

"Happy" New Year or Why You Should Stay away from Pyrotechnics: a Case Report of Firework-related Injury of Both Eyes

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Eye injuries are the leading cause of monocular visual impairment and blindness in the world. Worldwide, pyrotechnics are used to celebrate popular events such as holidays, national and cultural festivals. Firework-related injuries affect patients of all ages however, they have a higher prevalence in male adults and children. The incidence of these injuries is particularly high around New Year's celebrations. In this case report, we present a 25-year-old male patient who suffered ocular trauma to both eyes due to a firework explosion hitting his face on New Year's Eve. The patient arrived at the UMHAT St. George Eye Clinic shortly after midnight on January 1. He presented with bilateral penetrating injuries with prolapse of intraocular structures. Both eyes had a visual acuity of 0 /zero/ at the time of admission to the hospital. An imaging study was performed, which included a CT scan of the retrobulbar space and the brain. Among the findings were a fractured floor of the right orbit and its medial wall, and a prolapse of the lower oculomotor muscle into the homolateral maxillary sinus. The eyeballs were bilaterally deformed and asymmetric, metallic foreign bodies were also detected. A multidisciplinary team, including an ophthalmologist and a craniomaxillofacial surgeon, performed surgery on the patient. It is important to use pyrotechnics in a controlled environment, especially during celebrations where alcohol is consumed, which can slow down reactions. It is true that fireworks can be a pleasing sight for the eyes, but they can also cause fatal damage to them.

Keywords: *pyrotechnics, firework-related injury, bilateral ocular trauma*

Introduction

Monocular blindness is most commonly caused by eye injuries (1). About 19 million people worldwide suffer from monocular blindness and reduced visual acuity, caused by trauma (2), (3).

Approximately 3.5 people per 100,000 suffer monocular blindness as a result of trauma worldwide each year (4). Male adults and children are more likely to suffer fireworks-related eye injuries than females (5,6). Fireworks are a common way to celebrate holidays, national holidays, and cultural festivals across the globe. The incidence of these injuries is particularly high around New Year's celebrations (7). This case report illustrates ocular trauma caused by a firework explosion hitting the face of a male patient on New Year's Eve.

Clinical case

We present a clinical case report of a 25-year-old male who was admitted to UMHAT

St. George Eye Clinic shortly after midnight on January 1st with bilateral penetrating eye injuries and facial injuries sustained after getting hit by a firework explosion during a New Year's celebration. The examination of the eyeballs proved very challenging upon his admission due to the significant eyelid edema and hematoma. The visual acuity of both eyes was zero /0/

- lack of light perception. Slit-lamp examination revealed subconjunctival hemorrhage at 360 degrees and total hyphema. The manual examination of the eye pressure in both eyes was suggestive of low intraocular pressure. (**Fig. 1, 2**)

CT scan results showed that the inferior rectus muscle had prolapsed into the right maxillary sinus and the floor and medial wall of the right orbit were fractured. The optic nerves were bilaterally preserved in thickness and anatomical course. Moreover, foreign bodies were detected in the intrabulbar space of both eyes. (**Fig. 3**)



Figure 1. Right eye on admission



Figure 2. Left eye on admission

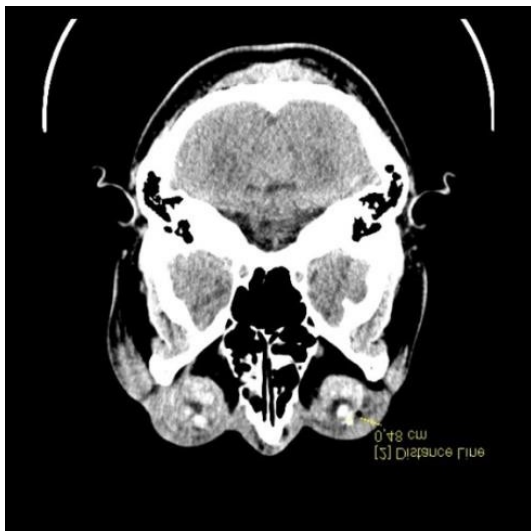


Figure 3. CT scan

B-scan examination revealed total vitreous hemorrhage in both eyes with no clear visualization of the retinal contours.

