Original Article

Non-penetrating Eye Injuries in Victims of Bomb Blasts and Mine Blasts

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Purpose: To study the type of non-penetrating eye injuries in victims of bomb blasts and mine blasts and to assess their visual outcome.

Material and Methods: The study was conducted at the Department of Ophthalmology, Khyber Teaching Hospital and Iqbal Eye clinic Peshawar, from March 2010 to February 2012. Detailed history was taken from all patients and complete ocular examination was done. In eyes with poor or no view of fundus a B-scan ultrasonography was done. Management and follow up varied according to the type and extent of eye injury. All the relevant data was recorded on a proforma.

Results: Total number of patients was 52, including 50 males (96.15%) and 02 female (03.84%). Mean age of patients was 24.12 years. Ocular injury was unilateral in 36 patients (69.23%) and bilateral in 16 eyes (30.76%). Vitreous hemorrhage was the most common ocular finding, seen in 21 eyes (30.88%). Conservative management was done in 57 eyes (83.82%), while 11 eyes (16.17%) required surgical intervention. Visual acuity improved in 49 eyes (72.05%) and remained unchanged in 19 eyes (27.94%). Final best corrected visual acuity was 6/12 or better in 40 eyes (58.82%).

Conclusion: Visual prognosis of non-penetrating eye injuries in blast victims is usually good. Most cases do not require surgical intervention and can be managed conservatively.

Ocular injury is an important cause of monocular visual impairment and blindness in younger age group[1,2]. Approximately 2 million eye injuries occur in the United States every year; and more than forty thousand result in permanent visual impairment[3].

Ocular injuries can be broadly divided into 2 groups i.e. closed globe (without full-thickness wound of eye wall) and open globe (with full-thickness wound of eye wall). Open globe injuries are divided into rupture and laceration. Closed globe injuries are divided into contusion and lamellar laceration[4].

Bomb blast injuries are one of the most common causes of severe ocular injury among adult males[5]. In our part of the world, blast related eye injuries are becoming increasingly common. Bomb blast causes peppering of the eye with multiple minute particles, which may be a combination of plastic or metallic particles, gunpowder, sand, dust and organic debris[6].

Closed globe eye injuries are common in blast victims and are caused by the primary blast effect shock waves. The blast wave displaces a dense medium across a less dense interface, and inertial forces may cause displacement of optical structures causing non-penetrating eye injuries[7].

The spectrum of eye injuries in blast victims ranges from very mild non-sight threatening to extremely serious with potentially blinding cones-quences. Our aim was to study the type of non-penetrating eye injuries in victims of bomb blasts and mine blasts and to assess their visual outcome.

MATERIAL AND METHODS

This was a prospective study conducted at Ophthalmology Department of Khyber Teaching Hospital and Iqbal Eye Clinic Peshawar, from March 2010 to February 2012. The study was done in collaboration with an organization, which was working for people suffering war injuries. All the patients had bomb blast or mine blast injuries. The patients were assessed by a trauma surgeon and any serious injuries were properly managed. Patients were then referred to us for the management of ocular injuries. All patients with closed globe injuries were included in this study (68 eyes of 52 patients). Patients who had intraocular foreign bodies (detected on clinical examination or CT scan) were excluded from the study.

Informed consent was taken from all the patients. Detailed history was taken and complete ocular examination was done including assessment of best corrected visual acuity (BCVA) using Snellen visual acuity chart, pupillary reaction, measurement of intraocular pressure with Perkin's tonometer MK2 (Clement Clarke, London), anterior segment examination with slit-lamp (Takagi SM-70, Japan) and dilated fundus examination with indirect ophthalmoscope (Neitz, Japan) and/or with slit-lamp using 90D lens (Volk, USA). In eyes with poor or no view of fundus a B-scan ultrasonography was done with AB 5500+ A/B Scan (Sonomed, USA). Management and follow up varied according to the type and extent of eye injury. All the relevant data was recorded on a performa.

RESULTS

The study included 68 eyes of 52 patients. Out of 52 patients, 50 were male (96.15%) and 02 female (03.84%). Mean age was 24.12 years (Range 04 to 65 years). Ocular injury was unilateral in 36 patients (69.23%) and bilateral in 16 patients (30.76%). Vitreous hemorrhage was the most common ocular finding, seen in 21 eyes (30.88%). Cataract was present in 11 eyes (16.17%) and retinal detachment in 05 eyes (07.35%). The types of eye injuries noted in our patients are given in Table 1. The treatment varied according to the type and severity of eye injury. Conservative management was done in 57 eyes (83.82%), while 11 eyes (16.17%) required surgical intervention Table 2. Cataract extraction with intraocular lens implantation and pars plana vitrectomy were the most commonly performed surgical procedures i.e. in 07 eyes (10.29%) each. Vitrectomy was required in patients who had non-resolving vitreous hemorrhage, or retinal detachment. The type and number of surgeries are given in Table 3. In addition, 360 argon laser was done in 06 eyes (08.82%) and YAG laser capsulotomy was done in 2 eyes (02.94%). Visual acuity improved in 49 eyes (72.05%) and remained unchanged in 19 eyes (27.94%). 40 eyes (58.82%) achieved best corrected visual acuity 6/12 or better. The initial and final visual acuities are given in Table 4.

