Retrospective Review of Corneal Ulcers in Ipoh Hospital

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SUMMARY

This study was a retrospective study on corneal ulcer of one year period in Hospital Ipoh. A total of 28 cases were studied. Among the risk factors identified were foreign body on cornea, trauma, contact lens, vernal keratoconjunctivitis and surgical complication. The nature of this disease which was severe and slow healing caused prolonged hospital admission. Identification of causative microorganism by corneal scraping help in the treatment and management of this condition.

KEY WORDS:
Corneal ulcer, Cornea scraping, Contact lens induced corneal ulcer

INTRODUCTION

Corneal ulcer is defined as suppuration of the corneal layers caused by infective organisms[2]. In order for the corneal ulcer to occur, a predisposing factor which traumatizes the corneal epithelium must occur first and then is followed by invasion of the cornea by pathogenic organisms.

It is one of the most visually threatening ocular infection which can cause significant morbidity. Corneal ulcers may result in perforation of the intact eyeball and this may require evisceration of the affected eyeball as the end result[2]. Otherwise it could lead to impaired visual acuity or even blindness as a result of corneal scarring.

Management of corneal ulcer involves proper history taking, proper corneal examination, corneal scraping and intensive topical antibiotics[5,6]. History taking is very important as it may point towards the cause of the corneal ulcer and probable causative organism. Corneal scraping must be done in all cases.

AIM OF THE STUDY:

1. To collect demographic data, including duration of stay in hospital, of corneal ulcer cases in Ipoh Hospital.
2. To determine the risk factors (ex: trauma, contact lens wear and others) of corneal ulcers in Ipoh Hospital.
3. To determine the causative organisms causing corneal ulcers in Ipoh Hospital.
4. To determine the association between presenting visual acuity, final visual acuity and risk factors.

MATERIALS AND METHODS

This was an observational retrospective study done from a period of 1st June 2003 till 30th June 2004. Collection of data from case-notes of patients admitted during the above time period which included: registration number, sex, age and race for demographic data. Visual acuity on admission and at discharge, risk factors of corneal ulcer, gram stain, culture and sensitivity results, causative organisms, outcome of treatment while in the ward and the length of stay in the eye ward of Ipoh Hospital (ward 1A) were included in data collection. Every case of corneal ulcers were admitted to ward 1A and visual acuity at presentation and at discharge were taken using Snellen chart. Collection of data did not include after patients were referred for cornea specialist's opinion and management because they were admitted and managed there accordingly. (3 cases)

Patients that were diagnosed as having intraocular infection (endophthalmitis) and did not have corneal ulcer were excluded from the study.

RESULTS

There were 28 cases of corneal ulcer admitted during the above period. Out of these; 14 cases (50%) were Malay, 9 cases (32%) were Indian and 5 cases (18%) were Chinese. This is shown in Figure 1.

Twenty one cases were male and seven cases were female. Patients' age ranged from 7.3 years to 86.4 years and duration of admission was from two days to 61 days with the mean duration of staying in the ward being 15.6 days.

The risk factors of corneal ulcers were foreign body (9 cases), trauma (7), contact lens induced (5), unknown cause (4), vernal keratoconjunctivitis (2) and post surgical complication (1). (Refer to Figure 2)

Patients with corneal ulcer due to trauma mostly had the worst visual acuity at presentation. These were shown from the above table (Table I); 85.7% (6 cases) presented with visual acuity of counting finger (CF) to no perception of light (NPL). Patients with corneal ulcer due to VKC had visual acuity at presentation of 6/12 (1 case) and 6/36 (1 case). Corneal ulcer due to contact lens had visual acuity at presentation of 3/60 (1 case), CF (2 cases) and hand movement (HM) 2 cases. Surgical induced corneal ulcer presented with visual acuity of perception to light (PL) whereas corneal ulcer due to foreign body presented with visual acuity ranging from 6/18 to PL.

Corneal scrapings were done in 71.4% (20 cases) and out of this only 70% (14 cases) were positive for organisms on culture. Bacterial pathogens were isolated in 64% (9 cases) and fungus were isolated in 36% (5 cases) of the culture positive. Gram positive bacteria caused infection in 56% (5

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cases) and all fungal infections were caused by Fusarium species. The table below shows the types of bacterial pathogens which were isolated from corneal scraping.

For contact lens induced corneal ulcers, two cases were due to *Pseudomonas aeruginosa*, one case was due to mixed infection of *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. All 5 fungal infections cause by Fusarium species occurred in foreign body induced corneal ulcers and 2 infections resulting from *Pseudomonas aeruginosa*. Organisms isolated from traumatic corneal ulcers were; *Streptococcus pneumoniae* (1 case), Corynebacterium species (1 case), *Staphylococcus epidermidis* (1 case) and Klebsiella pneumoniae (1 case). A case of Staphylococcus aureus was isolated from unknown induced corneal ulcer and a Bacillus species was found to be the infecting organism in Vernal keratoconjunctivitis induced corneal ulcer.

