CASE REPORT
Bali Journal of Ophthalmology (BJO) 2021, Volume 5, Number 1: 10-12
P-ISSN.2089-1180, E-ISSN.2302-2914

Bali Journal of Ophthalmology

Bilateral ocular thermal burn due to battery explosions: a case report

Nyoman Brahmani Pitanatri[1*], Ni Made Suryanadi[2]

[1]Medical staff of Emergency Department Bali Mandara Eye Hospital, Bali, Indonesia;
[2]Medical staff of Eye Departement Bali Mandara Eye Hospital, Bali, Indonesia.

*Corresponding to:
Nyoman Brahmani Pitanatri;
Medical staff of Emergency Department Bali Mandara Eye Hospital, Bali, Indonesia;
brahmanipitana@gmail.com

Received: 2021-02-07
Accepted: 2021-03-20
Published: 2021-04-26

ABSTRACT

Background: Ocular burns are one of the most common eye emergencies and can cause visual impairment. Ocular burns are classified into chemical burns and thermal burns according to their etiology. Although thermal burn is less common than chemical burn, it can also cause loss of vision function if not treated properly.
Case Presentation: A 48-year-old man complaining of burns to his eyes and blurred vision due to battery explosions. He complained of moderate periorbital pain, decreased vision on both eyes, and difficulty opening his eyes suddenly after the explosions. The patient's eyes were irrigated bilaterally with 500 ml normal saline each eye as initial treatment and given topical antibiotic and steroid, artificial tears, oral antibiotics, and analgetic. The patient was discharged and advised to have a follow-up visit to an ophthalmologist within 72 hours.
Conclusion: Immediate irrigation is important after thermal burns. Initial evaluation and management of ocular burns are important in preventing severe injury. With prompt treatment and early ophthalmologic intervention, thermal burns generally have good visual outcomes.

Keywords: ocular burn, thermal, explosions.
Cite This Article: Pitanatri, N.B., Suryanadi, N.M. 2021. Bilateral ocular thermal burn due to battery explosions: a case report. *Bali Journal of Ophthalmology* 5(1): 10-12.

INTRODUCTION

Ocular burns are one of the most common causes of eye injuries and can cause visual impairment. Generally, ocular burns are classified into chemical burns and thermal burns according to their etiology. Ocular burns account for 7.7% to 18% of eye trauma cases.[1,2] Eighty-four percent of them are caused by chemicals and 16 percent are caused by heat damage.[3] A study conducted by Pradana et all, 26.9% of the total ocular trauma patients who went to the hospital are caused by the ocular burn.[4] Thermal burn itself represents 5.5% of the total ocular trauma cases. Boiling liquids, molten metals, flames, gasoline explosions, steam, and tar are the most common causes of thermal burn. When injured, the eye surface and accessory will be damaged by thermal burns. The impact on vision and tissue damage depends on the duration and area of contact, the degree of the heating agent, and the conductivity of the tissue.[1,5]

The initial evaluation of patients with thermal burns is very important. Evaluation of the eye after exposure should include a visual inspection of the surrounding skin, eyelids and eyelashes, and the external structure of the eye. First of all, we should evaluate the patient's visual acuity and measure the intraocular pressure of both eyes. Fluorescein staining should be performed to assess corneal abrasions or ulcers, and a slit lamp examination should be performed to assess the damage of deeper structures of the eye. The surface of the eyes and eyelids should also be assessed for visible foreign objects and should be removed.[5,6]

Thermal burns can cause serious injuries to the cornea and eye accessories, such as corneal burns or abrasions, conjunctivitis, cataracts, and corneal perforations.[3] Immediate irrigation with an isotonic solution is the important early treatment after chemical burns as well as for thermal burn.[1,5] The treatment options include a combination of topical antibiotics, instillation of artificial tears, application of an occlusive dressing, and sometimes cycloplegia.[5] Early surgical intervention is also can give a better outcome when needed.[6] With prompt treatment and evaluation, thermal burns generally have good visual outcomes.

CASE PRESENTATION

A 48-year-old man presented to the emergency department in the afternoon complaining of burns to his eyes and blurred vision. Earlier before, about 1 hour before admitted to the hospital, the patient reported that he was fixing his mobile phone at home when its battery exploded and hit his eyes. He complained of moderate periorbital pain and a sudden decreased of vision on both eyes after the explosions. He also felt difficult to open his eyes and sensation of a foreign body. Another complaint was denied. History of blurred vision was denied. He hasn't put any medication on his eyes.

On physical examination showed burns of the upper eyelid and eyelashes on the left eye and periorbital edema on both eyes. His unaided visual acuity was 6/12 on the right eye and 6/15 on the left eye. His extraocular movements were intact, pupils were 3 mm equal round and reactive. Slit-lamp examination revealed

Figure 1a. Fluorescein staining on the right eye.

Figure 1b. Fluorescein staining on the left eye.

no limbus ischemic and sclera appeared intact. His conjunctiva was found mixed type of injection and chemosis, fluorescein staining showed corneal abrasion bilaterally (Figure 1a and 1b). Anterior chamber and lens on both eyes were within normal limit. Digital palpation approximated normal bilateral IOP.

He was diagnosed with bilateral thermal ocular injury with corneal abrasion. As initial treatment, the patient's eyes were irrigated bilaterally with 500 ml normal saline for each eye. A topical anesthetic was given before the irrigation and cycloplegic drops were given right before the patient went home. He was discharged with antibiotic-steroid combination eyedrop every four hours, artificial tears every four hours, mefenamic acid every eight hours, oral ciprofloxacin every twelve hours, and oral vitamin C every twelve hours. He was advised to have a follow-up visit to an ophthalmologist within 72 hours. The patient had no adverse event and had a good prognosis.

