The Dark Side of Light: Clinical Management of Fire Cracker Related Globe Ruptures – Case Series

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ABSTRACT

Purpose: To analyse the clinical profile, surgical management, and visual outcomes of globe ruptures caused by firecracker-related ocular trauma in a tertiary care setting.
Methods: This prospective, hospital-based case series included 4 patients under 30 years of age who sustained firecracker-related globe injuries requiring surgical intervention. Data on patient demographics, mechanism of injury, ocular findings, imaging, surgical procedures, and outcomes were collected using a standardized trauma proforma. Injuries were classified according to the Birmingham Eye Trauma Terminology System (BETTS).[1]
Results: Of the 4 patients, 3 were male (75%) and one female (25%). 2 sustained injuries while handling firecrackers and 2 were bystanders. All patients presented with open-globe injuries. Primary globe repair was performed in all cases. Secondary interventions included phacoemulsification with intraocular lens (IOL) implantation, pars plana vitrectomy with intraocular foreign body (IOFB) removal. One patient developed post-traumatic endophthalmitis. All patients had poor initial visual acuity, 1 patient was lost to follow up, 2 patients vision improved to 6/60, 1 patient's vision improved to 6/12.
Conclusion: Firecracker-related globe ruptures pose a significant threat to vision, especially in young individuals. Despite prompt and skilled surgical intervention, outcomes are often limited by the severity of initial trauma.

Keywords: Firecracker injuries, globe rupture, ocular trauma, vitrectomy.

INTRODUCTION

Firecrackers are used for recreation and celebrations. However ocular firecracker injuries can result in permanent vision loss and irreparable ocular damage. We conducted this prospective study to note the pattern of clinical presentation , to analyse the effects of firecracker injuries and surgical management on final visual acuity at end of 3 months at a tertiary care hospital.

Take Home Message
Public awareness, use of protective eyewear, and regulatory control of firecrackers are critical to reducing the burden of ocular injuries.

Methodology

A prospective ,single center ,hospital based case series of 4 patients with Firecracker injuries requiring inpatient admission and surgical intervention. All patients were below 30 years of age.

Study protocol

Detailed history was noted . Collected data was entered in trauma proforma which included demographic details, mode of injury, type of injury and ocular examination findings. Detailed general and ocular examination was done including best corrected visual acuity, slit lamp examination, fundus and intraocular pressure measurement. Ocular B scan ultrasonography and CT scan /X ray orbit were done as indicated. Primary corneal/scleral tear repair followed by secondary surgeries were done as indicated. Injuries were classified according to BETTS classification.

CASE REPORT

There were 4 patients. 3 cases were males (75 %) and 1 case was female(25 %).

AGE IN YEARS	MALE	FEMALE
0-10	1 (Patient No. 2)	-

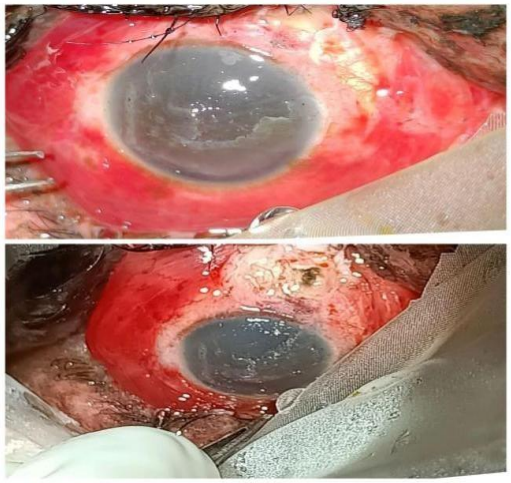
10-20	-	-
20-30	3 (Patient No. 1,3)	1 (Patient No. 4)

2 patients were bystanders and 2 were directly involved in handling the firecrackers. 3 patients had unilateral eye involvement (Patient No. 2,3,4) , 1 patient had bilateral involvement (Patient No. 1). No patients used any eye protection measures.

All patients had presenting vision hand movements close to face with good projection of light. Primary wound exploration and primary corneal/scleral tear repair were done in all the 4 patients. Poor vision prognosis and need for multiple surgeries was explained to all patients and relatives.

The child (Patient No. 2) was operated under general anaesthesia, rest of the patients were operated under local anaesthesia peribulbar block with 2 % Lignocaine and Adrenaline.

