Case Report

Case Report: Accidental Ocular Blast Injury To A Farmer's Eye by Gandhak Potash

Nimisha Nagpal, Pawan Prasher, Inderjit Kaur

Department of Ophthalmology, Sri Guru Ram Das Institute of Medical Sciences (SGRD) Amritsar, Punjab, India.

Abstract

Ocular exposure to chemical explosions constitute true emergency that can be associated with injuries leading to significant visual morbidities. Herein, we report a case of bilateral eye injury in a 54 year old male farmer due to a chemical explosion while preparing a Gandhak Potash mixture. He presented with multiple charred wounds around his face and embedded particulate matter over the eyelids, conjunctiva and cornea. He underwent superficial debridement of the particulate matter along with conservative management using topical antibiotics, cycloplegics and steroids with good visual outcome. Gandhak potash explosions can be potentially visually devastating. Ophthalmologists, especially those working in agricultural surroundings, should be aware of this mode of injury. Good visual outcome is possible with urgent, appropriate medical intervention.

Delhi J Ophthalmol 2021;32; 58-61; Doi http://dx.doi.org/10.7869/djo.690

Keywords : *Trauma, Gandhak, Chemical, Ocular, Injury*

Introduction

Eye trauma constitutes 7% of all bodily injuries and 10%–15% of all eye diseases.[1] It has been estimated that 90% of all ocular injuries are preventable.[2] The reported incidence of ocular chemical injuries in developing countries is approximately 1.25% to 4.4%.[3]

Chemical exposure is a potentially blinding ocular injury and constitutes a true ocular emergency requiring immediate assessment and initiation of treatment. The majority of victims are young and exposure occurs at home or workplace.[4] Gandhak Potash mixture is usually used by farmers in an improvised iron gun to produce a sound blast that deters birds, pests, and wildlife animals from damaging their harvest.[5]

This consists of a chemical reaction along with a thermal and sound blast which if held close by can cause significant primary and secondary injuries. Herein, we present an unusual case of bilateral ocular injuries secondary to the explosion of this mixture. To the best of our knowledge, this mechanism of ocular injuries has not been previously reported in ophthalmology literature.

Case Report

A 54-year-old male reported to our outpatient department with a history of pain, photophobia, and sudden onset of decreased vision after a blast injury with Gandhak and Potash to produce a minor sound blast. This was a routine activity in their agricultural practice as it helped ward off wild animals and protect their harvest. This time, for some reason that blast happened prematurely leading to burn injuries involving his face and eyes. Examination revealed multiple charred wounds on the face with embedded particulate matter on the swollen eyelids.

Slit-lamp examination showed conjunctival hyperemia and subconjunctival hemorrhage bilaterally with diffuse multiple yellowish-white granular foreign bodies embedded in the superficial and deep layers of the cornea along with surrounding corneal edema. In the left eye (LE), a clump of granular material had perforated through the cornea paracentrally and deposited on the anterior surface of the iris (Figure 1A, 1B).

There was a marked anterior chamber reaction in both eyes. Lenses were unaffected and visual acuity was hand motions close to face with intraocular pressures of 11 and 12 mm of Hg bilaterally. Fluorescein staining revealed a large epithelial defect in the right eye (RE) and multiple focal epithelial erosions in the LE (Figure 1C, 1D).

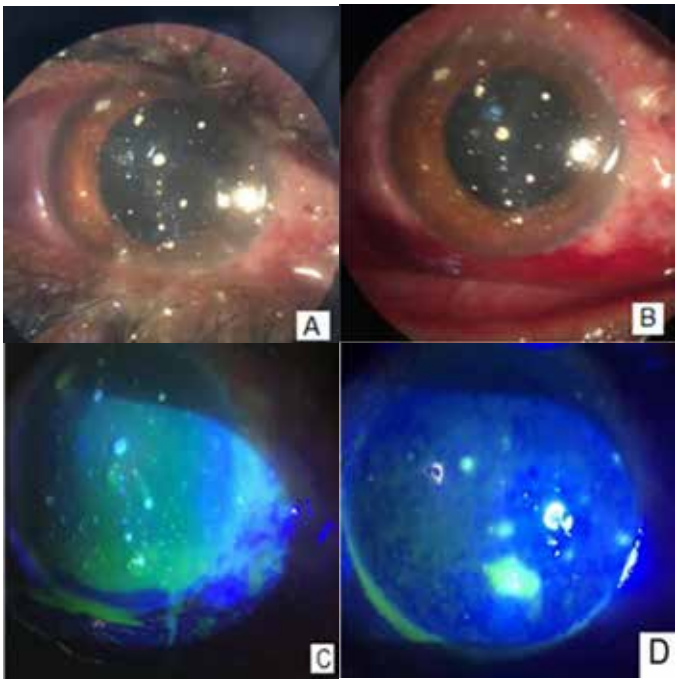

Figure 1: *Slit lamp picture at presentation (A) showing multiple granular deposits within the corneal epithelium and stroma along with surrounding conjunctiva along with conjunctival congestion and matted eyelashes in the right eye (B) left eye showing sub conjunctival haemorrhage (C) diffuse epithelial defect in cobalt blue filter after Fluorescein staining in the right eye and (D) multiple punctuate staining in the left eye.*

