



## Bandage Contact Lens for Ultraviolet Light Photo keratitis

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### ABSTRACT

*Subject: To compare usage of bandage contact lens (BCL) and eye patching on treatment of patient's signs and symptoms with ultraviolet (UV) light exposure photo keratitis. Method: This prospective study included 32 patients with bilateral UV photo keratitis, due to welder's flash with equal severity. After primary evaluation BCL is placed for one eye and patching is done for another one. Reexamination performed after 12 to 24 hours and severity of pain, Superficial Punctate Keratopathy (SPK) and duration of symptom improvement compared in both eyes. Results: Our findings revealed that SPK and duration of improvement were not different statistically significant but were more satisfied and comfortable with BCL. Conclusion: According to this study, BCL can use in patients with photo keratitis instead of eye patching.*

**Keywords:** Contact Lens, Ultraviolet Light, Superficial Punctate Keratopathy

### INTRODUCTION

UV Radiation includes electromagnetic waves of 100-400 nm wave length [1]. This radiation contains more energy than infrared and visible light [2]. Also it has higher potential in order to tissue destruction. As a matter of fact we can divide it into 3 ranges of wavelength; 315-400 nm is called UVA, 280-315 nm UVB, and 100-280nm is UVC [3]. As exposed to UV, eyes absorbed each individual wave at different tissue levels [4]; waves with lower wave length are more biologically active and are mostly absorbed in cornea. On the other hand larger length waves will diffuse across inner parts of eye including lens and retina. Generally cornea absorbs waves lower than 300 nm while the lens absorbs lower than 400 nm. Retina and uvea absorb wave length of 400-1400 nm [5].

Acute contact with UVB and UVC induces painful superficial punctate keratopathy (SPK) that known as photo keratitis. This phenomenon appears 6 hours later than first contact and will last till 24 hours [6]. Symptoms of photo keratitis will initiate with loosing or destruction of epithelial cells [7]. In fact these in turn lead in to a feeling like sands in eyes with severe photophobia and tearing; the following result is blurring of vision due to corneal edema. More radiation of UV will cause corneal exfoliation.

Clinical signs of photo keratitis includes conjunctival chemosis, corneal staining and corneal edema [6]. Suprathreshold contact with UV can be created by natural and artificial mechanisms. Photo keratitis arising from natural UV radiation is considered as "Snow-Blindness" which may cause by skiing, mountain-climbing or long stay at beach [8]. Artificial UV-radiation source contains welding flash; even instantaneous contact with UVB and UVC while welding can lead to photo keratitis [8]. The treatment options are closing eyes in order to decrease eyelid movement, local antibiotics, topical cycloplegics, and oral analgesics in severe cases [9]. We decide to compare usage of bandage contact lens (BCL) and eye patching on treatment of patient's signs and symptoms with ultraviolet (UV) light exposure photo keratitis.

## MATERIALS AND METHODS

All of patients with UV photo keratitis arising from having contact with UV radiation in welding 12 hours before referral, these were picked in order to our study. The inclusion criteria of the study were negative past ocular history, such as trauma, keratitis or ulcer, noninfectious discharge, non-foreign body at the Surface of cornea, equal severity of symptoms in eyes also patient's own willing to participate in this project. The patient supposed to have necessitous ability in order to follow up later. In the case of withdrawal of Bandage Contact Lens (BCL) before 12 hours and intolerance of BCL also avoiding from referral afterwards done by patient, he would be put aside from study.

35 cases referring to ophthalmology emergency because of have a contact with UV- radiation while welding involving eyes simultaneously were selected to participation. After history taking and visual acuity, the examination performed by slit lamp device. Patients were evaluated on the base of clinical symptoms (pain severity according to the scale of 1-10, the status of conjunctiva, cornea, anterior chamber, iris and lens. Also after staining the cornea with fluorescein paper, intensity of SPK was checked. For each individual cycloplegic eye drop (Homatropin 2%) were trickled in both eyes; then accidentally for one eye patch and for another eye Bandage Contact Lens (BCL) were embedded. Next examination in order to reassessment and BCL removing was done 12 hours later. In rechecking, BCL was removed and after that the patient was asked about the pain severity in eyes after embedded, duration of recovery and their degree of satisfaction about the process also the intensity of SPK in both eyes was checked and he was evaluate according to healing and also probable complications from BCL .

