



VISUAL OUTCOME, CLINICAL FINDINGS AND MANAGEMENT OF BLUNT OCULAR TRAUMA DUE TO SHOTGUN PELLETS.

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ABSTRACT

Purpose: To analyze the clinical findings, management and visual prognosis of blunt ocular injuries due to shotgun pellets. **Methods:** A prospective observational study on 200 eyes with blunt ocular trauma due to shotgun pellets was conducted. Patients with other causes of ocular trauma or with open globe injury were excluded from study. Surgical interventions were employed when indicated for associations like, traumatic cataract, dense persistent vitreous hemorrhage(VH),retinal detachment(RD) etc. Patients were followed up for 6 months from time of injury. **Results:** The mean age of patients was 22.6+9.52 years. Majority (99.5%) of our patients were males and only 1(0.50%) was female. Sub-conjunctival hemorrhage (SCH) was the most common clinical manifestation(77.0%) followed hyphaema in 34.0% of patients and vitreous hemorrhage(VH) (27.5%). Cataractous changes were seen in 7.5% of patients, retinal hemorrhage in 11.0% while retinal detachment(RD) in 4.0%. 60.5% of patients were managed conservatively and 39.5% patients needed surgical intervention. Visual Acuity(VA) at presentation was recorded to be <6/60-PL(light perception) in 51.0% of the patients which progressed to range of 6/6 -6/9 in 82.5% of patients. 2 patients reported with no perception of light (NPL) at the time of trauma which persisted till the end of follow-up. **Conclusion:** We conclude that the blunt ocular trauma due to pellets occurs most commonly in males, and has a good prognosis in terms of anatomical and functional outcome. Anterior segment was more commonly involved than the posterior segment with reparable damage in majority of the cases. Educating the mass for use of any form of eye protection can prevent ocular trauma in most cases.

KEYWORDS : Blunt ocular trauma, closed globe, pellet, visual acuity.

INTRODUCTION

Ocular trauma is the most common cause of preventable monocular blindness worldwide¹ and has been well described in developed countries such as the United States, Japan, and Europe²⁻⁵. Ocular injuries caused by shotgun pellets represent a small subset of ocular trauma worldwide and their use was first reported during the civil unrest in Northern Ireland in the 1970s, In a similar unrest in Kashmir(India), the use of pellet guns to control mobs emerged as a significant cause ocular morbidity over the last few years. Shotguns with 12 Bore Pump Action (commonly known as riot gun) with shot type 8/9 were commonly used⁶. A number 9 shot contains 585 pellets of 2.01mm diameter per Oz and 8 number shot contains approximately 410 pellets of 2.26mm diameter per 1 Oz.⁷

The impact of injury and the damage caused by these small sized pellets, is inversely related to the distance from which they are fired and the energy with which they strike the globe. Other factors like temperature, powder load, shot size, and gauge also play a pivotal role. In majority of the studies⁸, pellets are notorious for causing visually incapacitating perforating injuries, but sometimes due to increased range of fire, the velocity and size of shotgun pellets decreases leading to blunt ocular trauma without penetrating or perforating injuries. Impact of blunt ocular trauma caused due to pellets are less reported in contrast to open globe injuries. This study aims to describe the clinical presentation and pattern, management and visual prognosis of blunt ocular injuries caused due to shotgun pellets.

MATERIALS AND METHODS

A prospective observational study was conducted in the department of Ophthalmology, GMC Srinagar between July 2017 and Jan 2019. 200 eyes who reported with blunt ocular trauma due to shotgun pellets were included after classifying the injuries according to BETT (Birmingham Eye Trauma Terminology) and Ocular Trauma Classification System.^{9,10}

We excluded all patients with history of any previous trauma, surgical intervention or any ocular disease which may affect the final visual outcome. Patients with other causes of ocular trauma other than shotgun pellet or with open globe injury were also excluded from study.

After obtaining informed consent a relevant ocular and surgical history was taken and careful examination including VA testing, Slit lamp examination(SLE), intraocular pressure (IOP) measurement, dilated fundus examination in cases of clear media, and B-scan in cases of media opacities was done. Computed tomography(CT) scans, and Surgical exploration was done in patients where the diagnosis of blunt trauma was uncertain and for detection and localization of foreign body if present. Most of the injuries in our study were managed conservatively. Surgical interventions like lensectomy, vitrectomy etc were employed when indicated. Patients were followed up at 1 week, 1 month, 3 months and 6 months from time of injury.

RESULTS

The age of patients in our study ranged from 8-61 years with the mean age of 22.6+9.52 years. Majority(99.5%) of our patients were males and only 1(0.50%) was female.

Table 1: Patterns of blunt ocular trauma and their distribution n=200

Pattern	Frequency (%age)	Pattern	Frequency (%age)
Eyelid and adnexal damage	5(2.5%)	Iridodialysis	12(6.0%)
Periorbital foreign body	53(26.5%)	Traumatic cataract	15(7.5%)
Intraorbital foreign body	2(1.0%)	Vitreous Hemorrhage (mild-dense)	55(27.5%)
Sub-conjunctival hemorrhage	154(77.0%)	Retinal hemorrhage(any subtype)	22(11.0%)

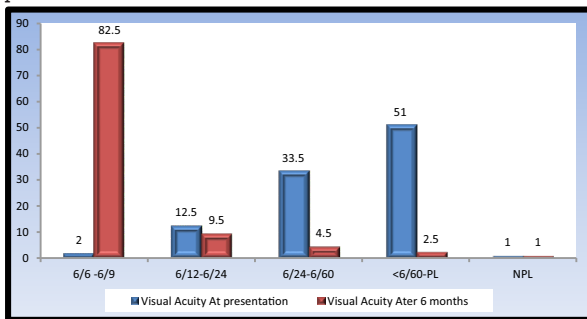
Sub conjunctival foreign body	48(24.0%)	Retinal break/detachment(all types)	8(4.0%)
Hyphaema (various grades)	68(34.0%)	-	-