Most patients with traumatic induced corneal ulcer (71.5% - 5 cases) had worst visual acuity at discharge ranging from CF to NPL. Patients with foreign body induced corneal ulcer had visual acuity at discharge ranging from 6/18 to PL. All patients with VKC had visual acuity improved at discharge, one case with 6/9 and the other with 6/24. For surgical induced corneal ulcer visual acuity at discharge remained the same from presentation (PL). Visual acuity at discharge were better in contact lens corneal ulcer; two cases improved to 6/60, one case to 1/60 and one case remained the same.

Twenty patients had healed from corneal ulcer. Two patients were complicated by perforation and panophthalmitis which warranted evisceration. Two cases had non healing corneal ulcer in which tarsorraphy were done and eventually healed. One case was complicated by non healing corneal epithelial defect which resolved with bandage contact lens whereas three cases were referred to a corneal subspecialist for further opinion and management.

DISCUSSION

Corneal ulcer is one of the eye conditions which in severe form needed prolong hospitalization. This is especially true in the case of fungal keratitis because of late presentation to the hospital as a result of slow insidious nature of the disease and late detection thus resulting in a much longer period for the infection to resolve from the cornea. In the case of Fusarium species it is more aggressive and more resistant to therapy as compared to Aspergillus species[1]. Most of the antifungal medications are fungistatic and in immunocompetent host it takes a longer period to eradicate the infection[1].

In this study, our patients with corneal ulcer stayed longer in ward when compared to other eye pathology with mean hospital stay of 15.6 days. The reasons for longer time of admission were due to infection cause by highly virulent microorganism and resistant strain. In bacterial corneal ulcers, some resistant strains have been identified in which a change to a stronger and newer topical antibiotic is needed in order to eradicate the infection and thus prolonging the hospital stay.

Foreign body is the most common risk factor of corneal ulcer in this study. This is different from the results of studies done in the Western countries where it was found that contact lens wear was the main risk factor[3,8]. Contact lens-induced corneal ulcers only constitute 18% of the cases in this study. However, this figure will be expected to rise in future as more people who are active and having modern life style are using it. The other risk factors identified in this study were: trauma, unknown, vernal keratoconjunctivitis and surgery.

Twenty-five percent of culture positive corneal ulcers grew Fusarium species. All Fusarium species were from foreign body. Fungi which is rich in vegetable and organic material1 (foreign body) penetrated corneal surface after causing breakdown in epithelial layer.

Corneal ulcer due to trauma had the worst presenting visual acuity followed by unknown risk factor, foreign body, surgical induced, contact lens and lastly vernal keratoconjunctivitis. Trauma causes worst visual acuity at presentation as a result of nature of the injury. As for the contact lens induced keratitis virulent nature of Pseudomonas aeruginosa was primarily responsible for poor visual acuity at presentation; however visual acuity at discharge was better as 50% of

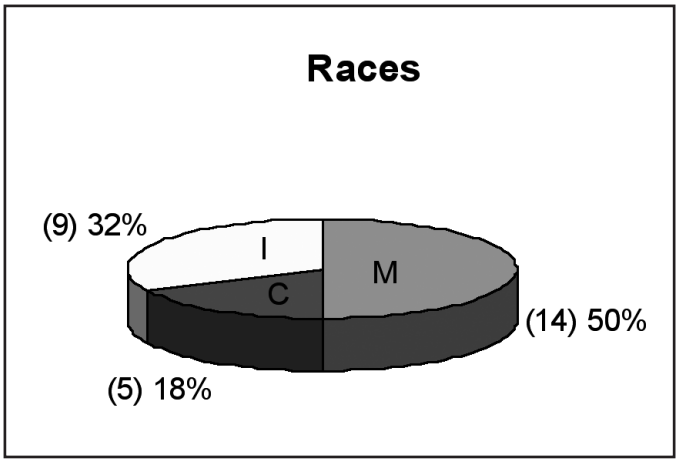

Fig. 1: Race distribution of corneal ulcer patients

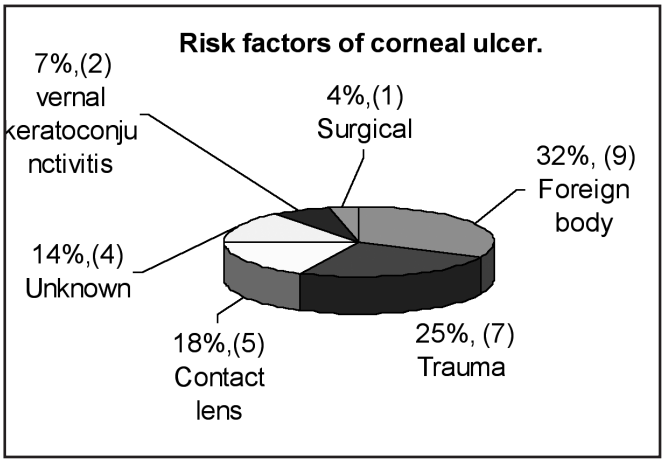

Fig. 2: Risk factors of corneal ulcer

As for visual acuity at presentation for each category of risk factor were shown in Table I

