

Original Article

**INCIDENCE OF SECONDARY GLAUCOMA AFTER OCULAR TRAUMA
CORRELATED WITH THE TYPE OF INJURY**

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ABSTRACT

Purpose :

To evaluate incidence of secondary glaucoma in post traumatic cases and correlates with the type of injury

Materials & Methodology

The Data was obtained from the records of 140 patient and reviewed and analysed from apr-2011 – December 2013.

Results :

The 32 months incidence of developing posttraumatic glaucoma was 11.39%.

Need for glaucoma surgery was independtly associated with

- a) Angle+ iris injury (46 cases , 32.85%)*
- b) Corneal + iris injury (15 cases , 10.71%)*
- c) Lens injury (56 cases , 40%)*
- d) Angle recession (21 cases,15%)*
- e) Presence of optic atrophy (16 cases , 11.42%)*
- f) H/o penetrating trauma(17 cases , 12.14%)*
- g) Vitreal injury 7 cases (5%)*

Conclusions :

This study estimates incidence 11.36% for the developing secondary glaucoma after ocular trauma associated with closed globe injury , blunt trauma. This study provides an estimate for the risk of developing glaucoma after ocular contusion in a large cohort study population and has determined several independently predictive factors that were significantly associated with development of posttraumatic glaucoma. These included poor visual acuity, advancing age , lens injury, angle recession and hyphema.

INTRODUCTION :

It is a 32months study of incidence of secondary glaucoma correlated with the type of injury after ocular trauma. Also we have included the age and the gender which is most commonly exposed to ocular trauma and time between trauma and onset of secondary glaucoma. There are many different sub-types of glaucoma but they can all be considered a type of optic disc neuropathy. Raised intraocular pressure (IOP) is a significant risk factor for developing glaucoma.

These studies confirm that a pathophysiological basis for glaucoma is elevated intraocular pressure. If the condition is detected early enough it is possible to arrest the development or slow the progression by medical and surgical means.

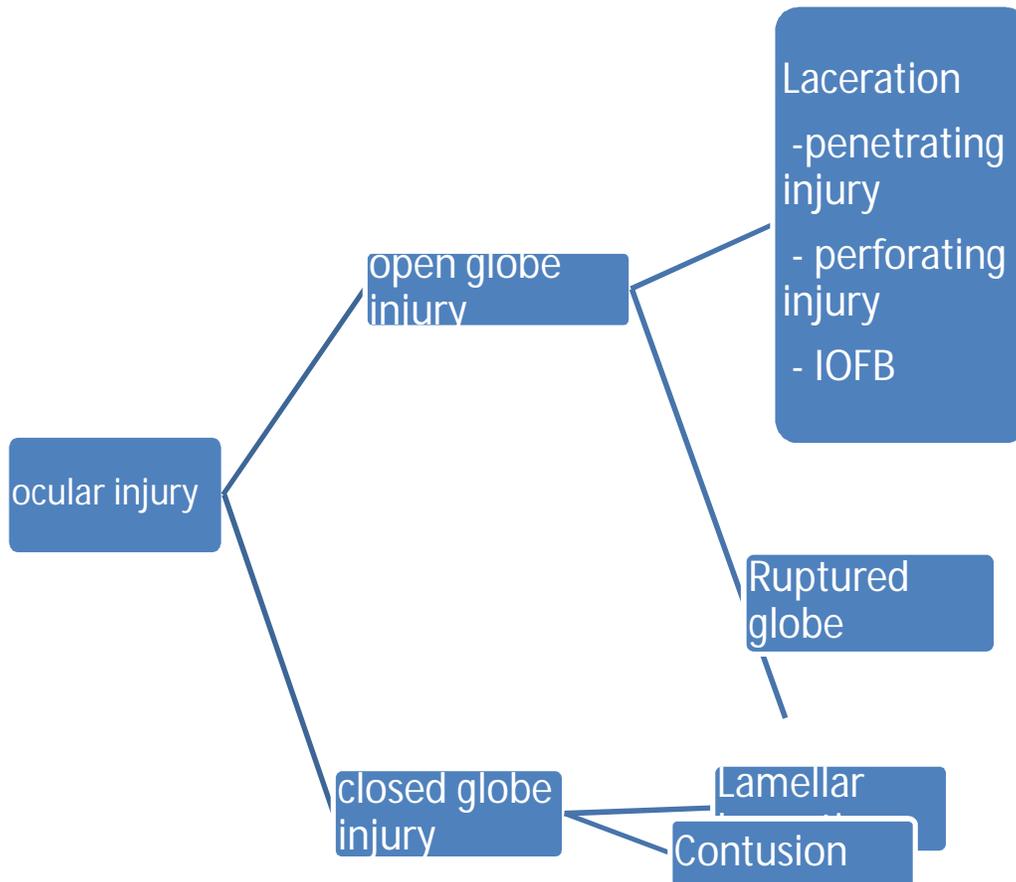
Prevention of blindness from eye injuries requires:

