

Spectrum of firecracker eye trauma in Batu Pahat

Muhammat Asyari **Ismail**, Shet Yee **Choy**, Jee Yao **Loke**, Pey Yih **Ng**, Krishnalatha **Buandasan**

¹Department of Ophthalmology, Hospital Sultanah Nora Ismail, Batu Pahat, Johor, Malaysia

Abstract

Background: Fireworks are small explosive devices used primarily to create a large amount of noise, usually for celebration or entertainment, especially during the holidays. Fireworks can cause chemical trauma as well as explosive trauma to the ocular tissue and orbit.

Case series: We report the spectrum of eye injuries in a district hospital on the Hari Raya Festival in 2022. In just 4 days during the Hari Raya Festival, a total of 6 patients were referred to us. We observed a variety of ocular injuries, such as hyphaema, angle recession, traumatic cataract, corneal abrasion, commotio retinae, and even traumatic optic neuropathy. Some patients were admitted for closer monitoring and intravenous administration of methylprednisolone, as is the case with patients with traumatic optic neuropathy. Some of them are treated only as outpatients.

Conclusion: Fireworks are dangerous and can cause severe blast injuries to the eyes. Early and prompt treatment is critical. However, primary prevention is also of utmost importance.

Keywords: corneal abrasion, firecracker, hyphaema, traumatic cataract, traumatic optic neuropathy

Spektrum kecederaan mata akibat mercun di Batu Pahat

Abstrak

Latarbelakang: Mercun ialah alat letupan kecil yang digunakan terutamanya untuk menghasilkan bunyi kuat, biasanya untuk perayaan atau hiburan, terutamanya semasa cuti. Mercun boleh menyebabkan kecederaan kimia serta kecederaan fizikal kepada mata dan orbit.

Siri kes: Kami melaporkan pelbagai kecederaan mata yang dilaporkan di sebuah hospital daerah semasa perayaan Hari Raya pada tahun 2022. Selama hanya empat hari semasa musim perayaan, sebanyak enam pesakit dirujuk kepada kami. Kami merawat pelbagai kecederaan mata, termasuk pendarahan di bahagian dalam mata, sudut mata merekah, katarak traumatik, pencilaran kornea, retina bengkak, dan juga kes-kes yang teruk seperti kecederaan traumatik kepada saraf optik. Tahap parah kecederaan sangat berbeza dalam setiap kes. Bagi sebilangan pesakit yang agak teruk, kami memasukkan mereka ke dalam ward untuk pemantauan yang lebih rapi. Dalam kes kecederaan kepada saraf optik traumatik, rawatan metilprednisolon intravena dimulakan. Bagaimanapun, untuk pesakit yang lain, mereka hanya memerlukan rawatan pesakit luar kerana kecederaan ringan.

Kesimpulan: Mercun adalah merbahaya dan berpotensi menyebabkan kecederaan parah pada mata. Rawatan awal dan segera adalah kritikal. Walau bagaimanapun, pencegahan utama juga sangat penting.

Kata kunci: bunga api, hifema, las kornea, mercun, traumatik katarak, traumatik saraf optik

Introduction

Fireworks are small explosive devices used primarily to create a large amount of noise, usually for celebration or entertainment, especially during the holidays. Fireworks can cause chemical trauma as well as explosive trauma to the eye tissue and orbit.

Table 1. Visual outcomes in 7 eyes of the 6 cases

Vision	At presentation (number of eyes)	Latest review (number of eyes)
> 6/12	3	4
6/12 to 6/60	2	0
6/60 to CF	0	1
HM	1	1
LP	1	1
NLP	0	0

CF: counting fingers; HM: hand movement; LP: light perception; NLP: no light perception

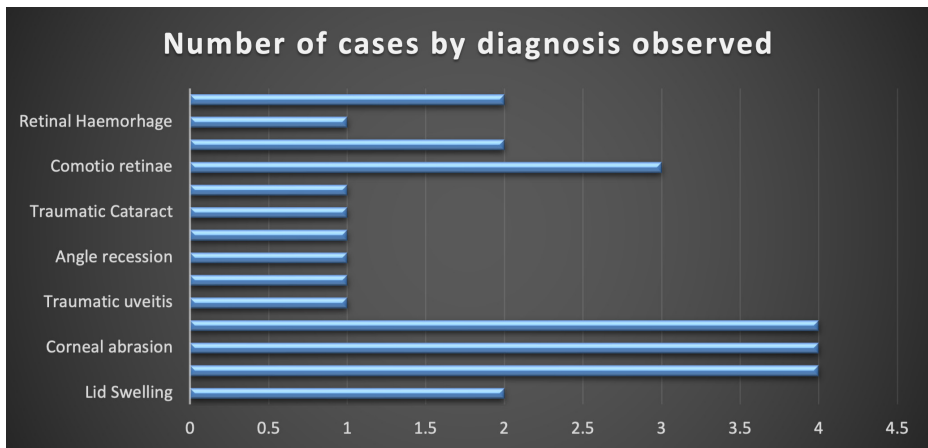


Fig. 1. Number of cases by observed diagnosis.

