

Suppurative Keratitis in a Nigerian Tertiary Hospital

OO Olawoye (FWACS), CO Bekibele (FWACS), AO Ashaye (FWACS)

Department of Ophthalmology, University College Hospital Ibadan, Nigeria

ABSTRACT

Purpose: Microbial keratitis is a potentially vision threatening condition that requires prompt diagnosis and treatment to prevent untoward outcome. This study describes the demographic characteristics, clinical presentation, and microbiological features of patients diagnosed with suppurative keratitis between April 2005 and May 2006 in the University College Hospital Ibadan, Nigeria.

Methods: A retrospective review of case notes of patients who presented with suppurative keratitis between April 2005 and May 2006 was done. The outcome measures were: interval between onset and presentation, aetiology of keratitis, extent of corneal involvement and final visual acuity.

Results: There were 23 (65.7%) males and 12 (34.3%) females. The mean age was 32.8 ± 18.64 . A positive history of trauma was present in 48% of patients. In 6% of the patients, the predisposing factor was severe allergic conjunctivitis. The presenting visual acuity was $<6/60$ in 66% of the patients, $<6/18-6/60$ in 14%, and $6/6-6/18$ in 17% of the patients. At discharge, 40% had a visual acuity of $6/6-6/18$, 15% had borderline vision ($<6/18-6/60$), 40% had severe visual impairment ($<6/60$), while 5% had no light perception. The most common organisms isolated microbiologically were *Staphylococcus aureus* in 28.6%, *Streptococcus pneumoniae* in 8.6%, and *Pseudomonas aeruginosa* in 2.9%. The risk factors for poor visual outcome were late presentation, farming, stromal thinning and large corneal involvement.

Conclusion: Bacteria is responsible for most cases of suppurative keratitis in a developing country like Nigeria and the risk for poor visual outcome includes late presentation, farming, stromal thinning and large corneal involvement.

Key words: cornea, suppurative keratitis, visual outcome

INTRODUCTION

Microbial keratitis is characterized by a corneal epithelial defect with underlying stromal inflammation caused by replicating microorganisms. Microbial keratitis is a potentially vision threatening condition that requires prompt diagnosis and treatment to prevent untoward outcome. Corneal opacification is the second most common cause of monocular blindness after un-operated cataract in some developing countries.^{1,2} It is a significant public health problem and numerous studies have described the microbiology of corneal infection.

The epidemiologic pattern and causative agents vary from country to country and even from region to region within the same country. The incidence of microbial keratitis varies from 11/100,000 persons/year in the US to 799/100,000 persons/year in some developing countries.³ In Ibadan, Ashaye et al.⁴ found that microbial keratitis accounted for 26.7% of cases of corneal opacity.

A major risk factor for microbial keratitis is interruption of the intact corneal epithelium. This occurs as a result of trauma which may be non surgical or surgical, corneal diseases such as post herpetic ulcers, neurotropic ulcers, contact lens wearers, abnormal tear film, and chronic dacryocystitis. However some organisms penetrate intact epithelium. These are *Neisseria gonorrhoeae*, *Corynebacterium diphtheriae*, *Pseudomonas aeruginosa*, and *Haemophilus influenzae*. Most of the organisms cultured from corneal infections are of the same specie as organisms found on the lids, peri-ocular skin, conjunctival sac or in the adjacent nasal passage.

This report describes the demographic characteristics, clinical presentation, and microbiological features of patients diagnosed with suppurative keratitis between April 2005 and May 2006 (14 months) in the Eye Clinic of the University College Hospital Ibadan, Nigeria.

METHODOLOGY

A retrospective review of the case notes of patients who presented with suppurative keratitis between April 2005 and May 2006 (14 months period) was done. Thirty-five case notes were retrieved out of 48 identified from the clinic emergency register (73% retrieval). Emergency and in-patient case notes were reviewed. Cases were included if the attending doctor documented a diagnosis of microbial keratitis. All patients had corneal scraping for m/c/s, gram stain and fungal studies done. Cases with herpetic ulcers (viral keratitis) were excluded.

The study protocol was approved by the Ethical Review Board of the University College Hospital and University of Ibadan before commencement of the study.

The following information was collected from the case notes—age, gender, duration of symptoms at presentation, presence of predisposing factors, microbiological diagnosis and the treatment instituted. The results were analyzed using the Statistical Package for Social Sciences (SPSS 11.0).

