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<u>Original Research Article</u> Pattern and Visual Outcome in Paediatric Open Globe Injuries- Two Years Prospective Interventional Study in Tertiary Care Centre in Central India

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Abstract

Purpose: To evaluate the pattern and the final visual outcome in paediatric (Up to 12 years) open globe injuries (OGI) in tertiary care centre in central India.

Methods: This was prospective interventional study at department of ophthalmology, government medical college Nagpur, India. We selected to include all the patients with OGI up to 12 years. We documented the 6 pattern of injuries and classified them and accordingly pattern wise BCVA at the presentation and the 6 months follow up was compared. Standard protocol was applied to all the patients from the very first day of admission up to 6 months follow up (1 week, 1 month, 3 months, and 6 months). Patients who are unable to follow as per protocol are excluded from the study.

Results: We studied total 56 eyes of the 56 patient with OGI, presenting to the outpatient department of Ophthalmology, Government Medical College, Nagpur, Central India.

We divided the pattern of OGI of the patients in the following categories-1)Corneal tear involving visual axis, 2) Corneo-scleral tear, 3) Scleral tear, 4) Traumatic cataract at presentation, 4) Presence of iris tissue/vitreous incarceration in wound, 6)Mixed injuries including adnexal injuries.

We divided the patients presenting BCVA in 6 categories (A-F) with the numbers of the patients as-

- A->6/18, 16 patients (28.57%),
- B- 6/18 to >6/36, 20 patients (35.71%),
- *C* 6/36 to >6/60, 6 patients (10.71%),
- D->1/60 to 6/60, 5 patients (8.93%),
- E- PL, PR to 1/60, 7 patients (12.50%),
- *F- No PL/Def. PR, 2 patients (3.57%)*

We analyse the final BCVA at 6 months as

- A- >6/18, 25 patients (44.64%)
- *B* 6/18 to >6/36, 11 patients (19.64%),
- C- 6/36 to >6/60, 4 patients (7.14%),
- D->1/60 to 6/60, 5 patients (8.93%),
- E- PL,PR to 1/60, 7 patients (21.43%),
- *F No PL/Def. PR*), 4 patients (7.14%).

From above observations we can say that more than 50% of the OGI are having the final visual outcome is poor. **Conclusion:** Most of the OGI are blinding in nature, although the final visual outcome mainly depends upon the type of injury and the BCVA at presentation.

Keywords: (OGI)- Open globe injuries, (BCVA)- Best corrected visual acuity.

Introduction

Open globe injury is defined as any traumatic fullthickness break in the wall of eye.¹ It is well established that the leading cause of unilateral vision loss in childhood is trauma to the eve.² Mechanical (open globe) injuries affecting the eye are the major cause of blindness all over world second to cataract. Eye injuries account for approximately 8-14% of total injuries in children^{3,4} and are the most common type requiring hospitalization (in up to 40% cases). Range of mechanical eye injuries ultimately affect transparency of cornea, scleral injuries, traumatic haemorrhage, cataracts. vitreous Vitreous detachment, retinal detachment, macular oedema, optic nerve injury, secondary glaucoma, sympathetic ophthalmitis which ultimately cause blindness. This adds substantial burden to community in general and health care resources. Individual with blindness are of younger age group as compared to those suffering from cataract. Hence in terms of total blind year, impact of blindness is greater in open globe injuries. In India there are 6.8 million people who have corneal blindness with vision less than 6/60 in at least one eye. About 1 million have bilateral corneal blindness. Although success rate of corneal blindness is more in developed world, they are very low in developing countries (46.5%).

Classification of Open Globe Injuries (OGI)

The International Society of Ocular Trauma of the United States Eye Injury Registry had formulated a standardized terminology for eye injury to facilitate a uniform definition to characterize the clinical condition. The Birmingham Eye Trauma Terminology (BETT)⁵ system provided definitions for the commonly used eye trauma terms (Figure 1).

Nomenclature: Following а standardized approach, we define an OGI as a full-thickness break in coat of an eye ball¹, i.e. the cornea and /or sclera. The two types of OGI are ruptures and lacerations. Ruptures result from blunt trauma causing a full-thickness defect at the weakest point thinnest sclera, posterior to insertion of the rectus muscle and the limbus. Lacerationsthe result of a sharp object entering the globe, are further classified as penetrating (only an entrance wound or same entrance/exit wound) perforating (separate entrance and exit wounds) injuries.