The operative treatment, performed under general anesthesia, required a multidisciplinary approach – the team included an ophthalmologist and a craniomaxillofacial surgeon. During surgery, the scleral tear in the right eye was observed to be behind the upper and lateral rectus muscle attachment points, protruding behind the equator and causing uveal, retinal, and vitreous prolapse. The scleral wounds were sutured with 7/0 Silk. The scleral wounds of the left eye started at the limbus and continued posteriorly – reaching behind the medial rectus muscle, which was delaminated and torn. Similarly to the right eye, uveal, retinal, and vitreous prolapse were also present. Limbal wounds were sutured with 10/0 Silk. The conjunctival wounds were adapted with 7/0 Vicryl. Vancomycin was applied intravitreally to both eyes. The eyelid wounds were adapted with 6/0 Silk. The lacerations on the tip of the nose and upper lip were sutured by a craniomaxillofacial surgeon (**Fig. 4**).



Figure 4. An intraoperative image of the left eye

The patient's visual acuity was still poor on his follow-up appointment

- twenty days after discharge. The patient did not attend any subsequent follow-up appointments (**Fig. 5**).

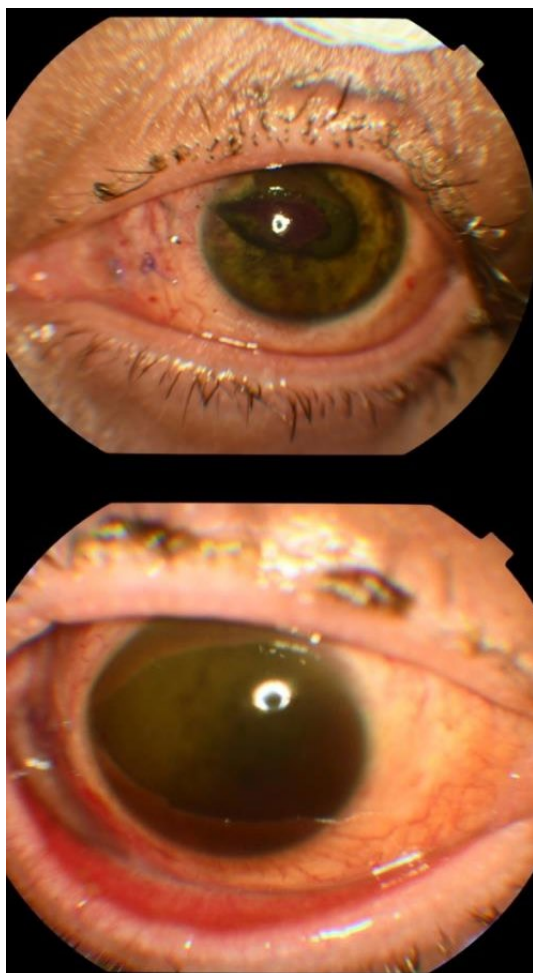


Figure 5. Postoperative images of the left and right eye

Discussion

Fireworks and other types of pyrotechnics are used in Bulgaria and around the world during various celebrations. Their use is especially widespread during New Year's celebrations (7, 8). Ocular trauma, particularly penetrating traumas, are the leading cause of monocular visual impairment and blindness worldwide (1). In various parts of the world, it has been found that during national celebrations and especially around

New Year, cases of eye injuries associated with pyrotechnics increase.

For example, in Switzerland, a study showed that the cases of patients with eye injuries related to fireworks had 2 (two) peaks. The first one is in January (around the New Year holidays) and the second is in August (during the Swiss National Holiday) when pyrotechnics are used the most (7). In the USA, similar results have been published – 85% of eye trauma cases related to fireworks are in the period around New Year's Day and Independence Day (8). Until 1996 the sale and use of pyrotechnics were banned in Ireland, and after the ban was lifted, the incidence of eye injuries associated with fireworks increased dramatically (9). In most cases, these injuries lead to severe vision loss or blindness, resulting in reduced quality of life. The focus should therefore be on prevention, such as banning the sale of pyrotechnics or providing special training for handling explosives. A similar restriction is in place in Sofia, Bulgaria – pyrotechnic products of categories F2 and F3 can only be used on New Year's Eve or after prior permission from the regional administration. It is believed that the incidence of firework-related injuries can be reduced by limiting the use of pyrotechnics and conducting educational campaigns on how to handle them.

Conclusion

Injuries caused by pyrotechnics can range from erosion of the corneal epithelium to perforation with loss of intraocular structures. Injuries with such genesis can be considered socially significant since they predominantly affect young people. Primary prevention must be emphasized to reduce the frequency of this type of trauma, which includes banning the sale and use of pyrotechnics in a controlled environment.

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