- injury prevention (health promotion including advocacy)
- early presentation by the patient (health promotion and health worker training)
- accurate assessment (good primary eye care and first aid)
- prompt referral of serious injuries requiring specialist management.(4,5)

Traumatic glaucoma is a multifactorial group of disorders that results from closed- or open-globe injuries. Although different underlying mechanisms may be involved with the initial injury, the resulting optic neuropathy and visual field loss is secondary to elevated IOP from reduction in aqueous outflow through the trabecular meshwork. (18) Secondary glaucoma after trauma is more likely to occur with a closed-globe injury, but it is often underdiagnosed because its onset may be delayed and the history of eye injury may be remote or overlooked. (6)

Types of injury :

We have divided the patient according to **BIRMINGHAM EYE TRAUMA TERMINOLOGY SYSTEM(10,11)**



According to this, we found 17 (12.14%) patient of open globe injury and 123 (87.85%) patient of close globe injury.

Onset : Duration of developing glaucoma after trauma is quite variable.so we classified the patient into early, intermediate and late categories from the time of injury.Early - < 2 month,Intermediate – 2 -6 month,Late - > 6 monthMajority of patients are presented within two months of exposure to trauma. Their chief complains were mainly pain associated with dimness of vision.

IOP Assessment

- Goldman tonometry is the “gold standard”
- Applanates over 3.02 mm so tear meniscus pressure and corneal rigidity are balanced
- The inward pressure of the tonometer equals the IOP
- Will vary with corneal abnormalities

- “Normal IOP” is 6 - 22 mmHg
- 95 % of normals fall within this range
- Ocular hypertension > glaucoma
- 25-30 % of glaucoma in N.Z. is normal pressure glaucoma
- Proportion varies markedly with race(9,12)

Clinical finding of secondary glaucoma associated with trauma are complex. This study found several independent predictive factors such as hyphema , pupillary block ,angle abnormality including synechial closure-angle recession and presence of optic atrophy that were significantly associated with development of secondary glaucoma. Out of all above mentioned factors , injury to Lens injury was the most commonly found followed by injury to angle , iris and corneal injury to be responsible for PTG. Each type of PTG received different type of therapeutic treatment. Indication for glaucoma surgery independently associated with corneal , hyphema, lens, vitreal, penetrating trauma was found to be statically significant. Most of the patients were treated with conservative treatment with antiglaucoma medication. And some of them underwent surgery in the form of those patient who had taken glaucoma treatment elsewhere and having pre-existing glaucoma were not included in these study.