Table I: Visual acuity at presentation for each category of risk factor

VA at presentation	Risk factors					
	Foreign body	Trauma	Contact lens	Unknown	Vernal kerato-conjunctivitis	Surgical induced
6/12	-	-	-	-	50% (1)	-
6/18	22.2% (2)	14.3% (1)	-	25% (1)	-	-
6/24	22.2% (2)	-	-	25% (1)	-	-
6/36	11.1% (1)	-	-	-	50% (1)	-
6/60	11.1% (1)	-	-	-	-	-
3/60	-	-	20% (1)	-	-	-
Counting Finger (CF)	11.1% (1)	57.1% (4)	40% (2)	25% (1)	-	-
Hand movement (HM)	-	-	40% (2)	-	-	-
Perception to light (PL)	22.2% (2)	14.3% (1)	-	-	-	100% (1)
No PL	-	14.3% (1)	-	25% (1)	-	-

Table II: Type of bacterial pathogens that were isolated on culture plate

Type of bacteria	Number of cases
Pseudomonas aeruginosa	3
Streptococcus pneumoniae	1
Bacillus species	1
Corynebacterium species	1
Staphyloccocus aureus	1
Staphyloccocus epidermidis	1
Klebsiella pneumoniae	1

The table below showing the type of microorganism isolated for each category of risk factor

Table III: Microorganism isolated for each category of risk factor

Risk factor	Foreign body	Trauma	Contact lens	Unkown	Vernal keratoconjunctivi-tis
No organism	2	1	0	0	1
Pseudomonas aeruginosa	2	0	2 + 1(mix infection with Klebsiella)	0	0
Streptococcus pneumoniae	0	1	0	0	0
Bacillus species	0	0	0	0	1
Corynebacterium Species	0	1	0	0	0
Staphylococcus Aureus	0	0	0	1	0
Staphylococcus epidermidis	0	1	0	0	0
Klebsiella Pneumoniae	0	1	0	0	0
Fusarium species	5	0	0	0	0

Table IV: visual acuity at discharge

VA at discharge	Risk factors					
	Foreign body	Trauma	Contact lens	Unknown	Vernal kerato-conjunctivitis	Surgical induced
6/9	-	14.3% (1)	-	-	50% (1)	-
6/12	-	-	-	25% (1)	-	-
6/18	22.2% (2)	14.3% (1)	-	25% (1)	-	-
6/24	11.1% (1)	-	-	-	50% (1)	-
6/36	11.1% (1)	-	-	-	-	-
6/60	11.1% (1)	-	50% (2)	-	-	-
1/60	11.1% (1)	-	25% (1)	25% (1)	-	-
Counting finger (CF)	11.1% (1)	14.3% (1)				
Hand movement (HM)	-	14.3% (1)	25% (1)	-	-	-
Perception to light (PL)	22.2% (2)	28.6% (2)	-	-	-	100% (1)
No PL	-	14.3% (1)	-	25% (1)	-	-

patients had visual acuity of 6/60. The topical antibiotics that being used were able to control the infection without emergence of resistance strain. Pseudomonas aeruginosa keratitis is one of the most damaging eye infections and often progresses toward corneal perforation if not promptly diagnosed and appropriately treated [2, 4].

Diagnostic corneal scraping is indicated when infective keratitis is suspected in order to identify the causative organisms and to choose appropriate antibiotic therapy[3,4]. Corneal scraping also helps in accelerating the disease resolution by enhancing antibiotic penetration, therapeutically debride necrotic tissue and decreasing the organism load at the site of infection[5,6]. In cases such as when there are extensive corneal melting, or patient refusal and uncooperativeness for the procedure, cornea scraping could not be done. These are the reasons of inability to do corneal scrapping in eight cases in this study. Sometimes it is not possible to yield positive culture result; even in the best centers as up to 20% of cases of presumed infective keratitis remain culture negative[7].

Most of the bacterial corneal ulcers were due to gram positive organisms as found in other studies;[7,8] however in this study 55.5% of bacterial corneal ulcers were due to gram negative organisms. Pseudomonas aeruginosa is the most common gram negative organism isolated and is also the most common organism responsible for contact lens induced corneal ulcer[8]. In one of the study, Pseudomonas was responsible for nearly two thirds of the culture-positive cases[8]. Gram negative bacteria are known to be associated with soft contact lens wear[10].

The mainstay of treatment of corneal ulcers is topical antibiotic. Usually it is started empirically. Any change in topical antibiotics will be made according to the clinical response as well as the sensitivity pattern of the organisms isolated.

CONCLUSION

Corneal ulcer is one of the most visually threatening ocular infection which can cause a significant morbidity. Patients can have poor clinical outcome if aggressive and prompt therapy is not promptly initiated. Most of the contact lens induced corneal ulcers are caused by Pseudomonas aeruginosa and this finding will help in determining the empirical treatment to be initiated. Fungal keratitis should be suspected in any corneal ulcers that have relation with foreign body.

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