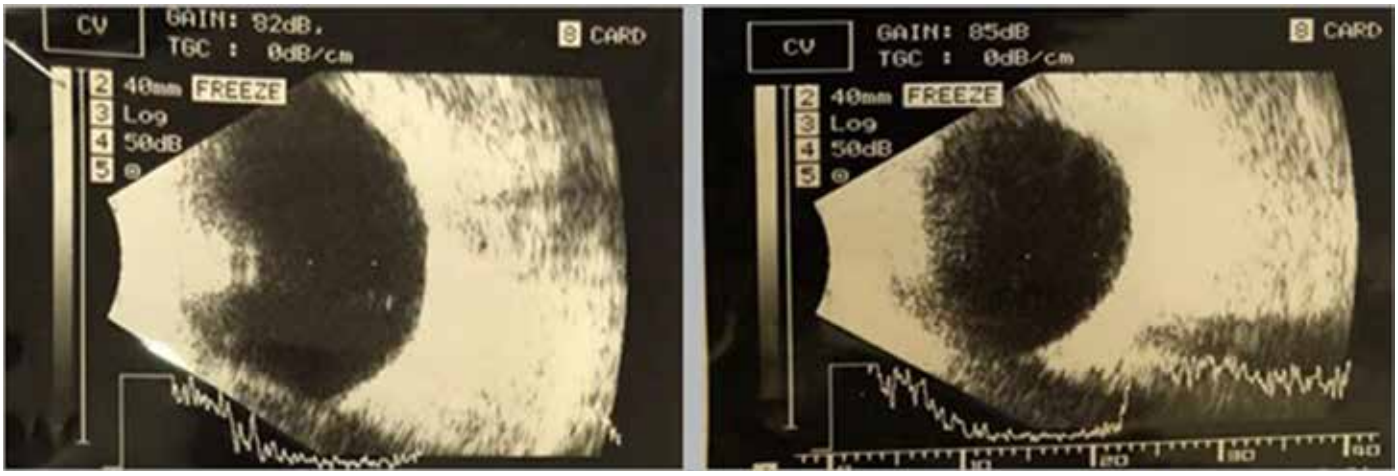

Figure 2: *B-scan shows both eyes showed attached retinas with no evidence of any foreign body in the vitreous cavity.*

Seidel test was negative. The red glow was visible but fundus details could not be visualized due to reduced media clarity. B scan ultrasonography of the posterior segment was normal (Figure 2).

The patient was managed conservatively. After vigorous saline wash, superficial debridement was done using 26 G needle and particulate matter was removed from the corneal stroma taking care not to go too close to Descemet's membrane. The patient was started on topical moxifloxacin 0.5% four times a day, prednisolone 0.5% four times a day, homatropine 2% three times a day hydroxypropyl methyl cellulose 0.3% four times a day, along with oral doxycycline 100 mg twice daily and tablet vitamin C 500 mg three times a day.

Patient was followed up on day 1, 3, 7, 14, 30, 2 months and 3 months. In the first few days, the LE showed worsening of inflammation with the occurrence of hypopyon and an increase in IOP, which was managed by adding topical brimonidine and timolol combination ED twice daily (Figure 3A, 3B).

The hypopyon appeared to be sterile in nature and gradually resolved over a period of 2 weeks with no evidence of corneal infiltrate (Figure 3C, 3D).

On follow up after 3 months, scattered superficial corneal opacities were seen in both eyes with no epithelial defect or anterior chamber reaction. The best-corrected visual acuity was 20/20 in RE and 20/40 in LE and IOP were 11 mm Hg in both eyes (Figure 3E, 3F).