DISCUSSION

This case is reported with patient permission. In this case, the patient complained of burns on both eyes after being exposed to a mobile phone battery explosion. On examination, we found a first-degree burn wound on the palpebra bilaterally, accompanied by edema, and burnt lashes on the left eye. According to a study by Merle et all, the eyelashes and lids are mainly affected if the burn is caused by a flame because of the speed of the protective blink response.[7] The inflammation on the eye can also cause the appearance of blepharospasm so the patient complaint difficult to open his eyes. The patient also experienced foreign body sensations and blurred vision. Foreign body sensation could be contributed by the debris left inside the eyes and the corneal epithelial defect. In addition, the corneal epithelial defect can cause a sudden decreased in vision.[2]

As initial treatment, both eyes were irrigated with 500 ml of ringer lactate each eye. A topical anesthetic drop was applied before the irrigation to reduce the pain. Immediate irrigation is important after both chemical and thermal burns. In thermal burn, irrigation is needed to stop the burning process by decreasing the temperature of the ocular surface and also helps clean debris and inflammatory substances on the ocular surface.[3,6,8]

The treatment options for superficial lesions caused by thermal burns include a combination of local antibiotics, artificial tears, and sometimes cycloplegia.[7] In this case, the patient was discharged and given steroid-antibiotic combination eye drops and artificial tears. Topical antibiotics are prescribed to reduce the risk of secondary bacterial infection which is increased due to the corneal abrasion and the presence of foreign materials in the eye surface.[7,9] Artificial tears are needed to lubricate the eyes in addition to comfort the eye. Although not commonly used, the topical steroid was considered to reduce inflammation and relieve pain, redness, or irritation.[10] A systematic review by Calder et al, shows that topical use of NSAIDs can relieve painful corneal abrasions in patients with the following diseases and help restore normal activities more quickly without delaying the cure rate or obvious side effects.[10] Cycloplegic is given in the emergency department to reduce the pain by relieving the ciliary muscle spasms.[7]

We also gave systemic antibiotics, analgesics, and vitamin C to the patient. First-degree burns found on the patient's left palpebra were our consideration on giving systemic antibiotics which aimed at preventing the secondary infections in the periorbita area. Analgesics are given to reduce pain, in addition, to provide comfort to the patient. Vitamin C administration is believed to accelerate the process of corneal re-epithelialization. A study by Chen et all shows there is evidence of the therapeutic benefits of ascorbic acid on the repair of corneal epithelial wounds.[11]

This case has a good prognosis. Most corneal abrasions heal within 48–72 hours, but sometimes it can take longer which is associated with complications such as secondary bacterial infection.[9] Thus, a visit to an ophthalmologist within 72 hours is advised for the patient as well as routine follow-up.

CONCLUSION

The initial evaluation of corneal burns requires assessment of visual acuity, injury of the ocular surface, extraocular movement, and intraocular pressure. Immediate irrigation is important after chemical or thermal burns. The treatment options for superficial lesions caused by thermal burns include a combination of local antibiotics, instillation of artificial tears, and sometimes cycloplegia. Emergency department treatment should be carried out under ophthalmology consultation, as the patients need frequent follow-up. Appropriate management of therapy can save the patient's vision.

FUNDING

The authors received no financial support for this article.

CONFLICT OF INTEREST

There was no conflict of interest in this article.

AUTHOR CONTRIBUTION

Each author contributed equally to this article.

REFERENCE

1. Mashige K. Chemical and thermal ocular burns: a review of causes, clinical features and management protocol. S Afr Fam Pract. 2016; 58(1): 1–4. DOI: 10.1080/20786190.2015.1085221
2. Merle H, Gérard M, Schrage N. Brûlures oculaires [Ocular burns]. J Fr Ophtalmol. 2008 Sep;31(7):723-34.
3. Sarabahi S, Kanchana K. Management of ocular and periocular burns. Indian J Burns 2014;22:22-32.
4. Pradana, P.A.S., Yuliawati, P., Djelantik, A.A.A.S., Manuaba, I.B.P., Triningrat, A.A.M.P., Utari, N.M.L. 2017. Karakteristik Pasien Trauma Okuli Di Rsup Sanglah Denpasar Pada Bulan Juli 2011–Februari 2015. Medicina 48(3): 174-180. DOI:10.15562/medi.v48i3.148
5. Bates A, Zanaboni A. Ocular Burns. [Updated 2020 Aug 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459221/
6. Kuckelkorn R, Schrage N, Keller G, Redbrake C. Emergency treatment of chemical and thermal eye burns. Acta Ophthalmol Scand. 2002; 80(1): 4–10
7. Fish R, Davidson RS. Management of ocular thermal and chemical injuries, including amniotic membrane therapy. Curr Opin Ophthalmol. 2010 Jul;21(4):317-21.
8. Friedstat J, Brown DA, Levi B. Chemical, Electrical, and Radiation Injuries. Clin Plast Surg. 2017 Jul;44(3):657-669.
9. Shahid SM, Harrison N. Corneal abrasion: assessment and management. InnovAiT. 2013;6(9):551-554. DOI:10.1177/1755738012467981
10. Calder, L. A., Balasubramanian, S., & Fergusson, D. (2005). Topical nonsteroidal anti-inflammatory drugs for corneal abrasions: meta-analysis of randomized trials. Academic Emergency Medicine, 12(5): 467–473. DOI: 10.1197/j.aem.2004.10.026
11. Chen, J., Lan, J., Liu, D., Et Al. Ascorbic Acid Promotes The Stemness Of Corneal Epithelial Stem/Progenitor Cells And Accelerates Epithelial Wound Healing In The Cornea. *Stem Cells Translational Medicine*. 2017;6:1356–1365