RESULTS

There were 23 (65.7%) males and 12 (34.3%) females. The age range was 6 - 60 years with a mean of 32.8+/-18.64. (table1). Most of the patients (31.4%) were young students, 28.6% were artisans, 17.1% were traders, and 17.1% were farmers. Over 60% of the patients belonged to the low socioeconomic class. A positive history of trauma was present in 48% of patients. In 6% of the patients, the predisposing factor was secondary to severe allergic conjunctivitis. The predisposing factor could not be ascertained in 43% of patients.

Table 1. Age and sex characteristics of patients

Age Range (Years)	Sex	
	Male No (%)	Female No (%)
1-9	3(8.5)	1(2.9)
10-19	3(8.5)	3(8.6)
20-29	4(11.4)	2(5.7)
30-39	3(8.5)	2(5.7)
40-49	2(5.7)	2(5.7)
50-59	5(14.3)	0(0)
60-69	3 (8.5)	2(5.7)
Total	23(65.7)	12(34.3)

The presenting visual acuity (visual acuity on admission) in 66% of the patients was <6/60, while 14% of the patients presented with a visual acuity of <6/18—6/60, and 17% presented with a visual acuity of 6/6-6/18. A visual acuity of no light perception was seen in 3% of patients. (figure 1).

Majority of the patients (57.1%) presented with corneal ulcers, while 28.6% presented with corneal abscess and corneal infiltrates. The remaining 14.3% presented with corneal abscess and descematocele. Positive culture was obtained in 45.7% of all patients. Gram stain revealed gram positive organisms in 37.1%, gram negative in 2.9%, and filamentous hyphae in 5.7% of patients. The most common organism isolated microbiologically was Staphylococcus aureus in 28.6%, followed by Streptococcus pneumoniae in 8.6%, and Pseudomonas aeruginosa in 2.9% of patients.

All patients had frequent topical antibiotics (ciprofloxacin). Twelve patients (34.3%) had additional systemic antibiotics (ciprofloxacin) and 3 (8.6%) patients had additional topical antifungal eye drops (fluconazole) and subconjunctival injections of gentamycin and cefuroxime.

At discharge, 40% had a visual acuity of 6/6-6/18, 15% had borderline vision (<6/18-6/60), 40% had severe visual impairment

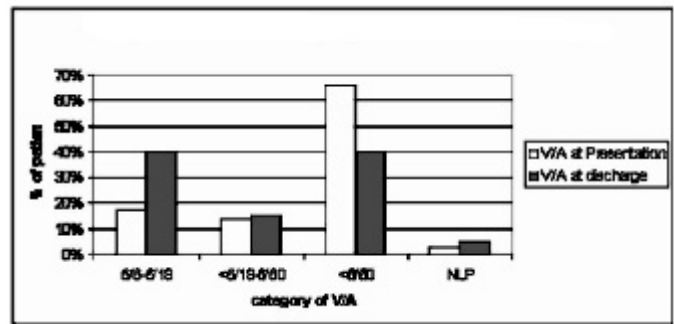


Figure 1. Comparison of visual acuity at presentation and at discharge

(<6/60) while another 5% had no light perception (figure 1). About half of the patients (51.4%) healed with corneal opacity, 17.1% had descematocele/staphyloma, 5.7% had eversion, and 2.9% had phthisis bulbi. Table 2 shows the variables that affected the visual outcome of patients that presented with suppurative keratitis.

Table 2. Correlation of specific variables with visual outcome at discharge

Variables	Visual Outcome			Total (%)
	6/6-6/18 (%)	<6/18-6/60 (%)	<6/60 (%)	
Occupation				
Farmer	25	0	75	100
Trader	33.4	33.4	33.2	100
Student	54.5	9.1	36.4	100
Artisan	40	10	50	100
Clinical findings				
Localized Corneal Abscess	0	20	80	100
Corneal Ulcers	20	55	25	100
Multiple abscess/stromal thinning	0	0	100	100
Extent of cornea affected				
<1/3	93.4	0	6.6	100
1/3- 1/2	0	28.6	71.4	100
> 1/2- 3/4	0.0	0.0	100.0	100.0
> 3/4	0.0	0.0	100.0	100.0
Gram stain				
Gram positive	53.9	7.7	38.4	100
Gram negative	0	0	100	100
Interval between onset of symptoms and presentation				
≤ one week	52.6	10.5	36.9	100
> one week	26.7	6.6	66.7	100

DISCUSSION

In this study, most patients were male (66.7%) and below the age of 40 years. This is similar to studies done in Nigeria,⁴ Ghana,⁵ and East India.⁶ Over half of the patients were artisans and farmers (51.3%) who are more predisposed to workplace ocular injury.