Discussion

We report a unique case of ocular injury with Gandhak Potash mixture which comprises of sulfur powder and potassium chlorate powder respectively. Potassium chlorate (KClO3) reacts vigorously and spontaneously explodes when mixed with combustible materials. The sulfur powder is available over-the-counter containing different quantities of sulphuric acids which needs to be handled with utmost care. Potassium chlorate reacts with sulfuric acid (2 KClO3 + H2SO4 →2 HClO3 + K2SO4) to form a highly reactive solution of chloric acid and potassium sulfate which is a kind of low order explosive (Figure 4A, 4B).[6]

The injury caused by this chemical is a combination of chemical and thermal injury closely resembling blast injuries with firecrackers[7] causing damage to the ocular surface eventually resulting in poor visual outcomes.

To the best of our knowledge, only one case of Gandhak Potash explosion has been previously reported in India which was eventually fatal for the patient probably due to the higher quantity of mixture resulting in a bigger explosion. In our case, the patient was fortunate as the quantity was limited leading to predominantly superficially injuries.

The mainstays of primary management are immediate decontamination and copious irrigation. Our management was along the established guidelines[8] which aimed at providing symptomatic relief, reducing the inflammation and prevent any visually devastating complications in this patient.

Ocular chemical burns can have profound psychological, economic, and social consequences for the patient. For this reason, a proactive approach to prevention becomes the most effective approach to prevent ocular chemical injuries from occurring.

Purchase and use of such combustible materials over-the-counter should be regulated, mass health education and awareness should be provided to prevent delay in management and adoption of safety equipment, like protective eyeglasses, should be focused in the hope for the preservation of vision.

Ophthalmologists, especially those working around such agricultural communities, should be aware of this unusual entity to best manage such cases of ocular injuries.

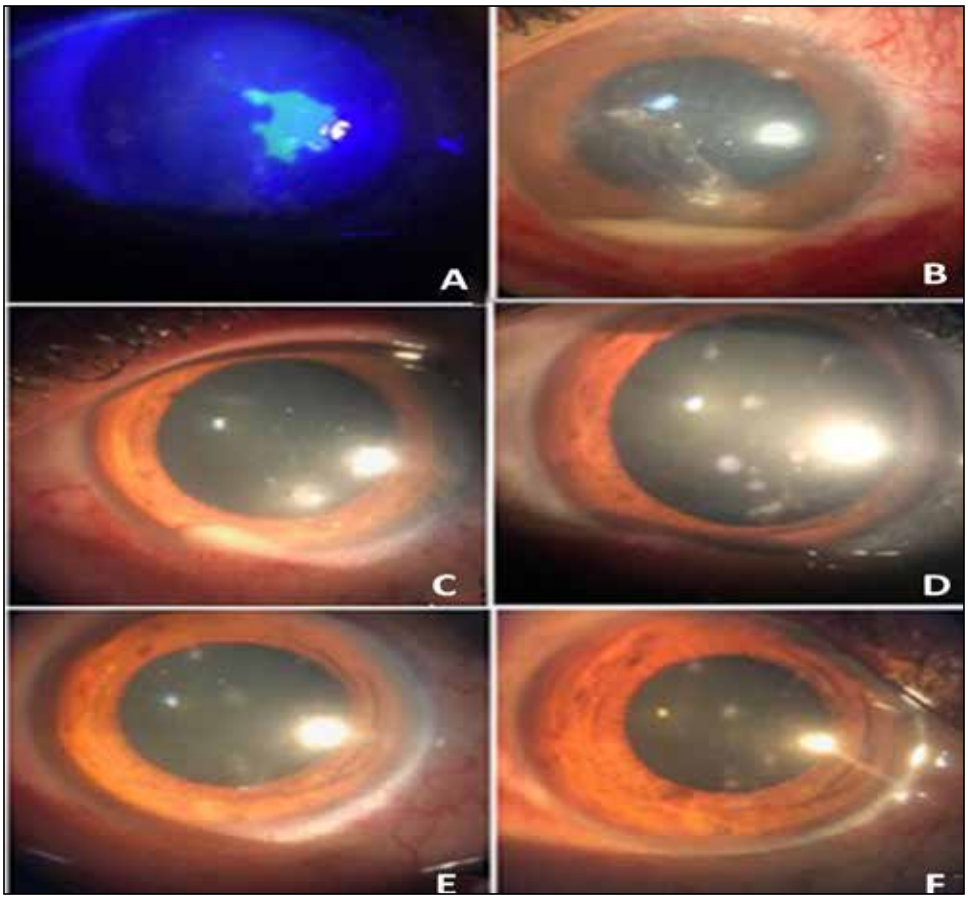

Figure 3: *Slit lamp biomicroscopy pictures on consecutive visits showing (A) minimal size of epithelial defect left in RE post treatment and (B) Resolving anterior chamber hypopyon with corneal opacities and conjunctival congestion on day 14 (C,D) Reducing corneal opacities in number and size with resolving anterior chamber reaction on 1 month follow up of right and left eye respectively (E,F) Showing resolved corneal opacities and quiet anterior chamber on 3 month follow up*

