmitis and loss of vision.

Materials and Methods:
The present study was a randomized prospective study with 64 patients having corneal ulcer of all ages and sexes attended ophthalmology OPD, New civil hospital, Surat from November 2011 to October 2013. Non-compliant patients, severely debilitating patients and patients not giving proper due consent were excluded. A detailed history of present complaints and any past illness or treatment, any history of trauma was noted. Detailed clinical examination of every patient was done which included visual acuity and slit lamp biomicroscopy. The size, shape, depth, margin, floor, texture, surrounding area, corneal vascularisation, corneal sensation was examined. Surrounding adnexa was examined to look for infective foci. Associated ocular conditions, like blepharitis, dry eye, dacryocystitis, conjunctivitis, decreased corneal sensation, lagophthalmos, use of contact lens or steroid drops were noted.

After a detailed ocular examination, swabs from lids and conjunctival sac were taken. Corneal infiltrates and ulcers were scraped for microbial culture and drug sensitivity before treatment was started. A corneal scrapping was done after topical anaesthesia (4% lignocaine) with 15 number disposable blade from the ulcer floor and its edge. Two slides were made for the direct microscopic examination; one for gram staining and one for KOH wet mount. Scraped material was also inoculated directly onto nutrient agar, blood agar, chocolate agar, Mc-conky medium and Sabouraud dextrose agar. All samples were sent to the microbiology laboratory. Microbial cultures were considered positive only if growth of same organism was on >2 media. All culture positive samples were also tested for sensitivity to antimicrobial agents. Treatment decision was affected by culture sensitivity report.

Treatment was started with atropine 1% eye ointment / eye drops and a broad spectrum antibiotic eye drops instilled every 30 minutes. We shifted treatment to specific antibiotics on basis of microbiological report. Acyclovir 3% was used for viral keratitis. Systemic antimicrobials started if severe infection present. Adjunct therapy with antiglaucoma drugs like Acetazolamide, liquid glycerol, timolol (0.5%) eye drop, Mannitol (i.v.) given if needed and vitamin C also instituted without delay. Debridement of the ulcer bed was carried out as the debris hindered the drug penetration. Skin, ENT and dental examination for any septic foci also done.

Results:
Total 64 patients with corneal ulcer was studied. Ulceration occurred most frequently in the age group of 21 to 50 years of which 14 cases (39%) were bacterial keratitis, 10 cases (28%) were fungal keratitis, 9 cases (25%) were viral keratitis and 3 cases (8%) were mixed (Bacterial + Fungal) keratitis. [table 1]

TABLE – 1 Agewise distribution of cases of microbial keratitis

Age	Bacterial		Fungal		Viral		Bacterial & fungal		Total	
	NO	%	NO	%	NO	%	NO	%	NO	%
0-10	2	8	0	0	3	18	0	0	5	8
11-20	2	8	1	6	4	24	0	0	7	11
21-30	3	12	3	17	4	24	1	25	11	17
31-40	3	12	3	17	4	2	2	50	12	19
41-50	8	32	4	22	1	6	0	0	13	20
51-60	4	16	3	17	0	0	0	0	7	11
61-70	3	12	3	17	0	0	1	25	7	11
>70	0	0	1	6	1	6	0	0	2	3
Total	25	39%	18	28.2%	17	26.6%	04	6%	64	

Male female ratio was 1.5:1. In our study, 51(80%) cases belonged to low socio-economic group of which 21 cases(41%) of bacterial keratitis, 15 cases(29%) of fungal keratitis, 11 cases (21%) of viral keratitis and 4 cases(8%) of Mixed (bacterial + fungal) keratitis cases. In our study, overall incidence of microbial keratitis is more in rural area as compared to urban area (60% and 40 % respectively). Out of 18 cases of fungal keratitis, 11(60%) were from rural areas. While in viral keratitis cases were significantly higher in urban population.

Agricultural workers, were the most commonly (total 21 cases, 33%) associated with microbial keratitis of which 7 cases(33%) of bacterial keratitis and 10 cases(47%) of fungal keratitis. Moreover fungal keratitis is also more commonly found in labourer(23%) followed by housewife(19%) and students(16%). Total 30 cases(47%) microbial keratitis patients were due to trauma. Out of 30 cases, 12 cases (40%) fungal keratitis were associated with trauma, which has significant correlation at 5% level of significance p value=0 .04 i.e. p value <0.05. Post conjunctivitis conditions representing 5 cases (8 %) was the 2nd most common predisposing factor for microbial keratitis followed by lagophthalmos and contact lens which represented 3 cases and 2 cases of corneal ulcer respectively.

Out of 64 patients, 16 patients(25%) were gram stain positive, 13 patients(20%) were gram negative and 20 patients(31%) were KOH stain positive. Hence smear examination an important tool in initial diagnostic work up. In our study, 15 bacterial were isolated from culture of microbial keratitis patients included 4 cases of staphylococcus aureus, 2 cases of staphylococcus Epidermidis and 3 cases of streptococcus and amongst gram negative bacteria, 4 cases of pseudomonas was the most frequent isolate. *Staphylococcus aureus* was 100% sensitive to vancomycin, ciprofloxacin and 50% cases sensitive to penicillin G. *Staphylococcus epidermidis* were found 50% sensitive to vancomycin and Ciprofloxacin. *Streptococcus spp.* which was one of the most prevalent bacterial isolate that were 100% sensitive to vancomycin and 60% sensitive to penicillin G. Pseudomonas is 100% resistant to ampicillin, 50% sensitive to cefoparazone, amikacin, vancomycin, gentamycin, tetracycline.

