IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 2 Ver. 2 February. (2018), PP 37-39
www.iosrjournals.org

Long Standing, Non Healing Corneal Ulcer: Manegment Approach

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Abstract: *Corneal ulcer is one of the most common causes of visual acuity impairment and blindness all over the world. The aim of the study was to evaluate various factors affecting the corneal ulcers healing. A total of 93 Patients who were diagnosed as a case of corneal ulcer, were included in this retrospective study conducted in the Department of Ophthalmology, M.L.B.M.C, Jhansi, Uttar Pradesh, India over a period of 12 months. All data were taken retrospectively. An assessment of present complaints, detailed clinical history (present and past), Routine investigation (Random blood sugar, complete heamogram, ESR ect.), Slit lamp examination, corneal sensitivity, Fluorescein eye staining, KOH mount, Gram staining, and culture sensitivity was done. Topical antibiotic and other supportive therapy was given to all subjects in this study as the initial therapy. Treatment outcome of corneal ulcer is classified into improved, not improved (steady/worsen). Clinical improvement was noted in 60 patients. No improvement and clinical worsening were experienced in 33 patients. The male versus female ratio in this study was 2.1:1. Ocular trauma (51.61%) was the leading predisposing factor for corneal ulcer in our study. Most common causes of non healing corneal ulcer were depth and size of corneal ulcer (almost found in 80-90% cases) followed by meibomitis (39.39%), trichiasis (27.27%), chronic dacrocystitis (18.18%), and Diabetes mellitus (12.12%).*

Keywords: *Corneal sensitivity, Corneal ulcer, dacrocystitis, Diabetes mellitus, ESR, Gram staining, KOH mount, Meibomitis, Random blood sugar, Trichiasis , Visual acuity.*

Date of Submission: 22-01-2018 Date of acceptance: 09-02-2018

I. Introduction

Cornea is the principal refractive surface of the human eye and along with sclera forms the outermost coat of the eyeball. Cornea essentially consists of 5 layers namely—epithelium, Bowman's layer, stroma, Descemet's membrane and the endothelium (another newly discovered layer is pre- Descemet's membrane or Dua's layer [1]) Cornea along with conjunctiva and tear film acts as a major component of ocular defense system against the microbial infections. While corneal epithelium acts as a mechanical barrier, the cellular and chemical components of conjunctiva and pre-corneal tear film act as biologic protective systems. There are multiple barriers to ocular infection. Anatomically, the eye is protected from the introduction of microbes due to trauma by the surrounding bony structure of the protruding orbital rim. The cilia protect the eyelid by a rapid blink reflex. The eyelid skin, cilia and adnexal surfaces are normally inhabited by nonpathogenic/saprophytic aerobic and anaerobic bacteria which decreases the chances of colonization by the pathogenic microbes. Additionally, the intact epithelial surfaces of the conjunctiva and cornea provide a formidable barrier to the invasion by the microorganisms. The presence of an intact tear film and its drainage by the lacrimal apparatus acts as an intrinsic barrier to infection. The microorganisms, foreign bodies and desquamated epithelial cells are continuously washed out of the eye due to blinking and lacrimal drainage system. The mucus layer of the tear film also provides antimicrobial properties which inhibits the bacterial adhesion to the epithelial cell layer.

Barriers to microbial infection

1. Anatomical	**3. Antimicrobial**
• Bony orbital rim	• Tear film constituents
• Eyelids	• Mucus layer
• Eyelid cilia	• IgA
• Intact epithelial surface of conjunctiva and cornea	• Complement
2. Mechanical	• Lactoferrin
• Tear film	• Lysozyme
• Blinking	• β-lysin
• Punctal drainage system	• Conjunctiva
	• Conjunctiva associated lymphoid tissue (CALT)

Corneal ulcer

Corneal ulceration occurs due to the host cellular and immunologic responses to the offending agent which may be bacterial, viral, fungal or protozoal organism. Sometimes it is sterile corneal ulceration, which may occur due to systemic dermatologic or connective tissue disease and chemical or thermal injuries. The host cellular responses are mainly responsible for corneal destruction in infections and sterile corneal melting. In all cases, stromal melting is preceded by a corneal epithelial defect. The ulceration occurs secondary to the action of tissue collagenases. The polymorphonuclear cells (PMNs) are secreted in response to the corneal insult, which secrete various lytic enzymes such as collagenase, elastase and cathepsin causing destruction of the cornea.[2] Simultaneously, reactive fibroblasts, synthesize collagen and cause repair of the cornea.

II. Stages Of Corneal Ulcer

Stage 1: Progressive Stage: In the progressive stage, the ulcer is usually saucer shaped and is associated with gray zone of infiltration. In this stage, the microbes adhere to the epithelium, release toxins and enzymes and cause tissue destruction.

Stage 2: Regressive Stage: A line of demarcation forms around the ulcer so that the margin and floor of the ulcer become more smooth and transparent. The line of demarcation consists of leukocytes that neutralize and eventually phagocytose the offending organism and the necrotic cellular debris

Stage 3: Healing Stage: The process of epithelialization starts to occur at this stage. The histiocytes and keratocytes convert to fibroblasts so that the scar tissue is formed. Vascularization occurs towards the ulcer site, which further promotes healing as a result of influx of fibroblasts and antibodies. When the healing is complete, the vessels regress and become "ghost vessels" which may be visualized by indirect illumination.[3]

III. Material And Method

A total of 93 Patients who were diagnosed as a case of corneal ulcer, were included in this retrospective study conducted in the Department of Ophthalmology, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh, India over a period of 12 months from Nov. 2016 to Oct. 2017. The procedures followed were in accordance with the ethical standards committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000. The necessary permission from the Ethical and Research Committee was obtained for the study.

