

Outcome of combined pars plana vitrectomy and scleral fixated intraocular lens for the treatment of ocular trauma

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Abstract

• **AIM:** To determine the efficacy of combined pars plana vitrectomy (PPV) with primary scleral fixated intraocular lens (IOL) in patients with ocular trauma.

• **METHODS:** A retrospective case series descriptive study. A consecutive 8 patients of ocular trauma which underwent combined PPV with primary scleral fixated IOL at the University Malaya Medical Centre were reviewed. One patient had bilateral injury making it 9 eyes for analysis. The presenting visual acuity, technique of surgery, complications and outcomes were analyzed.

• **RESULTS:** Vision improved in 8 out of the 9 eyes (89%). The major postoperative complication noted was an elevated intraocular pressure while suture breakage was not noted in our series.

• **CONCLUSION:** Combined PPV and sutured IOL has a good outcome in eyes with history of trauma.

• **KEYWORDS:** ocular trauma; pars plana vitrectomy; scleral fixated lens

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INTRODUCTION

Blunt or perforating eye injuries are encountered in the emergency eye clinic and they can involve either the anterior or the posterior segment or both. These patients can have a multitude of ocular complications including lens related problems such as cataract^[1], injury to the zonules or the posterior capsule^[2,3]. Some of these cases may also have additional posterior segment complications which may require vitreoretinal interventions. Most of the articles published previously on surgical correction of aphakia included various causes of aphakia but we focused only on trauma cases.

Aphakic correction in the absence of posterior capsular support may be achieved by implantation of the IOL in the anterior chamber or the intraocular lens (IOL) may be sutured to the iris or to the sclera. Correction of aphakia in traumatized eyes can be challenging due to the altered anatomy. Anterior chamber IOL are historically associated with corneal decompensation, glaucoma, uveitis and cystoid macular edema (CME)^[4]. The corneal and angle changes post trauma further predispose these patients to the above mentioned complications.

In this retrospective study we analysed records of patients who had undergone pars plana vitrectomy (PPV) with primary scleral fixated lens post trauma, either blunt or penetrating had minimum of 24 months of follow-up. The intra- and post-operative complications as well as the final visual outcome were studied.

MATERIALS AND METHODS

Materials Nine eyes of eight patients (5 males and 3 females; mean age 54.1 years; range from 26 to 76 years) with a mean follow-up of 39.6±9.2 months (mean±standard deviation) were included in this study. The maximum follow-up was 54 months and minimum 29 months. One of the patients had penetrating injury to both eyes.

The records of all the patients with history of ocular trauma, who had undergone combined PPV and scleral fixated sutured IOL implantation were reviewed retrospectively. These patients had undergone the procedure at the University Hospital, Kuala Lumpur, Malaysia from January 2010 to March 2011.

The parameters obtained from the records included the demographic data, type of ocular injury (blunt or penetrating), lens status at the time of vitrectomy, pre- and postoperative visual acuity (VA), intra- and postoperative complications and the last follow-up date. The postoperative complications were divided into early (<2 weeks) and late (>2 weeks) and Snellen visual acuity was converted to the logarithm of the minimum angle of resolution (logMar) units for analysis after literature review^[4]. Counting fingers were converted to 2.0, hand movements to 2.3 and light perception to 3.0^[4]. Preoperatively the patients had undergone a thorough eye assessment including visual acuity and slit-lamp examination. The IOL power had been calculated using the SRK II formula and was chosen after considering the refractive error and the status of the crystalline lens of the fellow eye.

Table 1 Clinical characteristics of patients

No	Age (yrs)	Sex	Nature of the trauma	Status of the lens and retina at the time of surgery	Preoperative VA (logMar unit)	Postoperative VA (logMar unit)
1	62	F	Penetrating injury, primary repair done.	Aphakic with vitreous haemorrhage	2.0	0.3
2	62	F	Penetrating injury, primary repair done.	Aphakic with vitreous haemorrhage	2.0	2.3
3	76	F	Penetrating injury, primary repair done.	Lens in anterior chamber with vitreous haemorrhage	2.3	2.0
4	49	M	Penetrating injury, primary repair done.	Lens in anterior chamber with vitreous haemorrhage	3.0	1.0
5	57	M	Blunt injury 4 months prior to presentation.	Aphakia with vitreous haemorrhage. Lens in vitreous cavity	1.0	0.3
6	50	M	Blunt injury about 10 years ago	Lens in vitreous cavity	1.0	0.3
7	26	M	Penetrating injury 2 months prior to presentation. Primary repair done.	Lens in vitreous cavity with mild vitreous haemorrhage	1.0	0.6
8	50	F	Blunt trauma about 40 yrs ago.	Lens in vitreous cavity	2.0	1.0
9	55	M	Blunt trauma 10 yrs ago	Lens in vitreous cavity	2.3	1.0

F:Female; M:Male; VA:Visual acuity; logMar:Logarithm of the minimum angle of resolution.

All the patients were implanted with the Alcon CZ70BD single piece PMMA IOL. All the 8 patients were aphakic at baseline and lacked adequate capsular support. The crystalline lens of the patient with bilateral injury had extruded through the laceration site at the time of injury and there was near total aniridia. 2 eyes had their lens dislocated in the anterior chamber and in the other 2 eyes the lens had dislocated in the vitreous cavity. All the patients underwent PPV with scleral fixation of IOL.