1.0 AIMS AND OBJECTIVES

1. To determine the incidence of secondary glaucoma following ocular trauma
2. Correlation with the type of injury

2.0 MATERIALS & METHODOLOGY

- 1) study type: 32 month observational cross sectional
- 2) Study area - Patient who presented with symptom of raised IOP and poor visual acuity following ocular trauma at Sheth C.H.Nagri Eye hospital.
- 3) Study population - Patient who presented with symptom of raised IOP and poor visual acuity following ocular trauma at Sheth C.H.Nagri eye hospital , April 2011 – December 2013 were included. Total 1236 patient were included ,out of which 140 patient were found with PTG.
- 4) Inclusion criteria
 - 1.New case of ocular trauma
 - 2.First time detected PTG
 - 3.No other pre-existing eye disease
- 5) Exclusion criteria
 - 1..Pre-existing glaucoma
 - 2.ocular co morbidity
- 6) Sampling and sample size – 140 patients

7) Procedures – Most of patient presenting with chief complain of sudden dimness of vision and pain. Proper ophthalmic history and full ophthalmic examination including tonometry, pachymetry, torch light, slit lamp examination, gonioscopy (except penetrating injury), fundus examination and ultrasonography in selected patients were carried out.

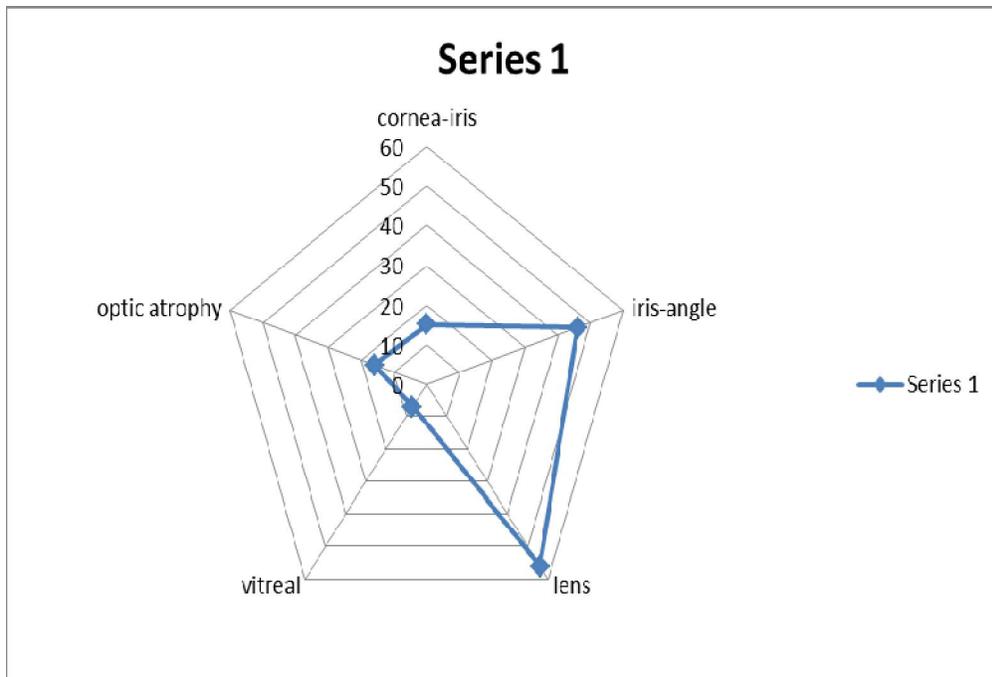
8) Data management and analysis : we have recorded all the patients and classified them according to age group, Gender, duration, Type of injury, structural abnormality, treatment modality to be given

3. 0 RESULTS

In this study we have included 1236 patients having ocular trauma who attended during OPD hours from which 140 patients developed post traumatic glaucoma giving an incidence rate of 11.36%.Need for glaucoma surgery was independently associated with

- a) Angle + Iris injury (46 cases, 32.85%)
- b) Corneal + Iris injury (15 cases, 10.71%)
- c) Lens injury (56 cases, 40%)
- d) Angle recession (21 cases, 15%)
- e) Optic atrophy (16 cases, 11.42%)
- f) H/O penetrating trauma (17 cases, 12.14%)
- g) Vitreal injury (7 cases, 5%)
- h) Incidence was found higher in male 86 (61.42%) population than female 54 (38.57%) population. Most commonly affected age groups were 31 – 40 years and 41 – 50 years. Maximum patients presented in early phase; 84 (60%) , minimum in intermediate Phase 16 (11.42%) in between and 40(28.57%) in late phase.