Figure-1:



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Material and Methods

Following patients are excluded from study Closed globe injuries, Lamellar laceration, Uncooperative child for measurement of visual acuity, Parents not willing for consent, age more than 12 years, perforated corneal ulcers, post chemical injury perforation, retained intra-ocular foreign body of posterior segments, previous h/o Vitrectomy, RD surgery, Keratoplasty, and the patients not able to follow-up as per study protocol. Detailed history of trauma is obtained from patient and parents. General examination, stabilisation of vitals, systemic assessment, full and examination further treatment ocular accordingly standard protocol followed.

We also divided pattern of the OGI in the following categories--1)Corneal tear involving visual axis, 2) Corneo-Scleral tear, 3) Scleral tear, 4) Traumatic cataract at presentation, 5) Presence of iris tissue/vitreous incarceration in wound, 6) Mixed injuries including adnexal injuries. We divided the patients presenting BCVA in the six categories from A to F as follow—Category A (>6/18), Category B (6/18 to >6/36), Category C (6/36 to >6/60), Category D (>1/60 to 6/60), Category E (PL,PR to 1/60), Category F (No PL/Def. PR). Then we analysed the pattern and BCVA at presentation and at 6 months follow up (at 1 week, 1 month, 3 months, 6 months).

Observations & Results

We studied total 56 eyes of the 56 numbers of the outpatient patient, from department of Ophthalmology, government medical college, Nagpur central India, having OGI up to 12 years of age only. Our observations and results based mainly on the pattern and visual outcome in paediatric OGI. Thus this is a prospective interventional study. Out of the 56 patient, many patients required secondary interventions after the primary repair of the open globe injury. All patients attended the follow up schedule as advised at 1 week, 1 month, 3 months, and 6 months regularly. Table showing BCVA at presentation

Table No. 1: BCVA at presentation

•			
S.N.	BCVA Category	Numbers of the patients	Percentage
1	A (>6/18)	16	28.57%
2	B (6/18 to >6/36)	20	35.71%
3	C (6/36 to >6/60)	6	10.71%
4	D (>1/60 to 6/60)	5	8.93%
5	E (PL,PR to 1/60)	7	12.50%
6	F (No PL/Def. PR)	2	3.57%
	Total	56	100%

Figure-2



Table No. 2: Type of Injury and BCVA at Presentation

S.N.	Type of injury	No. of patients & BCVA at presentation		
1	Corneal tear involving visual axis(6 patients)	2- (>6/18), 4- (>6/36 to 6/18)		
2	Scleral tear (4 patients)	2- (>6/18), 2- (>6/36 to 6/18)		
3	Corneo-Scleral tear	1-(>6/18), 4-(>6/36 to 6/18)		
(8 patients) 1-(>1/60 to 6/60), 1- (>6/60 to 6/36),1- (PL,PR to 1)				
4	Traumatic cataract at presentation (4 patients)	2-(>6/18) ,2- (>6/36 to 6/18)		
5 Presence of iris (vitroous in yound (10 patients) 3-(>6/18), 2-(6		3-(>6/18), 2-(6/18 to>6/36)		
5	Tresence of his / vitreous in wound (10 patients)	1-(>6/60 to 6/36), 1-(>1/60 to 6/60) 3-(PL,PR to 1/60)		
Mixed injuries including educated injuries $6 \cdot (>6/18), 6 \cdot (0)$		6-(>6/18), 6-(6/18 to>6/36)		
6	(24 patients)	4-(6/36 to>6/60), 3-(>1/60 to 6/60) 3-(PL,PR to 1/60) 2-		
		(NoPL/Def.PR)		
Total	56	56		

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BCVA after 6 Months Follow Up Table No.3

S.N.	BCVA Category	Numbers of the patients	Percentage
1	A (>6/18)	25	44.64%
2	B (6/18 to >6/36)	11	19.64%
3	C (6/36 to >6/60)	4	7.14%
4	D (>1/60 to 6/60)	5	8.93%
5	E (PL,PR to 1/60)	7	21.43%
6	F (No PL/Def. PR)	4	7.14%
	Total	56	100%

Figure-3



Type of injury and BCVA after the 6 months follow (Table no.3) Most of the patients is in the group of >6/18 counting 25 in number.