Methods The surgical technique was standard as it was performed by the same vitreoretinal surgeon. Two 3mm long partial thickness sclerotomies were made at the 3 and 9 o'clock positions, 2mm from the limbus. Three port PPV and necessary retinal surgery were performed. At the end of vitrectomy a 7.5mm limbal wound was made and viscoelastic injected to protect the endothelium. Anterior chamber was maintained by a slow infusion. A 10-0 polypropylene suture on a straight needle was inserted parallel to and behind the iris, through the inferior end of the partial thickness sclerotomy at 3 o'clock position. A 30 gauge disposable needle was passed through the limbal section and the 10-0 propylene straight needle was engaged in the barrel of the hollow bore needle. The 30 gauge needle was pulled out through the limbal section and the suture was threaded through the eyelet of the haptic. Next the same 30 gauge needle was inserted through the superior part of the sclerotomy at the 3 o'clock and the straight needle fed into the barrel of the 30 gauge needle. Subsequently the 30 gauge needle was withdrawn and the same process repeated at the 9 o'clock position. Following this the IOL was inserted into the sulcus and once the slack was removed from the suture the lens rotated in position. The sutures were tied and the polypropylene buried in the partial thickness sclerotomies and covered by conjunctiva. The limbal wound was closed using 10-0 nylon. At the end of surgery all patients were given subconjunctival dexamethasone (4mg) and cefuroxime (125mg).

Statistical Analysis The data was analysed using SPSS 17.0 (SPSS, Inc., Chicago, Illinois, USA). Relationships between preoperative and postoperative variables were analyzed using non-parametric tests like Wilcoxon Signed Rank test and Chi-square test. In the statistical analysis significance level was set at 0.05.

RESULTS

Blunt injury accounted for 4 of the eyes and penetrating injury for the other 5 eyes. All the penetrating injuries were secondary to motor vehicle accidents (MVA). All the 4 patients (5 eyes) with penetrating injury had undergone primary repair post trauma. The clinical characteristics of the patients are summarized in Table 1.

The mean preoperative VA was 1.84 ± 0.70 and postoperative 0.977 ± 0.73 . There was a significant difference in pre- and postoperative VA. (Wilcoxon Signed Rank test, $P=0.013$).

8 out of the 9 eyes had no intraoperative complications. In one eye small localized choroidal effusion developed due to improper insertion of 4 mm infusion cannula, hence it was removed and a 6 mm infusion cannula was inserted.

The main early postoperative complication was elevated intraocular pressure (IOP) in 4 out of the 9 eyes (44%), for which topical antiglaucoma had to be started. Transient corneal edema was noted in 3 out of 9 eyes (33%), due to elevated IOP. None of the cases had hyphaema or vitreous haemorrhage in the early postoperative period. Lens decentration was also not noted.

In the late postoperative period the IOP remained elevated in the same four cases for which the antiglaucoma had to be continued. However none of them had to undergo any surgical intervention for the control of IOP. The patient with bilateral injury developed retinal detachment in the left eye and required a second vitrectomy with silicon oil but developed re-detachment again. In all the other cases the retina remained flat. The other problem encountered in the postoperative period was glare in 3 eyes (33%) and a compromise of visual

acuity in 3 eyes (33%) due to central corneal scar. Patients who complained of glare had near total aniridia. Black diaphragm IOL was not used in these patients due to financial constraints. In our case series suture breakage with subluxation or dislocation of the IOL was not noted.

DISCUSSION

The implantation of posterior chamber IOL has the advantage of being closer to the focal point of the eye, thus minimizing magnification effects, anisocoria and pseudophacodonesis^[5]. However at the same time, implantation of a scleral fixated IOL involves risks such as vitreous haemorrhage, retinal breaks and retinal detachment^[5,6].

In our case series the intraoperative and early postoperative complications were mild and none of them required any surgical intervention. The major late postoperative complication noted was an elevated IOP (44%) and a similar rate has been noted in few other studies^[5,7,8]. The higher incidence of elevated IOP could be due to the fact that all these eyes had sustained significant trauma previously, predisposing them to a higher risk of developing glaucoma.

Vision improved in 8 out of the nine eyes (89%). One of the large series has also reported significant improvement in visual acuity^[4]. Recurrent retinal detachment was the cause of poor vision in one of the eye (11%) and a similar incidence of late retinal detachment has been noted in another large study^[9].

Suture breakage with subluxation or dislocation of IOL has been reported as a major late complication in few studies^[9].

We do not report any case of suture breakage during our follow-up. This may be because most of our patients were in the older age group and suture breakage is mostly encountered in younger age group^[9], in whom active lifestyle could be one of the factors contributing to suture breakage.

A few studies have been published regarding combined PPV and sutured IOL^[5,9-11] and to the best of our knowledge this is the first case series where all the cases included were trauma cases. The drawback of this case series is the small sample size. Large sample size with longer follow-up period will provide a better picture of the usage of scleral fixated IOL in trauma cases.

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玻璃体切割术联合人工晶状体巩膜固定术治疗眼外伤的疗效

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摘要

目的:探讨玻璃体切割术(pars plana vitrectomy, PPV)联合人工晶状体(intraocular lens, IOL)巩膜固定术治疗眼外伤的疗效。

方法:系列病例回顾性分析。将马来西亚大学医学中心接受PPV联合IOL巩膜固定术的8例连续性病例纳入研究,其中1例患者双眼均受伤,共有9眼。对现阶段视力,手术技巧,并发症及术后疗效进行分析。

结果:9眼中有8眼(89%)视力提高。术后主要并发症是眼压升高,无缝线破裂。

结论:PPV联合IOL巩膜固定术对有眼外伤病史的患者有非常好的疗效。

关键词:眼外伤;玻璃体切割术;人工晶状体巩膜固定术