EPIDEMIOLOGICAL AND MICROBIOLOGICAL PROFILE OF SUPPURATIVE KERATITIS

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ABSTRACT

BACKGROUND

The aim of the study is to find out the common causes and clinical characteristics of suppurative keratitis and to evaluate the adequacy of current therapy available in treating suppurative keratitis.

MATERIALS AND METHODS

Patients with suspected suppurative keratitis irrespective of their age and sex presenting to Outpatient Department of Ophthalmology in Santosh Medical College, Ghaziabad, during the period July 2015 to June 2016 were evaluated.

RESULTS

Over 12 month's period, 50 patients with suppurative keratitis were evaluated. Ocular trauma was the most common predisposing factor in 62% of cases followed by chronic dacryocystitis in 16% of cases. 40% of the patients had used antibiotics and antifungals prior to admission. Most common clinical characteristics of bacterial keratitis greyish white with curdy purulent slough in 63% of cases. Dry with raised slough ulcer (83%) and satellite lesions (67%) in fungal culture positive cases. Hypopyon observed more frequently in fungal keratitis (83%). Culture were positive in 31 (62%), 36% had pure fungal infection and 26% had pure bacterial infections. The most common fungal pathogens Aspergillus (18%) and Fusarium (18%). Most common bacterial isolate was staphylococcus aureus (16%). 67% of fungal keratitis cases healed only with natamycin 5% and where in 28% cases azoles added as second agent. 85% of bacterial keratitis cases treated only with commercially available fluoroquinolones (0.3%) showed favourable response.

CONCLUSION

Fungal keratitis are more common than bacterial keratitis. Filamentous fungi and staphylococcus aureus were the most common fungi and bacteria, respectively. Most community-acquired suppurative ulcers resolve with appropriate treatment.

KEYWORDS

Suppurative Keratitis, Corneal Ulcer.

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BACKGROUND

Suppurative keratitis defined as a defect in the corneal epithelium with infiltration of underlying and surrounding stroma associated with signs of inflammation (with or without hypopyon) with super added infection.[1]

In India, there are about 12 million blind people. The incidence of corneal blindness is 15.4%, the corneal ulcer contributing 9.34% of this. Corneal infections are 2nd most common cause of monocular blindness in developing countries.[2]

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Most pathogens require a break in the epithelial barrier to gain entry and adhere. Bacterial keratitis begins with the adhesion of bacteria to the damaged epithelium and underlying stroma. This epithelial barrier is easily breached by trauma, which may range from a minor one with dust particles or small metallic foreign bodies to injury with vegetable matter, stone or wooden piece.

In all the types of corneal ulcers, acute inflammatory process proceeds to the local necrosis and casting of the necrosed material leaving behind a defect. This may be followed by healing, depending upon the depth involved in the necrosis, then scarring occurs.

The symptoms of corneal ulcers are similar in most patients, decreased visual acuity, photophobia, pain, redness, swelling and discharge.

The laboratory workup of a corneal ulcer, regardless of suspected aetiology, must be performed in a deliberate and meticulous manner. Multiple scrapings are collected from the base and margin of the ulcer and stained for immediate

microscopic examination. Scraping materials also inoculated into various media for culture studies.

All corneal ulcers should be considered ocular emergencies. Typically, they are best handled in a hospital where the patient can be closely observed with controlled antibiotic, antifungal treatment administered on a frequent basis.

The present study is undertaken to evaluate the current concepts of the aetiology, clinical characteristics, pathogenesis, microbiologic work up and management of suppurative keratitis.

MATERIALS AND METHODS

Source of data for this clinical study is fifty patients of suspected suppurative keratitis of suppurative keratitis attending Outpatient Department of Ophthalmology in Santosh Hospital, Ghaziabad, during a period from July 2015 to June 2016.

Patients presenting with suspected suppurative keratitis irrespective of their age and sex were included in this study. Patients with suspected or confirmed viral keratitis and other corneal abnormalities were excluded from this study.

