

## A retrospective analysis of open globe injuries in a tertiary ophthalmological centre in North-East India

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### Abstract

**Purpose:** To evaluate the clinical presentations and surgical outcome in patients with open globe injuries in a tertiary ophthalmological centre in North-east India. **Methods:** Case sheets of 79 patients undergoing surgery following open globe injuries at Sri Sankaradeva Nethralaya, Guwahati were studied retrospectively in terms of the type of injury, surgical interventions and final visual outcome. The period of study was from 1994-2005. **Results:** Injury was mild in 48 (60.8 %), moderate in 17 (21.5 %) & severe in 14 (17.7 %) cases (International Ocular Trauma Classification). 46 (58.2 %) cases had only primary repair, 27 (34.2 %) had associated lens extraction, 12 (15.2 %) had vitrectomy, 2 (2.5 %) had retinal detachment surgery, one (1.3 %) had intra-ocular foreign body removal, one (1.3 %) evisceration. 13 (16.5 %) cases underwent secondary procedures. Final vision was 6/18 or better in 20 (25.3 %), 6/18-6/60 in 14 (17.7 %) and <6/60 in 15 (18.9 %) cases. 10 (12.7 %) cases developed phthisical changes. **Conclusion:** Present analysis reveals that open globe injuries can present in varying severity & though the overall prognosis is grave, prompt surgical intervention can result in better visual outcome.

**Key words:** open globe injury, early attention, grave prognosis, visual outcome, phthisis.

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Ocular trauma which was once neglected has now gained attention as a major cause of visual morbidity. Around the world half a million blinding injuries occur every year, there are approximately 1.6 million people blind from eye injuries, 2.3 million bilaterally visually impaired and 19 million with unilateral visual loss; this being the commonest cause of unilateral blindness today. Maximum incidence is found in young adults and elderly<sup>5,6</sup> and is much more common in males<sup>7,8</sup>. As such, the cost of ocular trauma to the society is related not only to medical treatment, but also to a lifelong loss of productivity. Approximately half of all the patients present to an eye casualty department because of ocular trauma<sup>9,10</sup>. The globe injuries can be classified into open globe injuries and closed globe injuries. In an open globe injury there is a full thickness wound of the eye wall (corneo-sclera) whereas in a closed globe injury the eye wall does not have a full thickness wound<sup>11</sup>. The spectrum of injuries ranges from mild, non-sight threatening to extremely serious with potentially blinding consequences. Only 2-3% of all eye injuries require hospital admission and it is this small minority of cases that are of interest and concern with regard to management and outcome, and therefore have attracted most attention<sup>8,9</sup>.

In the present study, we did a retrospective analysis of 79 cases of open globe injury presenting to Sri

Sankaradeva Nethralaya, Guwahati, with regard to the clinical presentation, the time of presentation after injury and outcome of surgical management during 6 months follow up. Patients were identified, who had undergone open globe repair alone or with secondary repair. For grading the injuries, the anatomic and physiologic variables identified in the International Ocular Trauma Classification were used (Table 1). This classification system categorises open globe patients by:

1. Visual acuity at the time of presentation
2. Pupillary reaction in the affected eye.
3. The extent of laceration
4. The type of injury: penetrating, perforating and rupture with or without intra ocular foreign body.

The results of this suggests that the determinants for an acceptable outcome in patients with open globe injuries depend upon the severity of injury, time of presentation and institution of prompt treatment

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**Materials and methods**

This retrospective study included 79 cases of open globe injury that underwent surgical repair during 1994- 2005 at Sri Sankaradeva Nethralaya, Assam. Patients were identified by searching by diagnosis and surgical codes. Children in whom vision could not be recorded and patients with no light perception at the time of presentation were excluded from the study. Patient evaluation at presentation included

detailed history of the injury, Snellen’s visual acuity, slit lamp examination, intraocular pressure, fundus examination (if possible), and ultrasonography (wherever necessary).

The severity was graded as mild, moderate or severe on the basis of the score given to each factor as shown in table 1 (American Association for the Surgery of Trauma<sup>12</sup>).

**Table 1:** The ocular trauma severity score

Score	Visual Acuity	Pupil	Zone	Type
0		Negative		
1	>6/18	Afferent Pupillary Defect	I – isolated to cornea	Penetrating
2	6/18-6/60		II – 5mm posterior to Limbus	Perforating
3	<6/60		III – posterior to anterior 5 mm of the sclera	Rupture
4				IOFB
Mild: 3-5; Moderate: 6-8; Severe: 9-11				

The Surgical procedures were classified as Primary (performed following first presentation) and secondary (performed later following primary procedure). Surgeons at the institution had similar amounts of surgical experience and similar surgical approaches towards patients with open globe injuries. At our institution open globes or suspected open globes are emergently explored and repaired in the operating room. Corneal or scleral lacerations are primarily closed with non absorbable suture such as 8-0, 9-0 nylon. Uveal prolapse is either repositioned into the eye or excised. Vitreous at the wound if present is carefully excised. If needed IOL implantation after lens extraction, vitrectomy, IOFB removal or RD surgery is done at the same sitting. Post operatively patient receives broad spectrum topical and systemic antibiotics. As per requirements, depending upon the course of post-operative recovery, other secondary surgeries are performed. Patients’ ocular status at 6

months post-op. was taken as the final status. The vision was graded as good (VA 6/12 or better), fair (VA between 6/18 and 6/60) and poor (VA less than 6/60). It is seen whether the time of presentation after the injury had influenced the final outcome.

