

## A Retrospective Study to Evaluate Factors & Compare Results with OTS Scoring in Open Globe Injuries with IOFB Managed with Single Step Procedure

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Conflict of interest: Nil

### Abstract

**Aim:** The aim of the present study was to evaluate factors & compare results with OTS scoring in open globe injuries with IOFB managed with single step procedure.

**Methods:** A retrospective study was conducted on 22 eyes of 22 patients with perforating injury with retained IOFB at Department of Ophthalmology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from August 2017 to July 2018

**Results:** All the patients categorised under score 1 & 3 had better visual acuity gain compared to predicted by OTSI scoring system while in score 2, 80% patients attained more than predicted visual acuity. In this study, besides the patients with central visual axis involvement, the patients with non-metallic foreign body & who presented within 24 hours of injury showed less improvement in visual acuity. This paradox occurs because of the macular involvement in those cases.

**Conclusion:** International OTS factors had predictive value of 80% in general. Besides the factors included in OTS system, delayed presentation, Visual axis involvement, vegetative foreign body & macular involvement, negatively influences the prognosis. Early management by combined techniques leads to better outcomes & visual gains as predicted.

**Keywords:** penetrating injury, intra-ocular foreign body, combined procedure

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### Introduction

Retained posterior segment intraocular foreign bodies (RIOFBs) in open globe ocular injuries account for 18-40% of all ocular trauma cases. [1,2] Management of RIOFBs remains a challenge despite the advances in the surgical techniques. Most commonly posterior segment RIOFBs are removed after enlarging one of the sclerotomy ports. Enlargement of sclerotomy is associated with intraoperative complications such as hypotony, vitreous hemorrhage, incarceration of the retina in the wound intraoperatively and retinal detachment postoperatively. [3-5]

Late onset complications such as macular pucker, fibrovascular proliferations, retinal detachment and proliferative vitreoretinopathy also remain the major causes of concern in these eyes. [6-8] Limbal route of RIOFB has also been described for large RIOFBs with standard 20-gauge vitrectomy. [9] Improvement in surgical techniques has resulted in less invasive and less traumatic procedures for the

treatment of posterior segment disorders. Sutureless posterior segment surgery has the advantages of faster wound healing, minimal surgical trauma, decreased convalescence period besides reduced postoperative astigmatism. [10] Theoretically speaking, sutureless transconjunctival surgery may have no role in cases with RIOFB, as scleral port enlargement is necessary to facilitate the removal of foreign body. Kiss et al [11] have described 25-gauge transconjunctival sutureless pars plana vitrectomy for removal of RIOFB after enlarging one port to 20-gauge. Enlargement of the sclerotomy port makes these eyes prone to risk of developing sclerotomy-related complications.

The aim of the present study was to evaluate factors & compare results with OTS scoring in open globe injuries with IOFB managed with single step procedure.

## Materials and Methods

A retrospective study was conducted on 22 eyes of 22 patients with perforating injury with retained IOFB at Department of Ophthalmology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from August 2017 to July 2018. After taking informed consent each eye underwent combined procedure including Tear repair + lens / IOL (Intra Ocular Lens) extraction + vitrectomy + IOFB removal. Tamponading agent or intra-vitreous antibiotics were used in cases where needed.

## Surgical Procedure

After receiving informed consent from patient, surgery was performed mostly under local anaesthesia. In all cases, tear repair was done followed by lens / IOL extraction, 23 Gauge PPV with Alcon constellation was performed using a noncontact wide-angle viewing system (Oculus BIOM). Core vitrectomy was followed by PVD

induction. Membranes were peeled followed by IOFB removal. In cases of retinal detachment PFCL was used to flatten the retina and then PFCL – Air exchange was done. Endolaser photocoagulation using curved probe and was applied around the retinal tear and 360° to the vitreous base followed by tamponade. Cases with endophthalmitis received intra-vitreous antibiotic agents.

## Characteristics

Patient characteristics like age, gender and duration of trauma (first presentation after injury) were obtained. Other features like visual acuity, location of foreign body, involvement of visual axis, nature of foreign body, status of macula, associated retinal detachment and endophthalmitis were summarized. Prognosis was calculated & compared with OTS scoring & raw score factors.

## Results

**Table 1: Prognosis as compared to OTS factors**

OTS factors					
Score	NPL	PL/HM	1/200-19/ 200	20/200-10/50	>=20/40
1 (n=6)	0	0	2 (66.6%)	1 (33.3%)	0
2 (n=10)	0	1 (20%)		3 (60%)	1 (20%)
3 (n=6)	0	0	0	1 (33.3%)	2 (66.6%)
According to OTSI					
Score	NPL	PL/HM	1/200-19/ 200	20/200-10/50	>=20/40
1	73%	17%	7%	2%	1%
2	28%	26%	18%	13%	15%
3	2%	11%	15%	28%	44%

All the patients categorised under score 1 & 3 had better visual acuity gain compared to predicted by OTSI scoring system while in score 2, 80% patients attained more than predicted visual acuity.