Type of Injury and BCVA after 6 Month of Follow Up Table No. 4

S.N.	Type of injury	No. of patients & category of BCVA at 6 months	
1	Corneal tear involving visualaxis (6 patients)	4-(>6/18), 2-(>6/36 to 6/18)	
2	Scleral tear (4 patients)	3-(>6/18), 1-(>6/36 to 6/18)	
3	Corneo-scleral tear (8 patients)	4-(>6/18), 2-(>6/36 to 6/18) 2-(>6/60 to 6/36)	
4	Traumatic cataract at presentation (4 patients)	3-(>6/18), 1-(>6/36 to 6/18)	
5	Presence of iris /vitreous in wound (10 patients)	3-(>6/18), 2-(>6/36 to 6/18), 2-(>6/60 to 6/36) 2-(1/60 to PL), 1-(No PL/Def.PR)	
6	Mixed injuries including adnexal injuries (24 patients)	8-(>6/18), 3-(>6/36 to 6/18) 2-(>6/60 to 6/36), 3-(>1/60 to 6/60), 5-(1/60 to PL,PR), 3-(No PL/Def.PR)	
Total	56	56	

It is very clear from the above table that most common pattern of the injuries was the 'mixed injuries including adnexal injuries' (24 patients) and second was 'presence of iris and vitreous in the wound'(10 patients). From the table no.2 & 4 it is clear that pattern of the injuries have significant impact on the final visual outcome in OGI. We also noted that there is also maximum numbers of postoperative complications in these two types of the OGI with final poor visual outcome. From the above data we can say that the majority of the penetrating or perforating injuries had visually handicapping nature¹¹.

Comparison of the Pattern of Injury and BCVA at Presentation and after 6 Month of Follow Up Table No. 5:

CN	True of inium	No. of patients & category of BCVA at	No. of patients & category of BCVA at	
5.IN.	I ype of injury	presentation.	6 months	
1	A-Corneal tear involving visual axis(2-(>6/18)	4 - (>6/18) ,	
	6 patients)	4- (>6/36 to 6/18)	2- (>6/36 to 6/18)	
2	P Solaral toor (4 patients)	2-(>6/18),	3- (>6/18) ,	
2	B-Scierar tear (4 patients)	2- (>6/36 to 6/18)	1- (>6/36 to 6/18)	
		1-(>6/18)	4 (>6/18)	
		4- (>6/36 to 6/18)	4 = (>0/10), 2 (>6/36 to 6/18)	
3	C-Corneo-scleral tear(8 patients)	1-(>6/60 to 6/36)	2 - (>0/50 to 0/18)	
		1- (>1/60 to 6/60)	2-(>1/00 to 0/00)	
		1-(1/60 to PL,PR)		
	D Traumatic externat at presentation	2-(>6/18),	3-(>6/18),	
4	D-Traumatic cataract at presentation	2- (>6/36 to 6/18)	1- (>6/36 to 6/18)	
	(4 patients)			
		3-(>6/18)	3-(>6/18)	
	E Presence of iris/vitroous in wound	2- (>6/36 to 6/18)	2-(6/18 to>6/36)	
5	(10 patients)	1-(>6/60 to 6/36)	2-(>6/60 to 6/36)	
		1- (>1/60 to 6/60)	2-(PL,PR to 1/60)	
		3- (1/60 to PL,PR)	1-(No PL/Def.PR)	
		6-(>6/18),	8-(>6/18)	
		6- (>6/36 to 6/18)	3- (6/18 to>6/36)	
6	F-Mixed injuries including adnexal	4- (>6/60 to 6/36)	2-(6/36 to>6/60)	
0	injuries (24 patients)	3- (>1/60 to 6/60)	3-(>1/60 to 6/60)	
		3- (1/60 to PL,PR)	5-(PL,PR to 1/60)	
		2- No PL/Def.PR	3-(No PL/Def.PR)	
	Total	56	56	

Abbreviations: BCVA-Best corrected visual acuity, No.- Number, 1-6 is the numbers of the patients.

Causes of Decrease BCVA and Blindness

In our study we found the following causes of low vision and blindness (Table no.6).