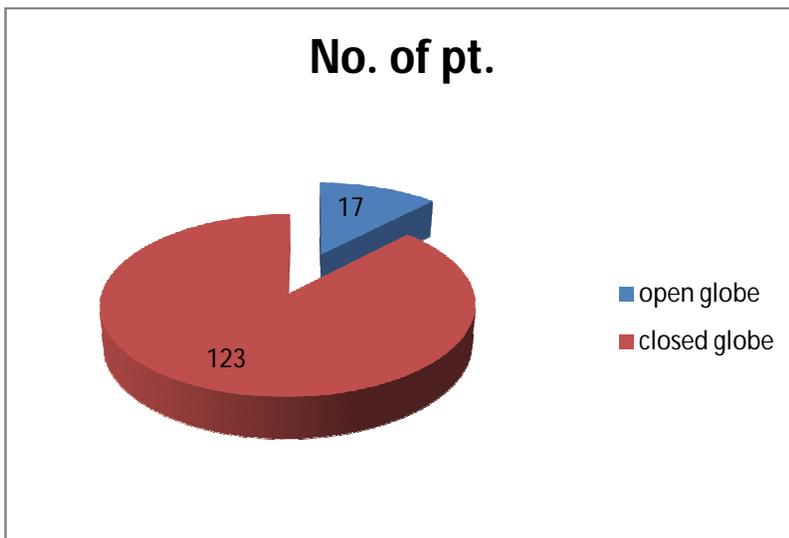
Table 1: Distribution of anatomical abnormalities



Structure abnormality	No. of patient
Cornea + iris	15
Iris + angle	46
Lens	56
Vitreous	07
Optic atrophy	16

most common structural abnormality was found to be injury to the lens 56(40%) , iris +angle 46 (32.85%) of which Angle recession was found in 21 (15%) , cornea + iris 15 (10.71%) , optic atrophy 16 (11.42%) and vitreal injury (5%).