Case series

We report a series of 6 ocular injuries caused by fireworks in Batu Pahat during the Hari Raya Festival in 2022. The severity of the patients was classified using the Ocular Trauma Score (OTS). Visual acuity (VA) at presentation varied from 6/6 to light perception (LP) (Table 1 and Fig. 1). While the majority of cases were treated as outpatients, 2 cases of traumatic optic neuropathy were admitted for intravenous methylprednisolone treatment.

Case 1

A 23-year-old male with no known medical illness allegedly was hit in both eyes by fireworks. After the trauma, he had bilateral ocular pain and blurred vision in the left eye. His vision at presentation was 6/6 in the right eye and 6/9 in the left eye. The patient suffered bilateral corneal abrasions and traumatic uveitis. He sustained commotio retinae in the left eye and Berlin oedema. The patient was treated with dexamethasone and chloramphenicol eye drops. One month after the trauma, all injuries had resolved, and the best-corrected visual acuity (BCVA) was 6/6 for both eyes.

Case 2

A 4-year-old boy presented with firecracker injury to his right eye. He was a pillion rider riding a motorbike with his father when a piece of exploded firecracker fell from the sky and hit his right eye. Visual acuity at presentation was hand movement and relative afferent pupillary defect (RAPD) was positive. The patient sustained traumatic optic neuropathy (TON), hyphaema, extensive Berlin's oedema, commotio retinae, and preretinal and subretinal haemorrhage in the right eye. The patient was treated with high-dose intravenous methylprednisolone for 3 days. However, there was not much visual improvement after completion of treatment. One month post-trauma, BCVA was counting fingers (CF).

Case 3

A 29-year-old man sustained an injury to his left eye while lighting a firecracker that suddenly exploded near his face. VA at presentation was light perception (PL) and RAPD was positive. He suffered eyelid swelling, corneal abrasion, hyphaema, phacodonesis with iridodialysis, and TON in the left eye (Figs. 2 and 3). The patient was treated with high-dose intravenous methylprednisolone for 3 days. However, there was no significant improvement in vision after completion of treatment. Visual acuity remained unchanged (LP).

Case 4

A 31-year-old Malay man alleged firecracker blast injury in his right eye. After the trauma, he suffered from pain, lacrimation, and blurred vision in the right eye. The right eye tested negative for RAPD and VA was LP. The patient sustained conjunctival haemorrhage, corneal abrasion, periorbital hematoma, and dispersive hyphaema in the right eye (Figs. 4 and 5). After the hyphaema resolved, VA improved to 6/12. Examination revealed that the lens was subluxated and there was a traumatic cataract with an angle recession of more than 180°. The patient was treated with dexamethasone and chloramphenicol eye drops, cycloplegics, and preservative-free artificial tears. Intraocular pressure remained normal during treatment. At the seventh week after trauma, vision decreased to hand movement (HM) and examination revealed a mature cataract. The patient was scheduled for cataract surgery.



Fig. 2. Eyelid swelling with skin excoriation and corneal and conjunctival abrasions seen in Case 3.

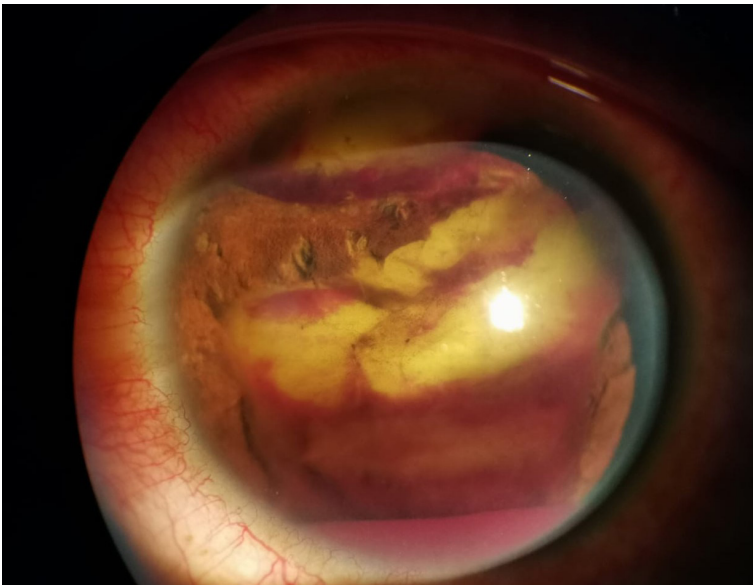


Fig. 3. Traumatic cataract, hyphaema, and iridodialysis seen in Case 3.