**Results**

There were 79 cases of open globe injury included in the study. Males were 69 and females were 10. Age of the patients varied between 04 to 70 years (mean 37 years). Follow-up was up to 6 months post-operatively. Out of the 79 cases, the nature of injury was penetrating in 71(89 %) and 08 (10.12 %) were blunt injuries. Injury was mild in 48 (60.8 %) cases, moderate in 17 (21.5 %) and severe in 14 (17.7 %) cases. At presentation, one (1.3 %) patient had visual acuity >6/18, 5 (6.3 %) had visual acuity between 6/18 to 6/60 and 73 (92.4 %) patients had visual acuity < 6/60 (Table 2).

**Table 2:** presenting visual acuity

Vision	No. of patients
≥6/12	01 (1.3%)
6/18-6/60	05 (6.3%)
<6/60	73 (92.4%)

All underwent surgery following initial general management. 46 (58.2 %) cases had only primary repair, 27 (34.2 %) had associated lens extraction, 11 (13.9 %) had intra-ocular lens implantation, 12 (15.2 %) had vitrectomy, 2 (2.5 %) had retinal detachment surgery, one (1.3 %) intra-ocular foreign body removal, one (1.3 %) evisceration. 13 (16.5 %) cases underwent secondary procedures: lens extraction in 9 (11.4 %) cases, intra-ocular lens implantation in 3 (3.8 %) cases, retinal detachment surgery in 7 (8.9 %), vitrectomy in 4 (5.06 %), intra-ocular foreign body removal in 1 (1.3 %) and evisceration in 3 (3.8

%) cases. (Table 3) Final visual outcome was good in 20 (25.3 %) cases, fair in 14 (17.7 %) cases and poor in 15 (18.9 %) cases (Table 4). 10 (12.7 %) cases developed phthisical changes. 20 (25.3 %) cases were lost to follow –up. Six out of 26 patients who received attention on the same day of injury regained vision up to 6/6. In 06 out of 46 patients receiving attention within a week regained vision up to 6/9 and one out of 07 patients receiving attention after 1 week had visual recovery up to 6/12.

**Table 3:** Surgical procedure

Surgical procedure		No. of patients
Primary:	Repair	46 (58.2%)
	Repair+lens extraction	27 (34.2%)
	Repair+IOL	11 (13.9%)
	Repair+vitrectomy	12 (15.2%)
	Repair+IOFB removal	01 (1.3%)
	Repair+RD surgery	02 (2.5%)
	Evisceration	01 (1.3%)
Secondary	Lens extraction	09 (11.4%)
	IOL	03 (3.8%)
	RD surgery	07 (8.9%)
	Vitrectomy	04 (5.06%)
	IOFB removal	01 (1.3%)
	Evisceration	03 (3.8%)

**Table 4:** Final visual status

Vision	No. of Patients
≥6/12	20 (25.3%)
6/18-6/60	14 (17.7%)
<6/60	15 (18.9%)

### Discussion

Open globe injuries can present with varying severities depending on the site of injury, nature of injury, associated damage, degree of haemorrhage, presence of intraocular foreign bodies and time of presentation<sup>14,15</sup>. Detailed history as regards time, place, nature of injury; thorough examination of the eyes including vision, papillary reflexes, slit lamp examination, intraocular pressure, dilated fundus examination (if possible), B-scan ultrasonography (if media is hazy / foreign body is suspected), and immediate institution of antibiotic and / or antifungal eye drops, cycloplegics, osmotic agents, systemic

antibiotics, analgesics, tetanus toxoid injection depending on the case is a must.

Though open globe injuries are associated with a poor visual and anatomical outcome, this study suggests that the institution of prompt treatment has an important effect on the final outcome. An open eye should be repaired as soon as possible and repair of a rupture or penetrating wound should always be attempted, even in an apparently disrupted eye, as it is not possible to predict the prognosis at the time of presentation. Scleral lacerations or ruptures require primary closure as soon as possible to restore normal anatomical relationships and reform the collapsed eye

without incarceration of uveal tract or vitreous in the wound<sup>13</sup>. Associated procedures which might be required are lens extraction with or without intra-ocular lens implantation, vitrectomy, intra-ocular foreign body removal, retinal detachment surgery. Secondary procedures including lens extraction, retinal detachment surgery, vitrectomy, intra-ocular foreign body removal might also be required later on. This study analyzed 79 cases of open globe injuries which presented at different intervals following injury with varying degrees of severity. Male patients outnumbered females (69:10) and was more common in the active age group. All patients received attention immediately on presentation. Surgical intervention was required in all the cases. Visual recovery was noticeably better in patients who presented early, but it was also dictated by the severity of injury. At the end of 6 months, 20 (25.3 %) patients regained good vision, 14 (17.7 %) patients regained fair vision and 15 (18.9%) regained poor vision. 4 (5.06 %) cases had evisceration and 10 (12.7 %) cases developed phthisical changes.

A review of experience indicates a very significant impact of eye injuries in terms of medical care, needs for vocational rehabilitation and great socio-economic costs<sup>2</sup>. Though the prognosis of open globe injuries has improved with the development of advanced microsurgical techniques and better understanding of tissue reaction to trauma<sup>13</sup>. However, the present study has some limitations. Firstly, the time interval up to the second surgical intervention and its course has not been studied owing to limited patient documentation or irregular numbers of follow-up. Secondly, the range of final visual acuity has not been seen who had presented on the same day, within a week or one week after the injury, so as to keep the study confined to one aim only. This study suggests that the severity of injury, time of presentation and institution of prompt treatment are also very important determinants in the final visual and anatomical outcome. Therefore, given the large number of patients at risk of visual impairment due to ocular trauma warrants the use of protective eye wears during work, sports, travel etc. which carries chances of injury, because, prevention is the best cure. Also, it warrants early referral of such cases by the attending doctor to well equipped centres having trained and experienced ophthalmologists.

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