DISCUSSION

Trauma is a common cause of ocular morbidity. The effect of trauma may be apparent immediately or may

Type of injury	No. of eyes n (%)	Type of injury	No. of eyes n (%)
Vitreous hemorrhage	21 (30.88)	Corneal edema	18 (26.47)
Corneal Foreign Bodies	15 (22.05)	Retinal hemorrhages	13 (19.11)
Sunconjunctival hemorrhage	12 (17.64)	Cataract	11 (16.17)
Hyphema	10 (14.70)	Increased IOP	08 (11.76)
Choroidal rupture	06 (08.82)	Optic atrophy	05 (07.35)
Retinal detachment	05 (07.35)	Macular scar	03 (04.41)
Iridodialysis	03 (04.41)	Lamellar corneal laceration	02 (02.94)
Corneal epithelial defect	02 (02.94)	Commotio retinae	02 (02.94)
Angle recession	01 (01.47)		

Table 2: Type of management

Treatment	No. of eyes
Conservative	57 eyes
Surgical	11 eyes
surgery	02 eyes
surgeries	06 eyes
surgeries	03 eyes
Total no of surgeries	23

Table 3: Type and number of surgeries

Type of surgery	No. of eyes
Cataract extraction Phacoemulsification + IOL (05) ECCE + IOL (02)	07
Vitrectomy With silicone oil (03) With C3F8 (02) With 276 explant + Silicon oil (02)	07
Vitrectomy + cataract extraction With silicon oil (02)	02
Removal of silicon oil	04
Amniotic membrane graft	02
Trabeculectomy	01

develop later as a secondary complication. Ocular trauma can cause permanent visual or cosmetic defect in the affected individuals and is one of the major cause of monocular blindness and impaired vision throughout the world[8].

In addition to the impact on affected individuals, blindness and severe visual impairment resulting from the injuries have important socioeconomic implications. The cost of treatment including hospital stay is tremendously high, whereas, the indirect cost resulting from loss of productivity by young men is equally important[9]. Developing countries carry the largest burden of such accidents, but are the least able to afford the costs[10,11].

Bomb blast and mine blast are becoming increasingly common causes of ocular injuries, especially in this part of the world. In a study of 387 randomly selected soldiers injured by blasts in Iraq, 329 (89%) sustained ocular injuries[12-14]. In the study of Mader TH et al,[15] 36.3% of all ocular injuries were closed globe, while in the study of Weichel ED et al[16] 54.16% of all eye injuries were closed globe injuries.

Table 4: Initial & Final Visual Acuity

	Initial BCVA n (%)
NPL	6 (08.82)
PL+	10 (14.70)
HM	10 (14.70)
CF	17 (25.00)
6/60-6/18	12 (17.64)
6/12-6/6	16 (23.52)

Vitreous hemorrhage was the most common ocular finding, seen in 21 eyes (30.88%), followed by corneal edema, seen in 18 eyes (26.47%), corneal foreign bodies in 15 eyes (22.05%), retinal hemorrhages in 13 eyes (19.11%) and subconjunctival hemorrhage in 12 eyes (17.64%). Cataract was present in 11 eyes (16.17%) and retinal detachment in 05 eyes (07.35%). Most of the eyes (83.16%) were managed conservatively, only 11 eyes (16.17%) required surgical intervention. Cataract, vitreous hemorrhage and retinal detachment were the most common indications for surgical intervention.

Visual outcome and prognosis in patients with ocular trauma due to blasts, depends upon the type of injury sustained. Majority of the patients with perforating injuries have poor visual outcome. Closed globe injuries usually have better visual outcome as compared to open globe injuries[16].

In our study, the best corrected visual acuity (BCVA) improved in 49 eyes (72.05%) and remained unchanged in 19 eyes (27.94%). 40 eyes (58.82%) had final BCVA > 6/12 or better, in 10 eyes (14.70%) the BCVA was ranging from 6/60 to 6/18 and in 18 eyes (26.47%) it was < 6/60. In the study of Weichel ED et al,[16] 42 % of all eyes (including both open globe and closed globe injuries) achieved a BCVA of 6/12 or better, closed – globe injuries accounted for 65% of BCVA of 6/12 or better.

CONCLUSION

Bomb blast is becoming increasingly common cause of ocular injuries. Visual prognosis of non-penetrating eye injuries in blast victims is usually good. Most cases do not require surgical intervention and can be managed conservatively.

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