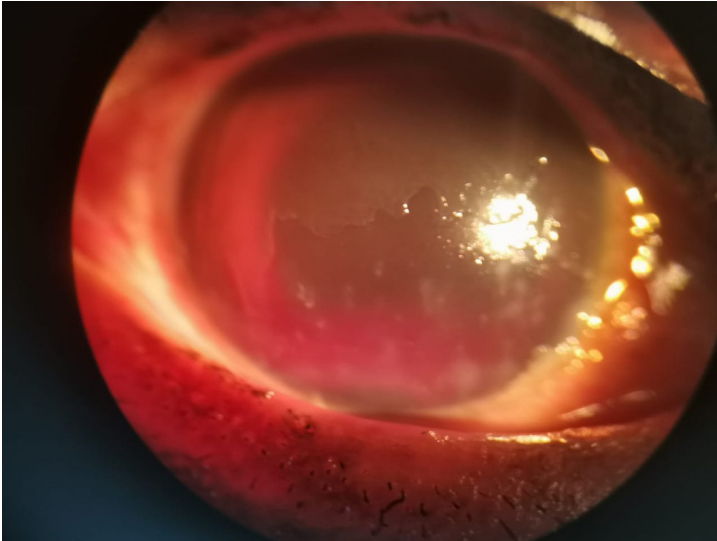


Fig. 4. Left eye traumatic hyphaema seen in Case 4.



Fig. 5. Traumatic cataract seen in Case 4.

Case 5

A 20-year-old man sustained a firecracker injury to his left eye after his friend threw a firecracker at his face. Following the trauma, he experienced pain in his left eye but denied any blurriness of vision. Bilateral VA was measured at 6/9. There was a periorbital haematoma in the left eye with minimal skin excoriation and the conjunctiva was injected with chemosis. Fundus examination showed a normal optic disc, no commotio retinae, no vitreous haemorrhage, and no retinal tear. The patient was treated with chloramphenicol eye drops. A review 1 week post-trauma revealed improving periorbital haematoma, and all other ocular examinations were normal.

Case 6

A 40-year-old gentleman suffered a firecracker blast injury to his left eye. The incident occurred shortly after he ignited a firecracker, causing the blast to impact his left eye. Upon presentation, VA was measured at 6/18, and RAPD was negative. The patient had sustained periorbital swelling, corneal abrasion, hyphaema, angle recession of less than 180°, traumatic cataract, and commotio retinae in his left eye. Treatment included the administration of dexamethasone eye drops, chloramphenicol eye drops, cycloplegics, and preservative-free artificial tears. One month after the trauma, there was noticeable improvement in his injuries, and BCVA had improved to 6/6.

Discussion

Firecracker-related ocular injuries are a significant concern, especially during festive seasons and celebrations where firecrackers are commonly used. These injuries can range from mild to severe and can lead to permanent visual impairment. The Malaysian government has banned recreational firecrackers since 1955 according to the Minor Offences Act of 1955. Individuals who are caught igniting fireworks illegally may be fined or imprisoned. Furthermore, firecrackers are considered explosive devices and governed under Section 4(2) of the Explosives Act of 1957, in which any person who is caught manufacturing, possessing, or importing them may be fined or imprisoned. However, all the cases in our series sustained ocular injuries from firecrackers obtained from illegal routes.

Our series includes a spectrum of firecracker-inflicted ocular injuries, which vary from mild corneal abrasion to permanent visual loss, as illustrated by the OTS. The following injuries are the most common: corneal abrasion, corneal burn, lid burn or laceration, corneoscleral laceration, hyphaema, vitreous haemorrhage, retinal haemorrhage, traumatic cataract, ruptured globe, iritis, iridodialysis, and choroidal rupture.¹⁻³

Our patients' injuries were graded according to the OTS. The OTS is a system used to predict the visual outcome of patients who have suffered ocular trauma. It is a tool that helps ophthalmologists and healthcare professionals assess the severity of an eye injury and provides a rough estimate of the potential visual outcome for the patient.⁴ The OTS considers various factors related to the eye injury, including:

1. Initial visual acuity: The patient's visual acuity at the time of the injury.
2. Ocular injury: The type of injury sustained by the eye, categorised as blunt or penetrating.
3. Presence of ruptured globe: Whether or not the globe (the eyeball) is ruptured.
4. Endophthalmitis: The presence of inflammation within the eye's internal structures.
5. Retinal detachment: Whether a retinal detachment has occurred.

Calculating the OTS is a straightforward process and holds significant importance for the injured individual, the attending ophthalmologist, and other public health experts concerned with eye injuries.

None of our patients were wearing protective eye gear while igniting the firecrackers. In a retrospective review by Kuhn *et al.* conducted in Alabama, most patients were bystanders and were not wearing any protective eye gear while playing with firecrackers. Protective eye gear is important for the ignitors and for the bystanders as protects from firecracker blast ocular injury.⁵

One paediatric patient from our series sustained TON with a visual outcome of LP. Visual loss in children is of great concern as it affects their learning capability and lifestyle, thus leading to significant psychological and physical burdens to both child and their caretakers.²

Conclusion

Firecrackers can cause serious ocular injuries. Early and prompt management is crucial but primary prevention is of utmost importance. Public education regarding the proper use of firecrackers and the devastating effects of firecracker inflicted ocular injuries may help in reducing significant morbidity.

Declarations

Informed consent for publication

The patients and their guardians provided informed consent for the publication of the clinical data and images contained in this case report.

Competing interests

None to declare

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None to declare.

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