A detailed history was taken with special reference to history of injury with dust, stone, vegetable matter or penetrating injury. All patients were enquired about watering from the eye before the present illness and any swelling in the medial canthus. This was stressed to know the presence of chronic dacryocystitis.

A detailed ocular examination was carried out using torch and slit lamp. Special attention was paid to the status of the ulcer- its size, site, shape, surface- elevation or depression, dry or moist, floor whether covered with slough or not and edges, regular or frayed. Corneal vascularisation and corneal sensation were noted. Ulcer is stained with 2% fluorescence to know the extent and the details of the ulcer. The amount of hypopyon in anterior chamber whether quarter or less, one third, two third or full, its colour whether creamy white or mixed with blood and consistency whether fluid or fibrinous were noted along with shape of upper level. The depth of the ulcer was determined by the slit lamp. Lacrimal sac patency was checked by doing sac syringing.

Laboratory investigations include urine examination for albumin, sugar and microscopy. Blood for FBS/RBS.

Corneal ulcer scrapings were taken for Gram stain, 10% KOH mount and culture and sensitivity for bacterial or fungal organism in blood agar, MacConkey medium and Sabouraud dextrose agar.

After the clinical examination was over, the eye is washed with sterile normal saline. Treatment is begun with atropine 1% eye ointment/eye drops and a broad-spectrum antibiotic like fluoroquinolones 0.35% eye drops instilled every 30 minutes.

RESULTS

The following observations were made during the study- Out of 50 cases, 2 (4%) cases were in 11-20 years of age group, 4 (8%) in 21-30 years age group, 9 (18%) were in 31-40 years age group, 20 (40%) in 41-50 years, 10 (20%) were in 51-60 years and 5 (10%) were 61 and above. Overall, 35 (70%) cases were males and 15 (30%) were females. Occupation of the patient has definite relationship with the incidence of injury to the eye. In our series of study, 22 (44%) patients were agricultural workers, 7 (14%) were industrial workers, 12 (24%) were housewives, 4 (8%) were student, 1 (2%) was driver and 5 (10%) were others. The most common predisposing factor observed in the study responsible for keratitis was trauma, which was seen in 62% (31/50) of the patients. Among the reasons for corneal ulcers, trauma due to vegetable matter (12 patients) was the leading cause followed by objects like (dust, stone, metal piece, insect, cow tail) in 11 patients, wooden piece (4 patients) and penetrating injury seen in 4 patients. Other predisposing factors were chronic dacryocystitis (8 patients) and trichiasis (3 patients). In our study, 20 patients has already applied some antibiotics/antifungal before coming to the hospital, 6 patients have used antibiotics with steroid preparation, 2 patients have applied native medicines and 22 of them have taken no treatment at all. Time interval between injury to onset of symptoms in fungal keratitis is 10-20 days in 67% of cases and is 1-10 days in 88% of cases of bacterial keratitis. Features of corneal ulcer raised dry slough in 83% of fungal keratitis and yellowish to grayish white purulent slough in 63% of bacterial keratitis cases. Satellite lesions seen in 67% of fungal keratitis cases. Hypopyon was present in 83% of fungal and 63% of bacterial keratitis cases. Stage of corneal ulcer in 56% of fungal keratitis cases were moderate and 50% of bacterial keratitis cases were mild at time of presentation. The location of infiltrates was central and inferior localisation predominantly. In our study, 24 cases fell into the moderate group, 22 cases were of mild type, white, 4 cases were of severe category. Microbial aetiology was established in 62% (31/50) of scrapings. Fungus accounts for majority of infection. Fusarium (18%, 9/50) and Aspergillus (18%, 9/50) were cultured. The most common bacterial isolate was Staphylococcus aureus (16%, 8/50) followed by Staphylococcus epidermidis (4%, 2/50), Pseudomonas (4%, 2/50) and Streptococcus pneumonia (2%, 1/50). In 38% of the cases, the report came as sterile. Out of 38% (19) culture negative cases 10% (5) negative for both Gram stain and KOH mount, 8% (4) positive for both Gram stain and KOH mount, 14% (7) positive for only Gram stain and 6% (3) positive only for KOH mount.

