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A STUDY OF CLINICAL PROFILE, MANAGEMENT AND OUTCOMES OF OCULAR THERMAL INJURIES AT A TERTIARY CARE INSTITUTE

Ophthalmology

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ABSTRACT

Thermal injury to the eyes is a grave ophthalmic emergency and a potential visual catastrophe. Urgent treatment to restore the ocular surface and lid structure is essential in order to ensure successful outcomes. Although less common than chemical injuries, thermal injuries to the eyes contribute to 10% of cases of ocular trauma[1]. Occupational and domestic accidents contribute to majority cases of thermal ocular injuries. Accurate ocular management and multidisciplinary approach to treatment of a thermal injury patient can lead to vision and life-saving results.

KEYWORDS

Thermal injury, Limbal stem cell deficiency, Corneal melt, Firecracker injury, Blast injury

INTRODUCTION

Thermal injury is one of the most important ophthalmic injuries. 16% of ocular burn cases are due to thermal injuries[2]. Ocular damage and final visual outcome depends on many factors like extent and duration of exposure to heat, temperature of offending agent, presence or absence of direct contact, systemic level of burns, time interval of burn to treatment. In general, due to inherent protective mechanism, such as blink reflex, Bell's phenomenon, and reflex shielding movements of the head and arms, severe ocular sequelae may not be associated. Ocular damage ranges from limbal stem cell damage causing recurrent epithelial breakdown, stromal ulceration and vascularization, symblephara and sometimes corneal perforation. Lid involvement adds to the insult. According to Duke-Elder, ocular thermal injury can be categorised as contact burns and flame burns[3]. Contact burns are due to contact with hot objects or liquids, while flame burns are caused by a fire. Corneal involvement is infrequently seen in flame burns due to rapid lid closure and insulation by the lids[3].

However, unlike chemical burns, thermal burns have higher incidence of associated systemic co morbidities. Hence, in cases of severe thermal burns immediate attention to airway, breathing and circulation is warranted.

MATERIALS AND METHODS

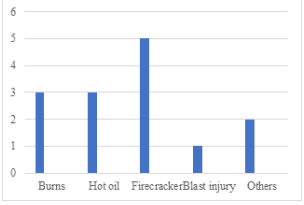
Our study was a retrospective observational study with 14 cases (21 eyes) of ocular thermal injury in a tertiary care institute over a period of 18 months. All the cases were managed medically as well as surgically, if required, for ocular surface restoration and lid burns. All patients were treated with preservative free topical steroids, lubricants, cycloplegics and antibiotics along with systemic steroids, when indicated. 1 patient additionally required amniotic membrane grafting followed by tectonic penetrating keratoplasty and upper lid lamellar reconstruction using oral mucosal membrane graft and retroauricular graft. Other surgical techniques such as simple limbal epithelial transplantation and keratoprosthesis were not required for any of the patients.

Patients were treated appropriately for systemic co-morbidities after urgent securing of airway, breathing and circulation by the burns unit.

Results

Cause of injury:

The most common cause of injury was due to firecrackers (50%) followed by burns (21%) and hot oil (21%)



Demography:

A total of 14 patients were included in the study with 21 eyes affected by thermal injury.

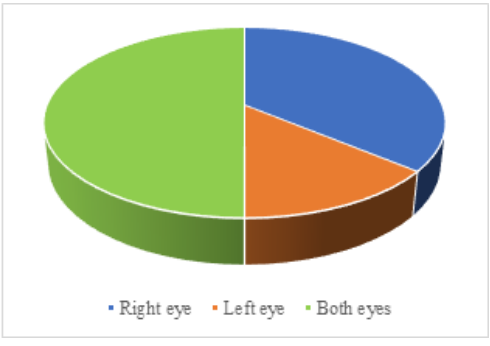
The age of the patients in the study ranged from 3.5 to 54 years with a mean of 24 years, signifying the high prevalence of ocular thermal injuries in young population.

12 out of 14 patients (86%) were males, whereas only 2 (14%) were females.

Average time interval from injury to initiation of treatment was 31 hours, ranging from 3 hours to 12 days.

Laterality of injury:

Majority of patients showed affection of both eyes by the injury



Visual acuity at presentation and after treatment

The visual acuity on presentation was upto WHO visual impairment category 2 in 95% of the eyes affected by thermal injury. Of these, all patients improved to visual acuity equal to or better than 6/9 following treatment. Only 1 patient who was affected by cylinder blast injury had vision of perception of light (PL) in the affected eye, which remained within WHO category 4 after treatment as well.