Table No. 6: showing causes of decrease vision and blindness

-	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		~
S.N.	Causes of decrease in vision and blindness	Number of patients	Percentage
1	Endophthalmitis+/- RD	8	14.29%
2	Early phthisical changes	4	7.14%
3	Amblyopia	2	3.57%
4	Uncontrolled Glaucoma+/- G.O.A.	6	10.71%
5	C.M.O.	2	3.57%
	Total	22 Out of 56	39.28%

Abbreviations: RD-Retinal Detachment, ETC-Early Phthisical Changes, G.O.A.-Glaucomatous Optic Artophy, ,C.M.O.-Cystiod macular Oedema

Figure-4



Abbreviations: ETC-Early Phthisical Changes, Endoph.- Endophthalmitis, G.O.A.-Glaucomatous Optic Atrophy, Uncont-Uncontrolled, C.M.O.- Cystiod macular Oedema

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Statastical Analysis

- Continuous variables like age are presented as mean.
- Categorical variables are expressed in actual numbers and percentage.

Examples of Cases Included in the Study A-Corneal tear involving visual axis



C-Corneo-scleral tears



E-Iris/Vitreous incarceration in wound



Preoperative and postoperative photographs 1) Pre operative



- p-value < 0.05 is considered as statistically significant.
- Statistical software STATA version 10.0 was used for data analysis.

B-Scleral tear:



D-Traumatic cataract at presentation



F-Mixed injuries





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2) Preoperative



3) Preoperative



4) Preoperative

Postoperative



Postoperative



Postoperative



5) Preoperative



Postoperative





Time of Injury, First Consultation and Surgical Repair

Table No.7: Showing the time of Injury and first visit to Ophthalmologist

S.N.	Time interval between trauma and first visit	Number of patients	Percentage
1.	< 6 Hrs.	11	19.64 %
2.	> 6 Hrs.	45	80.36 %
	Total	56	100 %

Abbreviations: Hrs.-Hours

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Now the time interval between the trauma and the first consult by ophthalmologist. Out of 56 patients only 11 patients consulted an ophthalmologist within 6 hours of injury who prescribe then few local antibiotics drops and

atropine and refer the patient to the our centre , rest 45 patients consulted ophthalmologist more than 6 hours but within the 24 hours of the injury (Table no.7).



Table No. 7 showing the difference in time interval between trauma and surgical repair. The time period between the occurrence of injury and treatment is also important in prevention of further dreaded complications like endophthalmitis. Study done by Subina Narang, Vishali Guptaet al⁴ showed that time interval between trauma and the repair is the single most important determinant of final visual outcome. and risk of the endophthalmitis. In our study 80.36% patients were consulted in >6 hours of trauma but repaired within 24 hours since time of injury. Health education to parents, teachers and child care providers through media can create awareness and can reduce this preventable cause of blindness. Majority of the trauma cases were accidental⁵ in nature as a result of natural curiosity and clumsiness in children. A small percentage was

Table No.8 BCVA at presentation
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due to quarrels amongst the children. Reported cases of trauma due to assault were found in older children who were involved in group fights. Prompt surgical intervention was given in all the open globe injuries (penetrating / perforating injuries, ruptured globe). After surgical intervention BCVA was noted in all the patients on day 1, day 7, 1 month, 3 months and 6 months.

Discussion

In general, children are more susceptible to eye injuries because they have immature motor skills and limited common sense⁹. They have a natural curiosity and are often seen imitating without regard to the risks and outcomes. Although most eye injuries are avoidable by simple preventive measures, many children suffer visual impairment that can affect their psychosocial development.

Study	Mary Esther, John B et al ⁶	Cecilia O, Ojabo et al ⁷	Our study
>6/18	25.60%	28.70%	28.57%
Rest of patients	74.40%	71.30%	71.43%

In most of the studies the BCVA at presentation is <6/18, a study by Mary Esther, John B et al⁶ shows that 25.6% of the patients presented with VA>6/18 at presentation. A study by Cecilia O, Ojabo et al⁷shows that 28.7% of the patients presented with VA>6/36 at presentation and thus

our study with 28.57% patients with >6/18 at presentation is comparable.

Table No.9 showing BCVA at 6 months follow up

S.N.	Study	>6/18	>6/36	6/36 to PL	No PL
			to 6/18		
1	Mary Esther, John B et.al ⁶	44.50 %	17.40%	30.90%	7.10%
2	MC Grieshaber,	39.80%	18.20%	28.90%	-
	R Stegmann et.al ⁸				
3	Our study	44.64%	19.64%	28.57%	7.14%

From the above table and studies, we can say that our study is comparable with the results.