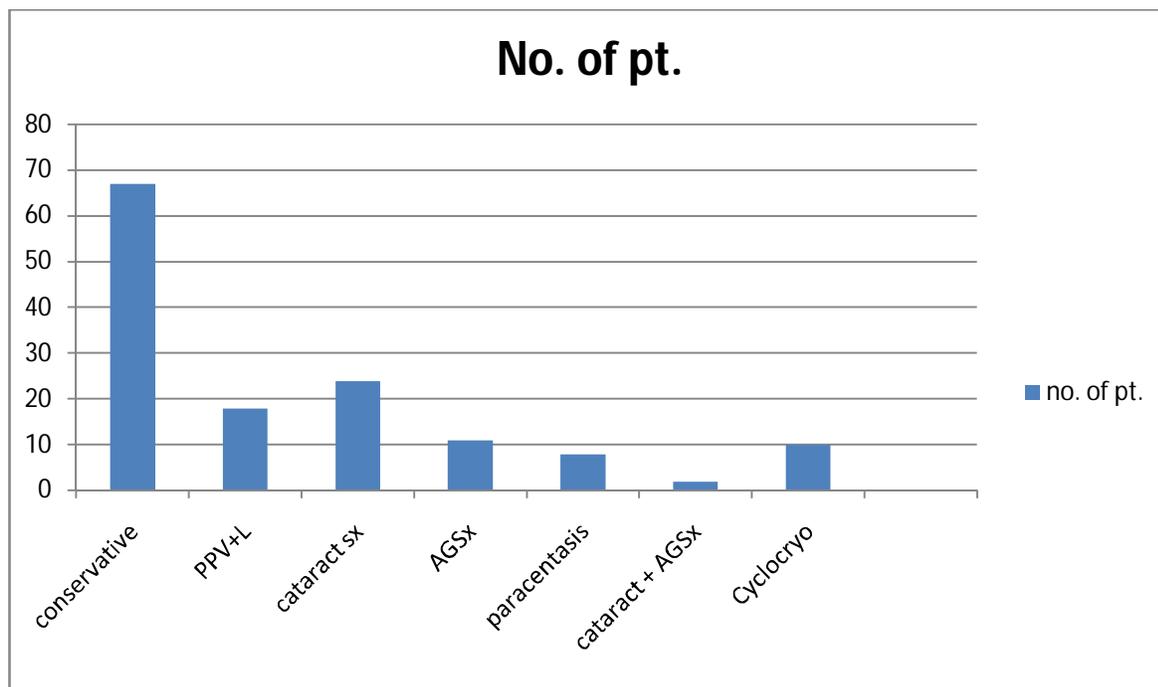
Table 2. Type of injury



Type of injury	No. of patient
Open globe injury	17
Closed globe injury	123

Open globe injury was found in 17 (12.14%) patients and closed globe injury in 123 (87.85%) patients.

Table 3. Treatment modality



Treatment modality	Conservative	PPV+L	CATARACT Sx	AGSx	Paracentesis	Cataract+AGSx	Cyclocryo
No. of pt.	67	18	24	11	8	2	10

Each subtype of patient was treated with different treatment of modality. Initially in all groups treatment started with conservative therapy. But it might be changed according to cause of raised IOP. Out of 140 patients, 67 (47.85%) were treated with conservative treatment. 18 (12.85%) patients required PPV + L. 24 (17.14%) and 11 (7.85%) required cataract and anti glaucoma surgery respectively. Paracentesis was carried out in 8 (5.71%) patients. 2 (1.42%) and 10 (7.14%) were treated with cataract with AGS (antiglaucoma surgery) and cyclocryotherapy respectively.

4.0 DISCUSSION

The inconsistent relationship of glaucomatous optic neuropathy with ocular hypertension has provoked hypotheses and studies on anatomic structure, eye development, nerve compression trauma, optic nerve blood flow, excitatory neurotransmitter, trophic factor, retinal ganglion cell/axon degeneration, glial support cell, immune, and aging mechanisms of neuron loss. But lowering intraocular pressure is the only proven means to slow or halt disease progression in studies of those at high risk of developing glaucoma (Ocular Hypertension Treatment Study OHTS) 5, those with early to moderate glaucoma (Collaborative Initial Glaucoma Treatment Study and early Manifest Glaucoma Trial EMGT) (10,11) and those with more advanced glaucoma (Collaborative Initial Normal-Tension Glaucoma Study 9,10 and Advanced Glaucoma Intervention Study AGIS)(14). These studies confirm that a pathophysiological basis for glaucoma is elevated intraocular pressure. If the condition is detected early enough it is possible to arrest the development or slow the progression by medical and surgical means.(13)

Regarding the injury causes and circumstances it becomes clear that the majority of open globe injuries can be prevented. Supervision plays a crucial role in the prevention of eye injuries. Besides, parents could be instructed how to arrange the domestic surroundings in a childproof manner. Furniture with round corners is the better option for households with kids. Plants with prickles are not suitable for gardens in which children play. Games with projectiles (darts, bow and arrow) are frequent injury causes and if parents take the time to teach their children a variety of other games, it is less probable that they get up to the dangerous games, even when they are unsupervised. The interaction with animals requires special instruction.(1,2,3)

5. 0 CONCLUSION

This study determines the incidence of developing glaucoma after ocular trauma has determined several independently predictive factors such as hyphema, pupillary block, angle recession, presence of optic atrophy associated with development of PTG. Incidence more found in closed globe injury in which blunt trauma was predominates. Age group 31-40 was the most commonly affected, may be because of the working age group. Most of the patients were presented within 2 month of injury due to inability to see properly , pain and headache. Structural abnormality included lens injury followed by angle, corneal, optic nerve and vitreal injury. Each subtype of PTG was treated according to structural damage.