Sl. No.	Age Group in Years	Number of Cases
1.	Up to 10	0
2.	11-20	2
3.	21-30	4
4.	31-40	9
5.	41-50	20
6.	51-60	10
7.	61 and above	5

Table 1. Age Distribution

Occupation	Number of Cases	Percentage
Agricultural workers	22	44
Industrial labourers	7	14
Housewives	12	24
Students	3	6
Driver	1	2
Others	5	10
Total	**50**	**100**

Table 2. Occupation

Predisposing Factor	Number of Cases	Percentage
Trauma	25	50
Trauma + chronic dacryocystitis	6	12
Chronic dacryocystitis	2	4
Trichiasis	3	6
Nil	14	28
Total	**50**	**100**

Table 3. Ocular Predisposing Factors

Microorganisms	Number of Cases	Percentage
Fusarium	9	18
Aspergillus	9	18
Staphylococcus aureus	8	16
Pseudomonas	2	4
Streptococcus pneumonia	1	2
Staphylococcus epidermidis	2	4
No growth	19	38
Total	**50**	**100**

Table 4. Microbiological Characteristics

DISCUSSION

Age Incidence

In this study, it was noted that patients between 31 to 60 years age group were most commonly (78%) affected. Both sexes tend to develop corneal ulcers in the middle decade of life when presumably they are more physically active and at a higher risk of corneal injuries. Similar results were observed in a study done by Norina TJ et al[3] in 2008 where average age of the patients with suppurative keratitis was 44.5 (±20.9) years and by Situola RP[4] in 2005 in which 76.6% of patients were in the age range of 30 to 69 years.

Sex Incidence

In the present study, out of 50 patients, 35 (70%) were males and 15 (30%) were females, which are consistent with other studies. In the study done by Bashir G et al[5] in 2001, predominantly male patients were involved.

Occupation

Occupation of the patient has definite relationship with the incidence of injury to the eye. In our series of study, 22 (44%) patients were agricultural workers, 7 (14%) were industrial workers, 12 were housewives (24%), 4 (8%) were student, 1 (2%) was driver and 5 (10%) were others. This analysis exhibits that suppurative keratitis is more common in rural population whose occupation is agriculture. Out of 50 cases, in 62% of cases, history of trauma present mainly with vegetable matter (24%), dust and stone. Apart from the trauma chronic dacryocystitis was most common risk factor. Many of these patients were from distant villages and they had come to the hospital very late. The delay in attending the ophthalmic OPD for treatment was due to poverty and ignorance. 56% of the patients gave history of application of some ointment or drops, either prescribed by a local doctor or a self-medicament. 40% on topical antibiotic/antifungal, 12% on antibiotic plus steroid and 4% on some native medication like breast milk, butter or plant extract. All these figures similar to the south Indian study and eastern Indian study.[6]

Common Clinical Characteristics

In our study, common clinical characteristics of fungal corneal ulcer were long duration of history, dry, raised necrotic slough is important feature of corneal ulcer in 83% of cases and satellite lesions in 67% of cases. All are similar to south Indian study.

Bacterial keratitis features were short duration of history, greyish white with curdy purulent slough in 63% of cases. Hypopyon was more frequently observed in fungal (83%) than in bacterial (63) keratitis. This figure unlike in south Indian study in which hypopyon was more frequently observed in bacterial than fungal ulcers.

