Vol: 08, Issue 03
OPHTHALMOLOGY PAKISTAN
www.ophthalmologypakistan.com

Original Article

Toy-Gun Pellet-Related Ocular Trauma on Festive Occasions

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Purpose: Toy-guns with plastic pellets are used on festive and social occasions by children in Pakistan. Assuming these guns as toys and incapable to cause severe ocular damage, these are favorites, cheap and easily available without age restriction. Purpose of this study was to report the data, treatment methods and results of the patients sustaining eye injuries with toy gun pellets.

Material and Methods: Prior permission was sought from Institutional Review Board of King Edward Medical University, Lahore. This is a retrospective analysis of patients with toy gun eye injuries who presented at Ophthalmology Unit-I, Mayo hospital Lahore, from January 2017 to May 2018. We observed demographic data and the type of injuries to the eyes, choice of treatment and visual acuity after treatment.

Results: Thirty (30) patients (22 male & 8 females) with ocular injuries due to Toy gun plastic pellets were included in this study. Gun pellet casualties were common in a young male with mean age 13.63 years ranging 4½ to 40 years. Most injuries to the globe were without laceration (n=20) and were unilateral (n=30). Most common ocular injury encountered was corneal abrasions (36.60%), followed by hyphema(33.33%) and corneal laceration (13.30%). No case of vitreous haemorrhage, retinal detachment, or intraocular foreign body was reported. Cases were managed conservatively. Corneoscleral laceration repair was done in four (04) cases while cataract surgery was done in two (02) cases only.

Conclusion: Ocular injuries resulting from pellets of plastic toy guns are quite significant in number among the younger population on festive occasions. It is desirable to report pellet related ocular injuries and their disastrous impact on visual acuity for proper public education.

Keywords: Arm Injuries, Injuries eye, Blunt eye injuries, Penetrating Eye Injuries, Blast injuries, pellet gun.

Introduction

Ocular trauma has been known as one of the main preventable[1] causes of visual loss and morbidity.[2] It is estimated that worldwide 19 million people sustain ocular injuries every year which require inpatient care. Worldwide, nearly 1.6 million people lose their vision from eye injuries. Main causes of injuries can be divided into roadside accidents, domestic violence, work-related hazards, outdoor activities.[3] Pellet guns are one of the disastrous objects, which result in ocular trauma. Severe complications result from the trauma by pellets of toy-guns such as hyphema, damage to trabecular meshwork resulting in late onset glaucoma.[4]An average pellet of toy-gun can weigh 0.3-0.4 g and collide with a globe in enough speed to penetrate as well as lacerate it and may also cause damage to the facial and orbital bones.[5] Explosive devices (IEDs) produce eye and adnexal injuries with very poor globe preservation and visual recovery. It can cause detached retina and choroid, foreign bodies in the eyeball, endophthalmitis and also cataract formation, and dislocated crystalline lens, and globe rupture.[6] Protective eye glasses are mandatory while handling with these kind of equipment.[7]

The final visual outcome even after treatment is not good.[8] This study includes reporting the number of toy gun pellet related injuries to eye and adnexa, received and treated at Eye Unit-I, Mayo Hospital Lahore in the duration of 1½ year. Due to the lack of public awareness among parents and guardians, children continue to play with such hazardous toys and suffer from life-long morbidity due to loss of their sight.[9,10] This study includes Mode of injury, age group as well as gender, type of sustained injury, treatment plan, and final post-treatment results including the final visual acuity.

Material and Methods

Prior permission was sought from Institutional Review Board of King Edward Medical University, Lahore. This retrospective analysis was conducted in Eye Unit-I, Mayo Hospital Lahore where a number of cases were received with toy-gun pellet related ocular injuries. Clinical files of 30 patients, who got ocular injuries from toy gun pellets, on festive occasions such as Eid-ul-Fitr and Eid-ul-Adha were retrospectively evaluated. All patients were admitted in Eye Unit-I, Mayo Hospital, Lahore, from January 2017 to June 2018. Analysis of the injuries to the eye by pellet guns, management of the patients, and their operation notes and final visual acuity and post-operative complications was done. All patients sustained trauma due to of toy gun pellet injuries on Eid-ul-Fitr and Shab-e-Barat Holidays. Birmingham Eye Trauma Terminology System (BETT) was used to classify the mechanical globe trauma in this study, which is an excellent system for describing it.

Results

Thirty (30) patients were included in this study which had ocular injuries due to toy gun related pellets. Most of the patients who presented to us were males. The mean age of our study group was 13.63 years. Male to female ratio of 11:4 was noted.

All the injuries included were unilateral, and no case sustained injuries to both eyes. In the thirty (30) eyes of 30 patients whom we studied a thorough examination was done of the anterior as well as posterior segment and injuries were recorded as shown in Table-1.