A study done by Mary Esther, John B et.al⁶ studied total 156 eyes of 156 OGI and found that 56 patients i.e.35.89%. Out of total 56 patients in our study, 18 patients (32.14%) required secondary surgical intervention and thus our study is comparable. BCVA at 6 months in some patients <6/18 having most common causes was found to be corneal opacity, endophthalmitis with RD, secondary glaucoma and early phthisical changes etc.A study done by MC Grieshaber, R Stegmann et al⁸ studied total 78 children and found that 39.80% patients having final BCVA of >6/18, 18.20% patients >6/36 to 6/18 and 28.90% patients was having final BCVA of 6/36 to PL at the end of 6 months follow up. Thus from above discussion we can say that, most of the paediatric OGI are vision threatening and blinding in nature.

Conclusion

Final visual outcome in paediatric OGI depends upon the pattern of the globe injury and initial BCVA. Early and prompt medical and surgical intervention¹⁰ help to salvage vision and globe but the final outcome depends upon pattern and severity of injury. Prevention of penetrating ocular injury requires greater education of community, parents and children and their care takers especially on the potential dangers within the home⁹.Preventive safety measures, community education, literacy and awareness programs may help to decrease this types of the injuries.

Conflicts of Interest- None **Ethical Committee Approval-** April 2015

References

 Pieramici DJ, Sternberg P Jr, Aaberg TM Sr, Bridges WZ Jr, Capone A Jr, Cardillo JA, de Juan E Jr, Kuhn F, Meredith TA, Mieler WF, Olsen TW, Rubsamen P, Stout T. A system for classifying mechanical injuries If the eye (globe).The Ocular Tauma Classification Group. Am J Ophthalmol 1997;123(6):820-831

- Niiranen M, RaivioI. Eye injuries in children. Br J Ophthalmol 1981;65 (6):436-438
- Scribano, P. V., Nance, M., Reilly, P., Sing, R. F. and Selbst, S. M., Paediatric non powder firearm injuries: Outcomes in an urban paediatric setting. Paediatrics,1997, 100, e-5.
- Takvam, J. A. and Midelfart, A., Survey of eye injuries in Norwegian children. Acta Ophthalmol. (Copenh.), 1993, 71, 500– 505.
- Kuhn F, Morris R, Witherspoon CD, et al. The Birmingham Eye Trauma Terminology (BETT) system. J Fr Ophthalmol 2004;27:206-210.
- Subina Narang, MS; Vishali Gupta, MS; Prabhat S imalandhi, MS; Amod Gupta, MS; Srishti Raj, MS; Mangat R Dogra, MS, Paediatric Open Globe Injuries. Visual Outcome and Risk Factors for Endophthalmitis, Indian J Ophtha Imo 1 2004;52:29-34
- Schrader WF, Gramer E, Open globe injuries induced by glass bottles containing carbonated drinks. Graefes Arch Clin Exp Ophthalmol. 2010 Mar;248(3):313-7.
- Mary Eshter, John B et al,epidemiology and visual outcone in open globe injuries, International Journal of Ocular Oncology and Oculoplasty, January- March,2016; 1(1): 69-75

- Cecilia O. Ojabo, Keziah N. Malu, and Olasupo S. Adeniyi, Open Globe Injuries in Nigerian Children: Epidemiological Characteristics, Etiological Factors, and Visual Outcome, Middle East Afr J Ophthalmol. 2015 Jan Mar; 22(1): 69–73.
- 10. MC Grieshaber, R Stegmann, Eye (2006)20, 789–795 & 2006 Nature Publishing www.nature.com/eye
- 11. Shoja MR, Miratashi AM. Paediatric Ocular Trauma. Acta Med Iran. 2006;44:2.
- Grieshaber MC, Stegmann R, Penetrating eye injuries in South African children: aetiology and visual outcome.Eye (Lond). 2006 Jul; 20(7):789-95.
- 13. Takvam JA, Midelfart A, Survey of eye injuries in Norwegian children. Acta Ophthalmol (Copenh). 1993 Aug; 71(4): 500-5.