Microbiological Characteristics

In this study 31 (62%) cases of corneal scrapings were culture positive. Fungus (36%) accounts for majority of infection. This is mainly because of the area served by our hospital, generally visited by poor agricultural workers and labours who were injured predominantly with organic matter such as paddy stalk, vegetable matter or dust. Fusarium (18%) and Aspergillus (18%) were cultured. This figure is less than the south Indian reports by Srinivasan et al[7] (51.9%), Leck et al (44.1%), Bharathi et al[8] and West Bengal eastern India study (59.3%). Aspergillus were predominant in south Indian reports by Bharathi et al, Fusarium were predominant in south Indian reports by Leck AK et al.[9]

In this study, 13 (26%) were bacterial culture positive. This reduction in bacterial corneal ulcer might be attributed to more successful treatment of bacterial corneal ulcers in periphery since the introduction of topical fluoroquinolones. Of the 13 cases, 20% Gram positive cocci and that 16% was staphylococcus aureus, which was similar to the eastern Indian study from Bengal and unlike the south Indian study in which most common infecting bacterium was Streptococcus pneumonia.

Treatment

All 50 cases were treated with antimicrobial medical therapy. In the 20/50 Gram stain smear positive cases (13 bacterial

culture positive) treated with commercially available broad-spectrum antibiotics. Fluoroquinolones 0.3% like ciprofloxacin, ofloxacin, gatifloxacin and moxifloxacin were the main drug of choice in our study. Almost, 17 cases (85%) of bacterial keratitis treated with these eye drops showed favourable response. Fluoroquinolones-resistant pseudomonas was treated with tobramycin 0.3% eye drop and subconjunctival injection of gentamycin 20 mg in 0.5 mL and 1 case of S. pneumoniae treated with fortified cefazolin 50 mg/mL eye drop and subconjunctival injection of gentamycin 20 mg in 0.5 mL. Leibowitz in a multicentre study of patients with culture positive infective keratitis observed 92% success with ciprofloxacin. Similarly, Wilhemus et al[10] found that clinical success occurred in 93% of patients treated with ciprofloxacin. Gangopadhya Nibaran et al[11] in their study shown that monotherapy with fluoroquinolone eye drops for treatment of bacterial corneal ulcers led to shorter duration of intensive therapy and shorter hospital stay compared with combined fortified therapy (cefazolin-tobramycin).

Out of 50 cases, 21 cases were KOH mount positive and 18 were fungal positive. Natamycin considered as drug of choice for all KOH mount positive cases. 14 cases (67%) cured completely with only natamycin and 6 cases azoles (fluconazole or itraconazole) added as second agent. Out of 9 Aspergillus culture positive cases (56%) responded well to natamycin and out of 9 Fusarium culture positive cases 8 (89%) responded well to natamycin. This is similar to study done by Jones DB et al.[12]

The predominant outcome was a corneal scar with or without vascularisation (45 of 50 cases). Of the 50 cases of suppurative keratitis studied in this series, 8 cases ended up with nebular, 29 cases with macular and 9 cases with leucomatous opacity with vascularisation. Complications of suppurative keratitis noted in 4 patients, 1 case ended in perforation underwent therapeutic penetrating keratoplasty, 2 cases lead to panophthalmitis and 1 case resulted in anterior staphyloma. Out of 2 panophthalmitis cases 1 was positive for Aspergillus and 1 showed no growth, not responded to the treatment underwent evisceration.

In our study, out of 48 cases 32 cases opacities were central and 16 cases opacities were peripheral.

CONCLUSION

Central corneal ulceration, common problem in developing countries most often occurs after a superficial corneal trauma with vegetative or organic materials. Fungal ulcers are more common than bacterial ulcers. Filamentous fungi and staphylococcus aureus were the most common fungi and bacteria, respectively.

Microbiological investigations should be performed whenever possible, however, where facilities are not available, a rapid presumptive diagnosis of suppurative keratitis maybe possible by a knowledge of the local aetiology within a region and by assessing common clinical characteristics. Most community-acquired suppurative ulcers resolve with appropriate treatment, delay in diagnosis probably contribute to poorer outcome from therapeutic measures. These findings have important public health implications for the treatment rapid referral, diagnosis and prevention of corneal ulceration in the developing world.

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