Various patterns of blunt ocular trauma (Table 1) due to pellets noted were SCH in majority(77.0%) of the patients followed by various grades of hyphaema and VH in in 34.0% and 27.5% respectively. Eyelid and adnexal damage was seen in 2.5% of patients. Superficial pellets were present in significant number of patients including 26.5% in periorbital area, 24.0% in subconjunctival area, while intraorbital pellets were noted in 2(1.0%) patients. Iridodialysis was seen in 6.0% of patients but cataractous changes, retinal hemorrhage and RD were seen in 7.5%, 11.0% and 4.0% of patients respectively.

Table 2: Management of blunt ocular trauma caused by shotgun pellet (n=200)

Management	Frequency (%age)
Conservative	121(60.5%)
Invasive	79(39.5%)
Eyelid and orbital tissue Repair	5(2.5%)
Removal of superficial foreign Bodies(periorbital and conjuntival)	15(7.5%)
Anterior chamber wash	13(6.5%)
Lensectomy/Phacoemulsification	15(7.5%)
Vitrectomy	31(15.5%)
Lensectomy + vitrectomy/ Phacovitrectomy	13(6.5%)

In 121 patients, the management was conservative (Table 2) while 79 patients needed surgical intervention which included AC wash in 6.5%, cataractous lens removal in 7.5% of patients and vitrectomy in 15.5% of patients. Combined lensectomy and vitrectomy was performed in 6.5% of patients. Removal of superficial foreign bodies was needed in 7.5% of patients.



Graph 1. VA in patients of blunt ocular trauma (n=200)

The VA at presentation was recorded to be <6/60-PL in majority(51.0%) of the patients while 33.5% has VA in range of 6/24-6/60. 25(12.5%) patients reported with 6/12-6/24 range of 6/6-6/9 vision and 4(2.0%) had vision in the range of 6/6-6/9.

After treatment, 82.5% of patients achieved VA in the range of 6/6-6/9 and 9.5% of patients had a good vision of 6/12-6/24. VA of 6/24-6/60 was recovered in 4.5% of patients and only 2.5% of patients had VA <6/60-PL. 2(1.0%) patients who reported with NPL at the time of trauma did not recover during the follow-up.

DISCUSSION

Many studies have been published on penetrating eye trauma due to pellet guns¹¹⁻¹⁷ but few studies related to blunt ocular pellet injuries have been documented.

The age of patients ranged from 8-61 years with the mean age

of 22.6+9.52 years and majority(99.5%) of our patients were males while only 1(0.50%) was female indicating the active participation of males in protests during civil unrest. Other studies^{18,19} have also concluded that males are prone to ocular trauma as they are naturally inclined to take part in dangerous activities. We observed that blunt trauma due to pellets affected both, the anterior and posterior segment, and SCH was the most common manifestation (77.0%), followed by various grades of hyphaema in 34.0% of patients, out of which 6.5% needed AC wash, but the rest resolved spontaneously with conservative management. Superficial pellets (both periorbital and subconjunctival) were found in around 50.0% of patients, but only 7.5% needed removal, although all 2.5% of patients with eyelid and adnexal damage needed repair to restore the anatomy. All patients of traumatic cataract needed lens removal either by lensectomy or phacoemulsification and IOL(intraocular lenses) was implanted in all patients at the end of surgery. None of our patients (6.0%) had iridoddiagnosis repair done. Significant involvement of these structures points towards the vulnerability of the anterior segment of the globe towards blunt ocular trauma more than the posterior segment which may be minimized by creating awareness about wearing eye-protection devices²⁰

Posterior segment involvement(42.5%) mostly manifested as VH (27.5%) followed by retinal hemorrhage and RD needed vitrectomy in 15.5% of patients, the most common indication for which was dense persistent VH. All patients of RD were treated surgically and retina reattached using standard management protocol. We believe that the Intraorbital pellets noted near the orbital apex on CT scan were the cause of NPL in 2 patients owing to the pellet abutting the optic nerve. Overall, 39.5% of patients needed surgical intervention while 60.5% of our patients were managed conservatively, which included symptomatic relief with painkillers, local antibiotic eye ointment application, decongestant eye drops for SCH, topical anti-glaucoma medication for raised IOP secondary to hypHEMA and other intraocular hemorrhage. Topical steroids were also prescribed in relevant cases to reduce any associated ocular inflammation.

The VA at presentation was recorded to be <6/60-PL in majority (51.0%) of the patients which progressed to around 6/6-6/9 in 82.5% of patients after various management discussed above. Other studied with closed globe injury due to fireworks have also showed that 90.5% of eyes had final visual outcome of more than 6/36.²¹ The outstanding visual improvement may be explained by the fact that most of the ocular tissues sustained severe but repairable damage. he 2(1.0%) patients who reported with NPL at the time of trauma never regained the vision back even after administration of systemic steroids.

CONCLUSION

We conclude that the blunt ocular trauma due to pellets occurs most commonly in males, buy has good prognosis in terms of anatomical and functional outcome. Anterior segment was more commonly involved than the posterior segment with repairable damage in majority of the cases. Educating the mass for the use of any form of eye protection can prevent ocular trauma in most cases. Although most patients needed conservative management, surgical Interventions like lensectomy, phaco emulsification and vitrectomy significantly improve the outcome in severe cases.

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