WHO Category		Visual Acuity	
		On presentation	After treatment
0	Mild or no visual impairment: >6/18	12 (57%)	20 (95%)
1	Moderate visual impairment: 6/60 to 6/18	4 (19%)	0
2	Severe visual impairment: 3/60 to 6/60	4 (19%)	0
3	Blindness: 1/60 to 3/60	0	0
4	Blindness: PL to 1/60	1 (5%)	1 (5%)
5	Blindness: No PL	0	0

Fig 1: Clinical photograph on presentation of cylinder blast injury

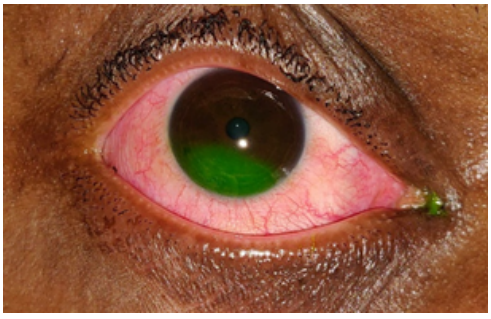
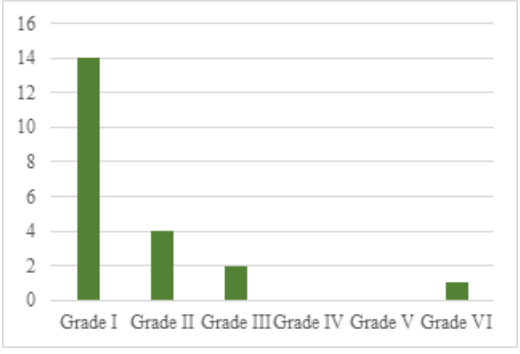


Fig 2: Clinical photograph on presentation of hot oil injury patient

Severity of injury:
According to Duas classification, the eyes with thermal injuries were classified as follows:



Treatment given:
13 out of 14 patients (95%) were managed conservatively with preservative free topical steroids, lubricants, cycloplegics and antibiotics along with systemic steroids when indicated.

1 patient of cylinder blast injury required amniotic membrane grafting followed by tectonic penetrating keratoplasty and upper lid lamellar reconstruction using oral mucosal membrane graft and retroauricular graft along with medical management.

DISCUSSION:

Ocular injuries are a major cause of concern in patients with thermal injuries and require vigilant screening and early management. Majority cases in our study were associated with fire cracker injury or work place injury. According to Vajpayee et al, 42% and 32% of ocular contact burns in India are caused by boiling fluid and hot oil respectively[8]. In our case series, majority patients are young. Merle et al also found in their study that majority of victims are young[2].

All patients who were systemically stable had good outcome because of early ophthalmic evaluation and management. One patient with maximum body burns also had grade VI ophthalmic burns. However, there was a major delay in ophthalmic intervention as he was admitted at a burns management centre, with no ophthalmic facility. On the other hand, two patients admitted in our hospital with round the clock ophthalmic facility with grade III moderate degree burns took longer time to heal, but healed completely.

86 % patients were males. Tegtmeyer LC et al also found a pre ponderence of males with thermal injury[4].

95 % patients in our series had good visual recovery after treatment. Iva Rani Kalita et al also had similar results[5]. However, Jong Ho et al presented a case of transient corneal infiltration with myopic shift following a cooking oil burn[6].

The extent of limbal stem cell damage plays a major role in determining the outcome of injury. Steroids help in controlling the inflammation and prevent formation of symblephara. None of our patients except one had serious vision threatening complications or limbal stem cell deficiency. One patient has severe grade VI burns with corneal melt.

Only 1 patient (5%) required surgical management. This co related with grade of thermal burn.

Incidents where the patient is unconscious due to smoke inhalation or an explosion or blast, the protective reflexes like blink reflex and Bell's phenomenon may be lost resulting in more damage. Hence, lid involvement is more frequent in extensive burns. Lid margins are usually spared from burns due to protractor spasm causing orbital and preseptal tissue to overlap and cover the tarsal region. Choi et al reported that facial burn patients with lid abnormalities had tear film instability and ocular discomfort[7].

CONCLUSION

Early management of thermal burns whether medical or surgical can prevent vision threatening sequelae of severe thermal injury. However, it is important to bear in mind that life-saving management should be instituted as soon as possible.

Future scope
Firecracker use by children should be strictly under adult supervision. Public health education can aid in achieving this objective.

Workplace injury can be prevented by use of safety goggles and special education and training regarding prevention.

REFERENCES:

1. Wagoner, M.D., Chemical injuries of the eye: current concepts in pathophysiology and therapy. Survey ophthalmol 1997;41(4):275-313
2. Merle H, Gerard M, Schrage N. [Ocular burns]. J Fr Ophtalmol 2008;31(7):723-734.
3. Krachmer> Volume 1- Fundamentals and Medical Aspects of Cornea and External Disease> Part VII- Diseases of the Cornea> Section 8- Corneal Trauma> Chapter 97- Mechanical Injury> Thermal Burns
4. Tegtmeyer LC, Herrnstadt GR, et al. Burns. 2018 Feb;44(1):150-157.
5. Vardhan Singh H, Rani Kalita I. Ocular thermal injury: Study on its management considerations, visual outcome and cosmesis in tertiary health care system. IP International Journal of Ocular Oncology and Oculoplasty. 2019;5(1):15-20.
6. Ahn JH, Kim DH. Thermal Ocular Surface Injury from Cooking Oil: Delayed Onset Transient Corneal Infiltration and Myopic Shift. Korean J Ophthalmol. 2016;30(2):150–151. doi:10.3341/kjo.2016.30.2.150
7. Burns. 2017 Dec;43(8):1748-1756. doi: 10.1016/j.burns.2017.04.015. Epub 2017 May 13. Impairment of tear film and the ocular surface in patients with facial burns.
8. Vajpayee RB, Gupta NK, Angra SK, et al. Contact thermal burns of the cornea. Can J Ophthalmol 1991;26(4):215–18.