



Posterior segment foreign body: single step combined procedure i.e. tear repair with vitrectomy with intra ocular foreign body (IOFB) removal

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Abstract

Aim: To evaluate factors & compare results with OTS scoring in open globe injuries with IOFB managed with single step procedure

Methods: Retrospective analysis of 22 cases with perforating injury with retained IOFB between January 2017- October 2018. Factors studied were nature of injury, nature of foreign body, time of presentation, & other raw score factors. Patients underwent tear repair with vitrectomy with IOFB removal as a single step procedure. Pre op factors affecting final outcome & post op visual acuity was analysed based on OTS scoring.

Results: Mean follow up was 6 months. Males were pre-dominantly affected. 54.6% presented within 1 day compared to 45.4% who presented after 1 day of injury. 20/200-20/50 post op vision was attained in 87.5% in non-centre involving wound while 33.33% in centre involving wound. 66.6% patients had final vision in the range 1/200-19/200 or 20/200-20/50 in OTS -1, while its 80% in OTS -2 & 100 % in OTS -3 in vision range 20/200-20/50 & 20/40

Conclusion: Patients with wound of entry away from visual axis, non-metallic foreign body & no associated infection had better visual prognosis. Ocular trauma score in this study is better compared with international ocular trauma scoring system.

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

Introduction

Retained Intraocular Foreign Body (IOFB) after penetrating injury is common form of ocular injury [1]. 17-41% of open globe injuries presents with retained IOFB. Penetrating injury with IOFB is a major cause of occupational hazard & outdoor activities specially in young adult males, leading to major socio-economic burden. Initial poor visual acuity [1, 3, 8, 13], afferent pupillary defect [1, 4, 6, 8, 9], uveal prolapse [1], hyphema [1, 9], vitreous hemorrhage [1, 6, 9, 10] and retinal detachment [1, 6, 8, 15] are poor visual prognostic factors.

Final visual outcome depends on various variables, which were given by International classification of ocular trauma [7]. Kuhn *et al.* 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 [6].

Study design

A retrospective observational study was conducted on 22 eyes of 22 patients with perforating injury with retained IOFB from January 2017 – October 2018 at a tertiary care centre, by a single retinal surgeon. 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. The study was performed according to ethical standards of the Declaration of Helsinki after approval from the ethics committee.

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

22 eyes were divided according to OTSI scoring system. In our study, patients were categorised into 1 (n=6), 2 (n=10) & 3 (n=6) only. As evident by Table 1, 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. Tables 2-5, shows the pre & post visual acuity according to various factors like duration of presentation, visual axis involvement, nature of foreign body & status of macula. 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 1: Prognosis as compared to OTS factors

Our Study					
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%

Table 2: Prognosis depending on duration of presentation

Duration < 1 day (n= 12)	Post-op			
	PL/HM	1/200-19/200	20/200-20/50	>=20/40
Pre-op				
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			
	PL/HM	1/200-19/200	20/200-20/50	>=20/40
Pre-op				
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			
	PL/HM	1/200-19/200	20/200-20/50	>=20/40
Pre-op ↓				
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			
	PL/HM	1/200-19/200	20/200-20/50	>=20/40
Pre-op ↓				
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

Metallic FB (n=18)	Post-op			
	PL/HM	1/200-19/200	20/200-20/50	>=20/40
Pre-op ↓				
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
Non Metallic FB (n=18)	Post-op			
	PL/HM	1/200-19/200	20/200-20/50	>=20/40
Pre-op V/A				
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 (n=6)	Post-op V/A				
	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
Away from Macula (n=18)	Post-op V/A				
	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

Discussion

Open globe injuries are common in young working age groups and are often preventable cause of permanent visual impairment and visual loss. Conventional practice include primary surgical closure of the globe in order to restore structural integrity of the globe at the earliest. Factors which significantly affects visual acuity includes age [8, 9], type or mechanism of injury, [6, 9, 11] initial VA, [1, 3, 8, 13] presence of RAPD [1, 4, 6, 8, 9], location of open globe wound [6, 9, 10], hyphema [1,9], vitreous hemorrhage [1, 6, 9, 10], retinal detachment [1, 6, 8, 15], and presence and type of intraocular foreign body [15]. 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 [16]. Like in our series, male preponderance is seen in open globe injuries in various studies [17, 18]. Except in a study by Agrawal et al. [9], in most of the studies pre-operative VA was shown to be most important prognostic factor [6, 8, 15] 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 [6]. 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). In our case series, 66.6 % of cases achieved visual acuity in range between 1/200 – 19/200 & 33.3 % between 20/200 – 20/50 in patients with initial score of 1 compared to 7% & 2% respectively according to OTS. Similarly, patients with initial score of 2, achieved vision in range of 20/200-20/50 in 60% & >= 20/40 in 20% of patients compared to 13 % & 15 % respectively according to OTS. In patients with score 3, 66.6% patients achieved vision of >= 20/40 compared to 44% as predicted by OTS. When the interplay between duration of presentation & treatment, visual axis involvement & nature of foreign body was taken in to consideration, more than 80% of patients in our case series achieved better results as predicted by OTS, when they underwent combined surgery in one go. Hence, detailed assessment of patients in terms of all the other associated factors, besides OTS factors, & prompt management in patients with penetrating injuries with retained IOFB in form of combined

procedure helps in salvaging vision & integrity in more than expected patients as predicted by international OTS score. Proper counselling of patients, keeping in mind the other factors which can adversely affects vision gain & also early combined management helped us in achieving better results in our case series

Conclusion

International OTS factors has 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.

Limitations: Small sample size. Further studies needed to study influence of other factors & early combined surgery for prognostication

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