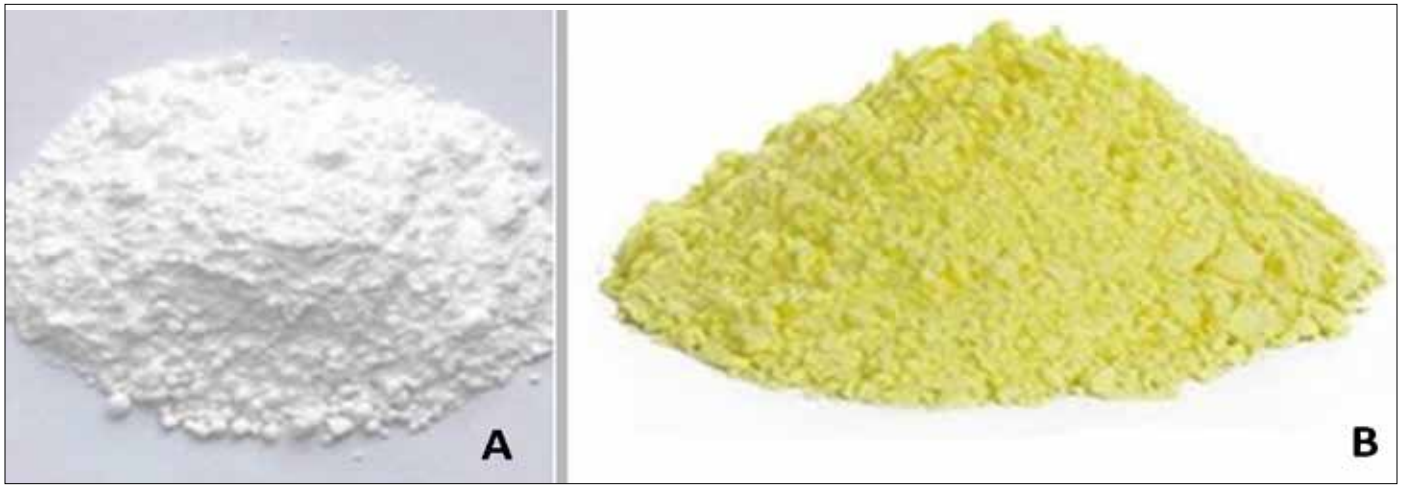

Figure 4 *: (A) Demonstrating Potash powder (KClO3) (B) Sulphur powder which is readily available over the counter.*

References

1. Acar U, Tok OY, Acar DE et al. A new ocular trauma score in pediatric penetrating eye injuries. Eye (Lond) 2011; 25: 370-4.
2. Hutton WL, Fuller DG. Factors influencing final visual results in severely injured eyes. Am J Ophthalmol 1984; 97: 715-22.
3. Xie Y, Tan Y, Tang S. Epidemiology of 377 patients with chemical burns in Guangdong province. Burns 2004; 30: 569-72.
4. Saini JS, Sharma A. Ocular chemical burns-clinical and demographic profile. Burns 1993; 19: 67-9.
5. Giri SK, Sharma L, Kumar V et al. Accidental Blast of an Improvised Bird Scarer Gun: A Case Report. Int. J. Curr. Adv. Res 2018; 7: 9212-4.
6. Pradyot Patnaik. Handbook of Inorganic Chemicals. McGraw-Hill, 2002.
7. Reddy KSN, Murty OP. The essentials of Forensic Medicine and Toxicology. 33rded. New Delhi: Jaypee Brothers Medical Publishers 2017: 214.
8. Spector J, Fernandez WG. Chemical, Thermal, and Biological Ocular Exposures. Emergency Medicine Clinics of North America 2008; 26: 125-36.

Cite This Article as: Nimisha Nagpal, Pawan Prasher, Inderjit Kaur. Case Report: Accidental Ocular Blast Injury To A Farmer's Eye by Gandhak Potash . Delhi J Ophthalmol 2021;32 (1), 58 - 61.

Acknowledgments: Nil

Conflict of interest: None declared

Source of Funding: None

Date of Submission: 06 Jul 2020
Date of Acceptance: 02 Apr 2021

Address for correspondence

Pawan Prasher
Professor, Department. of Ophthalmology
Sri Guru Ram Das Institute of Medical Sciences and Research, Vallah, Amritsar, Punjab, India,
E-mail: pawanprasher@yahoo.com

Quick Response Code