Ocular trauma is a common predisposing factor for microbial keratitis in developing countries,^{4,5,6} unlike in developed countries where the use of contact lens is the commonest predisposing factor.⁷

Staphylococcus aureus was the commonest organism isolated in this study, this was followed by *Streptococcus pneumoniae*. This is similar to findings by Basak et al.⁶ in east India and Ormerod et al⁷ in the United States where the most commonly cultured organism in uncompromised healthy cornea is *Staphylococcus aureus*, followed by *Streptococcus* spp, and *Pseudomonads*. *Streptococcus pneumoniae* was however most common in studies done in South India⁸ and Ghana.⁹ Filamentous hyphae was only retrieved from one in every 20 of the cases reviewed, this is a little less than expected considering that the location of the study was from a warm and humid country where the incidence of fungal keratitis is expected to be high as was reported from Southern India. The less than expected incidence of fungal keratitis may be related to issues having to do with specimen fixation and transportation.

Most of the patients (69%) presented with poor vision (<3/60). At discharge, despite treatment, 45% of the patients still had severe visual impairment. Even though these figures show some success in the treatment of these patients, over half of the patients still had impaired vision despite therapy. This may be due to the non availability of newer generation antibiotics and antifungals. Hence, corneal diseases are better avoided and prevented, especially in a country where eye banking facilities are not yet fully available.

Farmers had worse outcome, as 83% of them presented with severe visual impairment and at discharge despite intense therapy, 75% still had severe impairment. This may be attributed to their predisposition to ocular trauma from vegetative materials which further predisposes to fungal infections.

Clinical presentation was very important in prognosis. All patients who presented with multiple corneal abscess/stromal thinning had poor visual outcome at discharge. Patients with fungal infections had poorer prognosis. Although the patients with microbiologically confirmed fungal keratitis were few, it is relevant to note that these patients presented with visual acuity of <6/60 and remained so despite intensive topical, subconjunctival, systemic antibiotics. A study done in Tanzania¹⁰ revealed a 25% evisceration rate in eyes with fungal keratitis. Another study revealed that the rate of primary treatment failure was as high as 31%. Other prognostic factors included extent of

cornea affected. All patients who presented ≥ 3 weeks from onset of symptoms presented with visual acuities of hand movement and light perception and remained so at discharge, despite treatment.

The limitations of this study were its retrospective nature, the small number of culture positive results which may have been due to problems with specimen fixation and transportation.

CONCLUSION

This study has shown that bacteria is responsible for most cases of suppurative keratitis in a developing country like Nigeria and the risks for poor visual outcome include late presentation, farming, stromal thinning and large corneal involvement.

REFERENCES

1. Upadhayay MP, Karmacharya PC, Koirala et al. Epidemiologic characteristics, predisposing factors and aetiologic diagnosis of corneal ulceration in Nepal. *Am J Ophthalmol* 1991; 111: 92-9.
2. Whitcher JP, Srinivasan M, Upadhayay MP. Corneal blindness; a global perspective. *Bull World Health Organ* 2001; 79: 214-21
3. Upadhayay MP, Karmacharya PC, Koirala S et al. The Bhaktapur eye study: Ocular trauma and antibiotic prophylaxis for the prevention of corneal ulcer in Nepal. *Br J Ophthalmol* 2001; 85: 388-92.
4. Ashaye AO, Oluleye TS. Pattern of corneal opacity in Ibadan, Nigeria. *Annals of African Medicine* 2004; 3: 185-187.
5. Basak SK, Basak S, Mohanta A, Bhowmick A. Epidemiological and microbiological diagnosis of suppurative keratitis in Gangetic West Bengal, eastern India. *Indian J Ophthalmol* 2005; 53: 17-22.
6. Leck A.K, Thomas PA, Hagan M et al. Aetiology of Suppurative corneal ulcers in Ghana and south India, and epidemiology of fungal keratitis. *Br J Ophthalmol* 2002; 86:1211-5.
7. Ormerod LD, Hertzmark E, Gomez DS, Stabiner RG, Schanzlin DJ, Smith RE. Epidemiology of microbial keratitis in Southern California. A multivariate analysis. *Ophthalmology* 1987; 94: 1322-33.
8. Srinivasan M, Gonzales CA, George C, et al. Epidemiology and etiologic diagnosis of corneal ulcerations in Madurai, South India. *Br J Ophthalmol* 1997; 81: 965-71.
9. Hagan M, Wright E, Newman M, Dolin P, Johnson G. Causes of suppurative keratitis in Ghana. *Br J Ophthalmol* 1995; 79: 1024-8.
10. Rapoza PA, West SK, Katala SJ, Taylor HR. Prevalence and causes of vision loss in Central Tanzania. *Int Ophthalmol* 1991; 15: 123-9.