Table - 1: Eye injuries resulting from pellet guns

Type of Injury	No Of Eyes	Percentage
Cor neal Abrasion	11	36.60%
Hyphema	10	33.33%
Traumatic Cataract	05	16.66%
Corneal laceration	04	13.33%
Vitreous Haemorrhage	None	-
Retinal Detachment	None	-
Intraocular Foreign Body	None	-
Ocular Adnexa / Orbital Injury	None	-

The most common ocular injury encountered was Corneal Abrasion in 36.60% of eyes, followed by hyphema in 33.33%, Corneal Laceration 13.3% and Traumatic cataract in 6.66%. No case of vitreous haemorrhage, retinal detachment, or intraocular foreign body was seen.

Treatment options were followed according tothe type of injury recorded. Twenty (20) cases without any laceration of eyeball were on conservative management. Four (04) patients required surgical corneal laceration repair and two (2) patients needed traumatic cataract extraction.

The visual acuity on admission and final corrected visual acuity are shown in table-2.

Table-2: Best Corrected Visual Acuity (BCVA) at the time of presentation and after treatment

Visual Acuity	BCVA at presentation (Number of Eyes)	Post-treatment BC VA (Number of Eyes)
Perception of light +ve Projection of light +ve	02	None
HM	-	-
CF	02	None
6/60 to 6/36	08	05
6/24 to 6/6	18	25

On the first day of presentation of ocular injury, 6.66% of the eyes were positive for light perception (PL +). The final best corrected visual acuity improved in 100% of patients. About 16.66% of the cases had final post-operative visual acuity on discharge less than 6/24.While 83.33% had Post-treatment Best corrected visual acuity greater than 6/24.

Poor visual outcome was related to poor visual acuity at the time of presentation (< 6/60), open globe injury due to corneal laceration, arriving at the hospital late (more than 10 days after initial injury), and prolonged hyphema resulting into endothelial staining.

Discussion

Toy-Guns containing plastic pellets are widely being used in our country especially at Festive and social occasions like Eid-ul-Fitr & Shab-e-Barat. Pellet guns are easily accessible on inexpensive price to younger children and are popular among them as there is no restriction of age for the buyer, and their physical resemblance to real weapons i.e. pistols and handguns. Children assume these weapons to be toys and parents think that the projectile has very little power to cause any significant injury to the child which is wrong.

This study showed that most of the injuries caused by plastic toy gun pellets were sight-threatening and best corrected visual acuity (BCVA) of these patients did not improve up to 6/6. Instead, the injuries rendered the patients to the risk of Endophthalmitis, Glaucoma, traumatic cataract and Astigmatism in the longer run. The injuries were mostly closed-globe. The most common spectrum of injuries were corneal abrasions, corneal foreign body, and hyphema and vitreous hemorrhage with the vision-threatening outcome. A study carried out in Arabian gulf countries ascertained the ocular injuries to be more common in boys (77.4%) with mean age at 6.63 year and the incidence of closed globe injuries being more frequent (59.4%) than open globe injuries (40.6%) with final visual acuity more than 6/18 in 82.5%.

A recent study in Finland - Helsinki University Eye Hospitalwas carried out on 202 children less than 16 years of age with ocular injuries. Male representation was 74%. Out of 202 pediatric patients, 12 cases (6%) were pallet gun-related injuries. One third (36%)of pellet gun-related injuries ended up in permanent visual disability and the rest required prolonged follow up for glaucoma and other related complications. Yet another study carried out on 298 eyes at Mediterranean area, southern Italy, reinforces results of our study for male preponderance (84.6%) and ocular trauma a significant cause of visual impairment in unprotected eyes in rural population.In addition to visual impairment, ocular injuries cause considerable morbidity in terms of pain, psychological stress and economic burden on a health care system that may be prevented.

The incidence of firework-related, pellet and other such related ocular injuries is more on and around festive activities when these materials are readily available and disbursed without any license and restriction. In a study in Indian-held Kashmir pellets fired by security forces affected 75% of boys from schools and colleges. This resulted in closed globe injuries in 60% of injured students with poor visual prognosis. The introduction of war games and the use of paintball guns have resulted in a number of reports of injuries, especially to the eye. Non-powder guns cause serious injuries to children and adolescents Therefore non-powder guns should never be characterized as toys. Paintball-related ocular injuries are frequently severe and visually devastating. The compulsive use of protective eyewear may disregard 97% of injuries. If indispensable, the use of Pellet guns should be supervised and under protective eyewear.

There was an increased number of unintentional accidents among the injured children. The mostly non-intentional nature of these costly injuries emphasizes the importance of general public education regarding the hazards of these toys and awareness of masses regarding the risks of vision loss due to these toy guns is

also important. Increasing regulations for eye protection, sales, and usage of pellet guns are needed for prevention of vision loss due to these toy guns.

Conclusion

Most eye injuries in children are preventable. This reveals the importance of health education, adult supervision, and the application of appropriate measures for reducing the incidence and severity of ocular trauma. There is a need to explore strategies to minimize the incidence of ocular trauma. A collective approach for public awareness and implementing strong legislation is required to regulate the manufacture, sale, and use of pellet guns to reduce this preventable cause of ocular morbidity. A ban on practicing the causative agents in a non-professional, unsupervised environment promises to help reduce the number of cases of ocular injury.

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