## RESULTS

35 cases of bilateral photo keratitis were enrolled in present study. All of them were male. The mean age of patients were 37.8 years. Three patients was excluded from study due BCL intolerance. So final analysis was performed on 32 cases. Average pain severity in eyes on the scale of 0-10 at the time of visiting in ophthalmology emergency room was 8.25 and this scale was equal in both eyes of patients. The average time between UV exposure and eye examination in emergency room was 7.19 hours. SPK intensity was equal in both eyes at the time of referral. After treatment between the amount of SPK intensity in the patient's eye with patching and his eye with BCL, there was no statistically significant difference ( $p=0.576$ ).

The average recovery time for recovery duration mean to be recovered from symptoms for the eyes treated with patching and BCL was 2.4 h and 2.1 h, respectively and their difference was not significant ( $p=0.27$ ).

27 patients (84%) had more satisfaction and convenience with BCL than patching. No any complication occurred during the study.

## DISCUSSION

Photo keratitis resulting from contact with UV- Radiation is one of the cases which is complete common is ophthalmology emergency. This event is specially seen among welding industry labors. Pain, photophobia and foreign body sensation in eyes are obvious symptoms that patient referring to emergency ward.

UV-photo keratitis in most cases was limited and after 24 hours will be completely vanished. However the intensity of symptoms was really irritating and will make the medical intervention inevitable. Generally patching eyes which cover both sides of eyes and utilizing oral analgesics could be used in the process of treatment. However because of being bilateral in most cases, patching eyes in two-sided way will discomfort patient's daily activity. In this approach it was proved using BCL to reduce symptoms resulting from UV keratitis as like as eye patching can be effective, on the other hand because of not requiring to bind- up eyes in the process of applying BCL, the percentage of patient's satisfaction from treatment will go in higher rank and he can gain the ability to do daily activities. In this

study, Homatropin drop by the amount of single- dose for each individual was trickled in both eyes to reduce cyclospasm and patients pain by using its cyclopegic effect.

Early symptoms of photo keratitis will be appeared because of epithelial cells destruction or loss. In turn of that, it cause the foreign body sensation in eyes, photophobia and tearing. Epithelial cell destruction lead to exposure of neural end that this cause of patient's pain. BCL can provide corneal dressing and avoid contact of lids to corneal surface nerve.

Our findings revealed that SPK and duration of improvement were not different statistically significant but were more satisfied and comfortable and BCL can use in patients with photo keratitis instead of eye patching.

#### REFERENCES

- [1] Yam J. C. S, Kwok A.K.H .Ultraviolet light and ocular diseases. *Int. Ophthalmol.* 2014; 34: 383-400.
- [2] Golu A, Gheorghisor I, Balasoiu A. T,et al. The effect of ultraviolet radiation on the cornea – experimental study. *Rom J Morphol Embryol.* 2013; 54(4): 1115–1120.
- [3] World Health Organization. Global solar UV index: a practical guide. World Health Organization, Geneva. 2002.
- [4] McCarty CA, Taylor HR. A review of the epidemiologic evidence linking ultraviolet radiation and cataracts. *Dev Ophthalmol.* 2002; 35:21-31.
- [5] Young S, Sands J. Sun and the eye: prevention and detection of light-induced disease. *Clin Dermatol.* 1998; 16(4): 477-485.
- [6] Cullen AP. Photokeratitis and other phototoxic effects on the cornea and conjunctiva. *Int J Toxicol.* 2002; 21(6): 455-464.
- [7] Podskochoy A, Gan L, Fagerholm P. Apoptosis in UV-exposed rabbit corneas. *Cornea.* 2000; 19(1): 99-103.
- [8] Oliva MS, Taylor H. Ultraviolet radiation and the eye. *Int Ophthalmol Clin.* 2005; 45(1): 1–17.
- [9] Weisenthal RW, Afshari NA, Bouchard CS, et al. External disease and cornea. In: Skuta GL, Cantor LB, Cioffi GA. *Basic and Clinical Science Course. American Academy of Ophthalmology;* 2013-2014; P. 338.