**Table 2: Prognosis depending on duration of presentation**

Duration < 1 day (n= 12)	Post-op			
Pre-op	PL/HM	1/200-19/200	20/200-20/50	>=20/40
PL/HM	2 (33.3%)	2 (33.3%)	0	0
1/200-19/200	0	0	2(100%)	0
20/200-20/50	0	0	4(66.6%)	2(33.3%)
>=20/40	0	0	0	0
Duration >= 1 day (n= 12)	Post-op			
Pre-op	PL/HM	1/200-19/200	20/200-20/50	>=20/40
PL/HM		2 (33.3%)	2(50%)	0
1/200-19/200	0	0	2(33.3%)	4(66.6%)
20/200-20/50	0	0	0	0
>=20/40	0	0	0	0

**Table 3: Prognosis depending upon visual axis involvement**

Central wound (n=6)	Post-op			
Pre-op ↓	PL/HM	1/200-19/200	20/200-20/50	>=20/40
PL/HM	2 (33.3%)	2 (33.3%)	2 (33.3%)	0
1/200-19/200	0	0	0	0
20/200-20/50	0	0	0	0

>=20/40	0	0	0	0
Away from centre (n=16)	Post-op			
Pre-op ↓	PL/HM	1/200-19/200	20/200-20/50	>=20/40
PL/HM	2 (50.0%)	0	2 (50.0%)	0
1/200-19/200	0	0	6 (100%)	0
20/200-20/50	0	0	6 (100%)	0
>=20/40	0	0	0	0

**Table 4: Prognosis depending upon nature of foreign body**

<b>Metallic FB (n=18)</b>	<b>Post-op</b>			
Pre-op ↓	PL/HM	1/200-19/200	20/200-20/50	>=20/40
PL/HM	2 (25%)	2 (50%)	2 (25%)	0
1/200-19/200	0	0	2 (33.3%)	4 (66.6%)
20/200-20/50	0	0	2 (50%)	2 (50%)
>=20/40	0	0	0	0
<b>Non Metallic FB (n=18)</b>	<b>Post-op</b>			
Pre-op V/A	PL/HM	1/200-19/200	20/200-20/50	>=20/40
PL/HM	0	0	0	0
1/200-19/200	0	0	2 (100%)	0
20/200-20/50	0	0	2 (100%)	0
>=20/40	0	0	0	0

**Table 5: Macular involvement**

<b>Macular involvement (n=6)</b>	<b>Post-op V/A</b>			
Pre-op V/A	PL/HM	1/200-19/200	20/200-20/50	>=20/40
PL/HM	2 (33.3%)	4 (66.6%)	0	0
1/200-19/200	0	0	0	0
20/200-20/50	0	0	0	0
>=20/40	0	0	0	0
<b>Away from Macula (n=18)</b>	<b>Post-op V/A</b>			
Pre-op V/A	PL/HM	1/200-19/200	20/200-20/50	>=20/40
PL/HM	0	0	2 (100%)	0
1/200-19/200	0	0	4 (50%)	4 (50%)
20/200-20/50	0	0	4 (66.6%)	2 (33.3%)
>=20/40	0	0	0	0

In this study, besides the patients with central visual axis involvement, the patients with non-metallic foreign body & who presented within 24 hours of injury showed less improvement in visual acuity. This paradox occurs because of the macular involvement in those cases. (Table 2-5)

**Discussion**

Final visual outcome depends on various variables, which were given by International classification of ocular trauma. [12] Kuhn et al [13] suggested Ocular trauma score (OTS) system in open globe injuries to predict final visual outcome +. The six variables i.e. initial visual acuity, relative afferent papillary defect (RAPD), globe rupture, endophthalmitis, perforating injury and retinal detachment, were assigned numerical raw points which cumulatively calculate OTS. The probability of attaining range of visual acuity post-injury is stratified into five categories depending upon the score.

All the patients categorised under score 1 & 3 had better visual acuity gain compared to predicted by OTSI scoring system while in score 2, 80% patients attained more than predicted visual acuity. In this study, besides the patients with central visual axis involvement, the patients with non-metallic foreign body & who presented within 24 hours of injury showed less improvement in visual acuity. This paradox occurs because of the macular involvement in those cases. Though, incidence of trauma with metallic foreign body is more common, but more chances of endophthalmitis & difficulty in removal, usually leads to poorer prognosis in organic foreign bodies. Another strong predictor is Endophthalmitis. [14] Like in our series, male preponderance is seen in open globe injuries in various studies. [15,16] Except in a study by Agrawal et al [17] most of the studies pre-operative VA was shown to be most important prognostic factor [18] in open globe injuries. But, in these studies cases with endophthalmitis & IOFB were excluded. OTS

system effectively predicts final visual acuity gain in almost 80% of patients depending upon the raw scores. Patients with initial score of 1 have poorest final visual outcome while those with score of 5 have higher probability of better visual gain. [13] Besides the factors included in OTS, the other factors which can predict final visual outcome in open globe injuries with IOFB are: time of presentation, involvement of visual axis, involvement of macula & timing of surgery (specially in cases of retained IOFB, associated retinal detachment or endophthalmitis).

### Conclusion

International OTS factors had predictive value of 80% in general. Besides the factors included in OTS system, delayed presentation, Visual axis involvement, vegetative foreign body & macular involvement, negatively influences the prognosis. Early management by combined techniques leads to better outcomes & visual gains as predicted.

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