Patient No. 1 presented with bilateral ocular firecracker injury, with Roper-hall classification grade 3 ocular surface burns in right eye . Right eye corneal epithelial defect measuring 6 x 5 mm , scleral tear 2 mm extent, 3 mm away from limbus, superonasally. Left eye corneal epithelial defect measuring 3×3 mm was noted.Both eyes corneal and conjunctival soot particle deposition was removed with cotton bud and saline wash. Right eye scleral tear repair was done with 3 interrupted sutures using 6/0 vicryl, conjunctiva was sutured with 3 interrupted sutures using 8/0 vicryl. (Figure 1).



(Figure 1 - Right eye scleral tear in the superonasal quadrant with 6×5 mm corneal epithelial defect)

In 2 weeks follow-up patient developed right eye non healing epithelial defect with stromal haze with traumatic cataract and was given 1 % carboxymethylcellulose eye drops 8 times a day for a week, then gradually tapered to 3 times a day for 15 days. Right eye phacoemulsification with hydrophobic foldable posterior chamber intraocular lens implantation was done after 2 months (Figure 2).

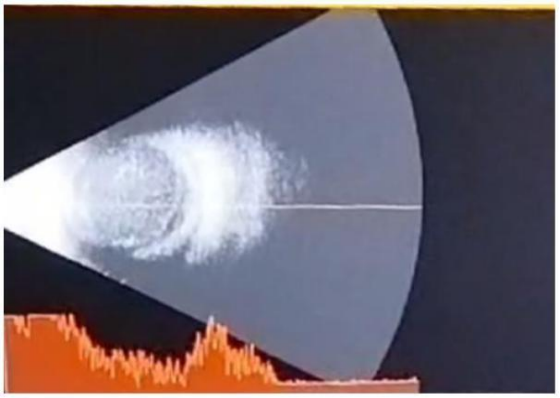
Patient still had central 6 x 5 mm macular corneal opacity and was posted for deep anterior lamellar keratoplasty, but he was lost to follow up.

(Figure 2- Right eye 6×5 mm macular corneal opacity)

Patient No. 1 presented after 48 hours of the injury with inferotemporal scleral tear measuring 2 mm and traumatic cataract in the left eye Primary scleral tear repair was done using 2 interrupted sutures with 6/0 vicryl. (Figure 3).

(Figure 3 - Left eye inferonasal scleral tear with traumatic cataract)

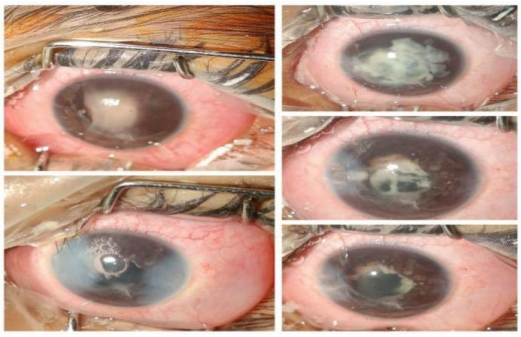
Postoperative day 1 gentle B scan ultrasonography showed dense vitreous echoes filling the globe suggesting endophthalmitis. (Figure 4).



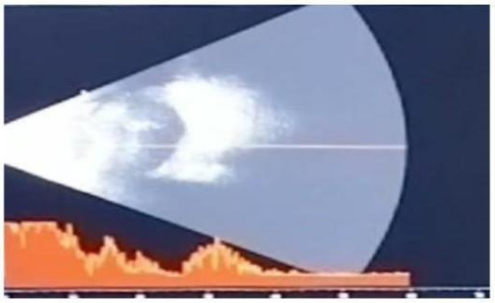
(Figure 4 -Left eye dense vitreous echoes suggesting endophthalmitis)

Core vitrectomy with lensectomy with intravitreal Vancomycin 1 mg and Ceftazidime 2.25 mg injection was done. (Figure 5). Postoperatively

patient was started on fortified Vancomycin eye drops 6 times a day. Postoperative B scan showed reduced vitreous echoes (Figure 6). Vision was 2 ft finger counting.

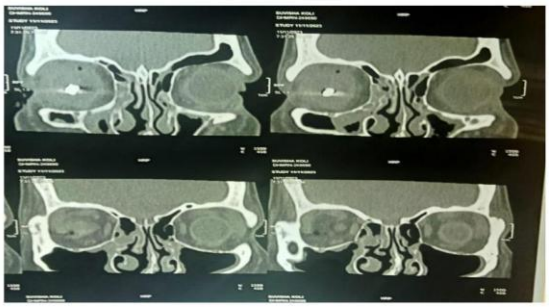


(Figure 5-Intraoperative photo of Left eye core vitrectomy and lensectomy)



(Figure 6- Left eye B scan showing decrease in vitreous echoes)