In our study, 47 cases(74%) of corneal ulcer treated conservatively. 5 cases of bacterial keratitis, 8 cases of fungal keratitis and 4 mixed cases required surgical intervention because in those cases even after medical management they were worsening and to prevent integrity of eye ball, surgical intervention was mandatory.[table 2]

TABLE NO-2 Treatment modalities in different corneal ulcer

Mode of treatment	Bacterial		Fungal		Viral		Bacterial & Fugal		Total	
	NO	%	NO	%	NO	%	NO	%	NO	%
Conservatively treated	20	80%	10	56%	17	100%	0	0%	47	74%
Surgical Mx required	5	20%	8	44%	0	0%	4	100%	17	26%
Total	25		18		17		4		64	

In our study, 4 patients of microbial keratitis underwent evisceration because of panophthalmitis and as perception of light was absent. 5 cases underwent therapeutic keratoplasty because there was no improvement even after medical management. Tectonic keratoplasty was done in 4 patients to prevent integrity of eye ball as there was large size of corneal ulcer not responding to medical management. All had graft failure subsequently. Glue with BCL application was successful in maintaining integrity of eyeball in 4 patients of which 2 patients developed dense leucomatous opacity, 2 patient developed adherent leucoma. Out of total 5 therapeutic keratoplasty, 2 patients had clear graft, 1 patient had graft failure and 2 patients had an attack of graft rejection.

Discussion:

Microbial keratitis is an important cause of monocular blindness worldwide especially in developing world. A variety of factors determine clinical outcome in microbial keratitis. Therefore, a comprehensive data is important to develop appropriate diagnostic and therapeutic strategies. In our study, out of total 64 patients, majority of patients (67%) having corneal ulcer are from 21-60 years of age, which is near to srinivasan study[5] it was 138 out of total 150 cases(90%) and in Samar Basak study[6] it was 60 out of 75 cases (80%). It might be due to high exposure to outdoor activities, so, more vulnerable to injury. In our study 61% of patients were male and 39% of patients were female. While similar observations were noted in Srinivasan study[5], it was 68% and 32% respectively and in Samar Basak study[6], it was 56% and 44% respectively.

In our study, 51(80%) cases belonged to low socio-economic group, which may be because they are taking faulty treatment, false beliefs, tolerance to pain is more, only earning member in the family so ignoring complains and unhygienic environment of the patient surrounding helps indirectly in progressing of corneal ulcer. In our study 33% of patients were agricultural worker, which are more exposed to field related injury with vegetative material. While in Srinivasan et al study it was 16.6% and in Samar Basak study[6] it was 57%. This difference may be due to small sample size of our study.

Bacterial keratitis remains the leading cause of microbial keratitis. In our study, 39% bacteria, 28% fungus, 6 % mix (bacterial + fungal) keratitis were isolated. While in srinivasan study[5] 39%, 21%, 5% and 40% respectively. While in Usha et al study[7] it was 31.48%, 28.63%, 7% and 39.88% respectively, results were more or less similar. In developed countries fungal keratitis is rare whereas fungal keratitis occurs with higher frequency in developing countries like India. In our study we found more bacterial keratitis cases than fungal keratitis it may be due to our institute is situated in urban area. So only complicated cases of fungal keratitis are referred here and all mild cases of fungal keratitis are treated at peripheral centres which are not included in our study, which might be responsible in discrepancy in reference standard results. In our study 17% staphylococcus, 8% staphylococcus epidermidis, 13% streptococcus spp. isolated in culture. In our study gram positive bacterial isolate was less compare to srinivasan study it might be due to small sample size in our study. In our study 17% pseudomonas 4% klebsiella and 4% acinobacter isolated on culture.

In our study 47% bacterial and 70% fungal were due to trauma. While similar observation was noted in Usha et al study[7], it is 46.6% and 81.9% of cases respectively. In our study 9% bacterial and 5 % fungal keratitis were due to lagophthalmos. While in Usha et al study it was 2.8% and 4.7% respectively. In our study 9% bacterial and none of fungal keratitis were due to contact lens.

For gram positive organism, vancomycin was the most sensitive drug. Conclusive sensitivity to gram negative organism could not be determined. Number of samples studied were relatively small to make a definite recommendation regarding antibiotic usage. In fungal keratitis surgical intervention required more as they presented late with complication and poor response to antifungal agents .While diagnostic and treatment modalities are well in place, the final outcome is suboptimal in fungal keratitis. The treatment of fungal keratitis is truly a challenge. Glue application reduces the need

for tectonic keratoplasty. Penetrating keratoplasty performed in fungal keratitis, survival of graft was very less as compare to bacterial keratitis.

Conclusion:

This study was performed primarily to identify the epidemiological characteristics of population at risk for corneal ulceration as well as predisposing factors and responsible pathogens, sensitivity pattern and effective treatment modalities of it. Microbial keratitis is mostly seen in farmers and lower socioeconomic group of people, mostly due to trauma. Early diagnosis and initiation of selective antimicrobial therapy is necessary to avoid complications and visual loss. Finally the patients and the caretakers should be educated about risk factors, severity of the disease and treatment. A good patient compliance is an important factor associated with a better prognosis.

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