STUDY LIMITATIONS

1. small sample size
2. long term follow up required

12. REFERENCES

1. Dandona L, Dandona R, Srinivas M, John RK, McCarty CA, Rao GN. Ocular trauma in an urban population in southern India: the Andhra Pradesh Eye Disease Study.

Clin Experiment Ophthalmol. 2000;28(5):350-356.

2. Sihota R, Sood NN, Agarwal HC. Traumatic glaucoma. *Acta Ophthalmol Scand.* 1995;73(3):252-254.

3. Girkin CA, McGwin G Jr, Long C, Morris R, Kuhn F. Glaucoma after ocular contusion: a cohort study of the United States eye injury registry. *J Glaucoma.* 2005;14(6):470-473.

4. Kaufman JH, Tolpin DW. Glaucoma after traumatic angle recession: a ten-year prospective study. *Am J Ophthalmol.* 1974;78(4):648-654.

5. Kuhn F, Morris R, Witherspoon DC, Heimann K, Jeffers JB, Treister G. A standardized classification of ocular trauma. *Ophthalmology.* 1996;103(2):240-243.

6. Négrel AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiology.* 1998, Vol. 5, 3, p. 143-169.

7. May DR, Kuhn FP, Morris RE, Witherspoon CD, Danis RP, Matthews GP, Mann L. The epidemiology of serious eye injuries from the United States Eye Injuries Registry. *Graefes Arch Clin Exp Ophthalmol.* 238, 2000, Vol. 2, p. 153-7.

8. Coles WH. Ocular surgery for traumatic injury in children. *South. Med. J.* 1974, Vol. 67, p. 930.

9. Lorenz B, Moore AT. *Pediatric Ophthalmology, Neuro-Ophthalmology, Genetics.* Berlin Heidelberg : Springer-Verlag Berlin Heidelberg, 2006.

10. Jandek C, Kellner U, Bornfeld N, Foerster MH. Open globe injuries in children. *Graefes Arch Clin Exp Ophthalmol.* 2000, Vol. 238, 5, p. 420-426.

11. Hassett P, Kelleher C. The epidemiology of occupational penetrating eye injuries in Ireland. *Occup Med.* 1994, Vol. 44, p. 209-211.

12. Prado Júnior J, Alves MR, Kara José N, Usuba FS, Onclix TM, Marantes CR. Perforating eye injuries in children. *Rev Hosp Clin Fac Med Sao Paulo.* 1996, Vol. 51, 2, p. 44-48.

13. Kuhn F, Morris R, Witherspoon CD. Birmingham Eye Trauma Terminology (BETT): terminology and classification of mechanical eye injuries. *Ophthalmol Clin North Am.* 2002, Vol. 15, 2, p. 139-43

14. Kuhn F, Morris R, Witherspoon CD, Mester V. The Birmingham Eye Trauma Terminology system (BETT). *J Fr. Ophtalmol.* 2004, Vol. 27, 2, p. 206-210.

15. Friedman DS, Wolfs RC, O'Colmain BJ, et al. Prevalence of open-angle glaucoma among adults in the United States. *Arch Ophthalmol.* 2004;122 (4):532-538

16. Kass MA, Heuer DK, Higginbotham EJ, et al. The Ocular Hypertension Treatment Study: a randomized trial determines that topical ocular hypotensive medication delays or prevents the onset of primary open-angle glaucoma. *Arch Ophthalmol.* 2002;120 (6):701-713, discussion 829-830

17. Lichter PR, Musch DC, Gillespie BW, et al. Interim clinical outcomes in the Collaborative Initial Glaucoma Treatment Study comparing initial treatment randomized to medical or surgery. *Ophthalmology.* 2001;108(11):1943-1953