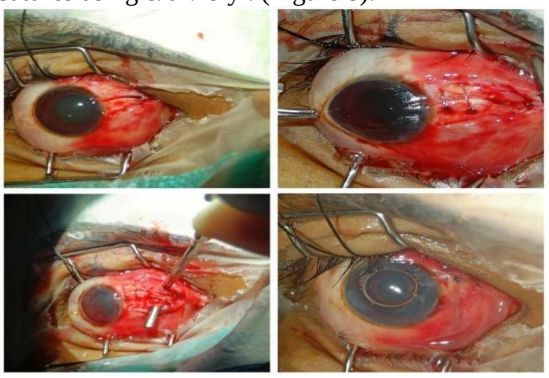
Patient No. 3 presented with right eye sclerocorneal tear extending 2 mm on cornea and 3 mm in sclera nasally. CT scan orbit showed intraocular foreign body (IOFB) in midvitreous. (Figure 7)



(Figure 7- CT scan of the orbit showing intraocular foreign body in the right eye)

Primary corneoscleral tear repair was done followed by Pars plana vitrectomy and IOFB removal was done in the second sitting after 1 week.

Patient No. 4 presented with right eye scleral tear size 4 mm nasally 0.5 mm away from limbus. Scleral tear repair was done with 4 interrupted sutures using 6/0 vicryl, conjunctiva was closed with 2 interrupted sutures using 8/0 vicryl. (Figure 8).



(Figure 8-Intraoperative photos of right eye scleral tear repair using 4 interrupted sutures using 6-0 vicryl suture)

All patients were given postoperative Inj Cefotaxime 50 mg/kg/day for 3 days, topical Moxifloxacin 0.5 % eye drops 4 times a day for 6 weeks, 2 % Homide eye drops twice a day for 3 days, topical Prednisolone eye drops 1 % for 2 weeks.

All the patients were admitted for minimum 3 days and kept on close follow up till 3 months

DISCUSSION

Our study evaluated the clinical management of globe ruptures caused by firecracker-related injuries in patients under 30 years of age. The predominance of young males in our case series (75%) is consistent with the demographic distribution reported in similar studies. For instance, a study by Saxena *et al.* involving 150 patients with firecracker-related ocular injuries during Diwali in North India showed that 85% were males and the majority were under 20 years of age, highlighting the vulnerability of young males during festive celebrations.[1]

The lack of eye protection in all our cases mirrors trends noted in international literature. Kumar et al. (2015) emphasized that most injuries occur due to the non-use of safety measures and close proximity to the explosive device, whether bystanders or handlers. Similarly, our study found that two patients were injured as bystanders, reflecting the indiscriminate risk posed by firecrackers in public space.[2]

The spectrum of injuries observed in our patients, including scleral tears, intraocular foreign bodies (IOFB), traumatic cataract, and chemical burns, illustrates the complex and multifactorial nature of firecracker trauma. Comparable observations were reported by Wani et al. (2018) in a tertiary hospital in Kashmir, where 22% of ocular firecracker injuries involved globe ruptures and required multiple interventions.[3]The need for secondary surgical procedures such as phacoemulsification with IOL implantation, Deep anterior lamellar keratoplasty, and vitrectomy was also noted in our study.

The average hospital stay of 3 days among our patients, with 3 requiring prolonged observation, underscores the intensive nature of post-operative care and highlights the burden on tertiary health systems. Whereas in a study from Sri Lanka by Herath et al. (2016), where the mean hospitalization duration for ocular trauma due to fireworks was noted over 8 days, with a majority requiring multiple surgical interventions.[4]

Additionally, endophthalmitis, as observed in one of our delayed presentation cases, remains a feared complication of open-globe injuries. Chatterjee *et al.* (2009) noted that delays in presentation beyond 24 hours significantly increase the risk of post-traumatic endophthalmitis, which mandates early intervention and intravitreal therapy as practiced in our management approach.[5]

Our study reaffirms the critical importance of timely and skilled ophthalmic care and the limitations even modern surgical techniques face when managing explosive ocular injuries. Public health initiatives, including community-based safety campaigns, regulation of firecracker use, and mandatory labelling for safety instructions, have been advocated by authors like Krishnaiah *et al.* (2014) to reduce injury incidence, especially among children and adolescents.[6]

In summary, our findings corroborate the existing global data on firecracker-related ocular trauma: the injuries are predominantly seen in young males, often preventable, and can lead to serious, sometimes irreversible, visual impairment. The necessity of primary and secondary interventions, extended hospital stays, and guarded visual outcomes further stress the need for preventive strategies and policy-level regulations.

CONCLUSION

Firecracker injuries may result in irreparable vision loss and long term complications. Awareness programmes should be conducted regularly emphasizing use of ocular protection.

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