Inclusion criteria:

1. Both male and female patients were included in the study.
2. Patients with corneal ulcer irrespective of age group.
3. Patients with corneal ulcer with or without affected visual acuity.
4. Patients with corneal already on medications, were also included in the study

Exclusion criteria:

1. Patients which were initially diagnosed as a case of endophthalamitis, were excluded from the study.
2. Patients with complicated corneal ulcer like perforation, descemetocele, were excluded from the study.
3. Patients with corneal opacity already taken intravitreal injection were excluded from the study.

An assessment of present complaints, detailed clinical history (present and past), and history of any ocular surgery, mode of trauma, Age, sex, occupation, socio-economic status, immunization status (in childrens), and random blood sugar were recorded. Ophthalmological check up as external examination of the eyes, visual acuity, torch light examination, slit lamp examination, corneal sensitivity, Fluorescein eye staining, KOH mount, Gram staining, and culture sensitivity was done. On the basis of history examination and investigation, patients with corneal ulcer were treated accordingly.

Treatment outcome

Topical antibiotic and other supportive therapy was given to all subjects in this study as the initial therapy. Treatment outcome of corneal ulcer is classified into improved, not improved (steady/worsen). Clinical improvement was noted in 60 patients, in which followed the treatment until corneal ulcers healed. No improvement and clinical worsening were experienced in 33 patients.

IV. Result

A total of 93 Patients which were diagnosed as a case of corneal ulcer, were included in this retrospective study.

Table 3.1 Gender ratio of patients with corneal ulcer (n=53)

	MALE	FEMALE
No. of patients/eye	62	31
Percentage (%)	66.67%	33.33%

Table 3.2: Causes of corneal ulcer (n=93)

	Traumatic	Non traumatic
No. of patients/eye	48	45
Percentage (%)	51.61%	48.39%

Table 3.3: Corneal ulcer in response to proper medication

Corneal ulcer treated with proper medication	Resolve within 3 week	Not resolve within 3 week	
No. of patients	60	33 (N)	
		Male-14	FEMALE-19
Percentage	64.52 %	35.48 %	

Table 3.3 shows that, out of 93 patients there were 33 (35.85%) patients which did not responded to proper medication.

Table 3.3: Factor affecting the resolution of corneal ulcer (N=33)

Factors affecting the corneal ulcers healing	**No. of patients (Non-healing corneal ulcer)**	**Percentage**
Diabetes mellitus	04	12.12%
Chronic dacrocystitis	06	18.18%
Meibomitis and blepheritis	13	39.39%
Incomplete closer of eyelid	03	9.1%
Trichiasis	09	27.27%
Immunological disorders	01	3.03%
Ulcer size (> 5 mm)	27	81.8%
Ulcer depth (stromal > 1/3)	30	90.9%
Recurrent Rhinosinusitis	03	9.1%
Concretions	03	9.1%
Vita-A deficiency	02	6.06%

V. Discussion

Corneal ulcers are the major cause of visual loss and blindness in world**.** The male versus female ratio in this study was 2.1:1. This was similar to other study conducted by Sirikul, et al[4] in Thailand.

Ocular trauma was the leading predisposing factor for corneal ulcer in our study. This result was similar to study by Damayanti and Sitompul[5],Bharathi, et al[6], and Srinivasan, et al.[7] However, our result was different from study by Fong, et al[8] and Keay, et al[9] in Australia that found contact lens use (44.3%) as the most common factor, and trauma (23.8%), as well as by Mah-Sadorra, et al[10] and Bourcier, et al.[11]

In this study, there were 33 (35.85%) patients which was not respond to proper medication. Non-healing corneal ulcer most commonly seen in female (20.43%). Most common causes of non healing corneal ulcer were depth and size of corneal ulcer (almost found in 80-90% cases) followed by meibomitis (39.39%), trichiasis (27.27%), chronic dacrocystitis (18.18%), and Diabetes mellitus (12.12%).

VI. Conclusion

Corneal scar is a significant cause of visual impairment and blindness in the developing world. Corneal infections are responsible for a large proportion of this scarring. A review of the data on indications for corneal transplantation in the developing world revealed that corneal scar was the most common indication (28.1%), of which keratitis accounted for 50.5%. Besides this, about 12.2% of all grafts were done for active infectious keratitis.[12]Thus suppurative keratitis and its complications constitute important causes of ocular morbidity, particularly in the developing world. When comprehensive ophthalmologists see a patient with a corneal ulcer, they reflexively start fluoroquinolones, but never think about other contributory factors and core diagnosis.

Detailed history (Present and past) past history of illness, careful examination of ulcer, lid, conjunctiva and lacrimal drainage system is a main soul of corneal ulcer management. Counseling of the patients to take proper medication, maintain hygiene, and avoid predisposing factors and proper time to time fallow-up, helps to increase the outcome of corneal ulcer.

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