Simultaneous posterior chamber intraocular lens implant combined with vitreoretinal surgery for intraocular foreign body injuries

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Abstract

Purpose To evaluate the safety of simultaneous posterior chamber intraocular lens (IOL) implant combined with complex vitreoretinal surgery for ocular trauma due to intraocular foreign body (IOFB).

Methods We undertook a retrospective analysis of 10 patients who had undergone simultaneous cataract extraction, vitreoretinal surgery, removal of IOFB and posterior chamber IOL implant, for ocular trauma due to IOFB. The visual outcome and complications were noted. The surgical procedure is described.

Results Ten young, male patients were followed for 5–30 months post-operatively. The post-operative visual acuity in the operated eye remained the same or improved as compared with their pre-operative vision. Eight patients had a visual acuity of 6/9 or better. One patient developed post-operative infective endophthalmitis. Three patients had retinal detachment post-operatively. The IOL was stable in all patients.

Conclusions Simultaneous posterior chamber IOL implant with vitreoretinal surgery is safe in selected cases of severe ocular trauma due to IOFB. It allows early visual rehabilitation of young, working patients.

Key words Vitreoretinal surgery, Intraocular lens, Trauma, Intraocular foreign body

Controversy exists over the contraindications to simultaneous intraocular lens (IOL) implant with surgery for severe ocular trauma.¹ Penetrating injuries involving the posterior segment often have devastating consequences and simultaneous IOL implant has previously been considered inadvisable. This leaves the patient with the problems of monocular aphakia. In the past, several authors have

advocated combining cataract extraction with posterior chamber IOL implants in patients with cataract and vitreoretinal diseases,^{2–5} but recently surgeons have performed this surgery on selected trauma cases. We studied the long-term results of 10 patients undergoing simultaneous posterior chamber IOL implant along with complex vitreoretinal surgery in the setting of penetrating trauma due to intraocular foreign body (IOFB) with lens damage.

Methods

Case notes of 10 patients who had undergone the above mentioned surgery between June 1992 and July 1995 were reviewed. The surgery had been performed either at Birmingham and Midland Eye Centre or at the Wolverhampton and Midland Counties Eye Infirmary. Pre-operative data compiled included age, sex, cause of injury, usage of protective glasses, time of presentation, entry site, visual acuity, severity of ocular trauma and location of the IOFB, which was confirmed with either radiotherapy, CT scan or ultrasound scan.

These patients had the following similar features: small corneal entry wound, traumatic cataract, IOFB and no evidence of intraocular infection. Cataract surgery was performed either to obtain a view for posterior segment injury assessment and treatment or to maintain the view of the posterior segment post-operatively.

Surgical procedure

All operations were done under general anaesthesia. The corneal wound, if not self-sealing, was closed with interrupted 10/0 nylon. A standard three-port pars plana sclerostomy was set up 3.5 mm behind the limbus. Nine patients had lensectomy performed through the pars plana taking care to leave behind adequate lens capsule for IOL

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support. In one patient lens aspiration was performed through two corneal swab wounds. Vitrectomy was then performed and the IOFB removed with either forceps or an extraocular magnet. The posterior hyaloid face was separated. Retinal breaks were treated with cryopexy or laser. Through a corneal section and using a viscoelastic cover the posterior chamber IOL was then placed either in the sulcus in front of the anterior capsule or in the capsular bag. The position of the IOL was based on the availability of lens capsule. The corneal section was sutured with 10/0 nylon. Central anterior capsulectomy was performed using the vitrectomy cutter through the pars plana in cases of sulcus-fixated IOL. Retinal cryopexy was applied posterior to the entry sites. Sclerostomies were closed and the conjunctiva sutured. A subconjunctival steroid and antibiotic injection was given at the end of the operation (lensectomy/vitrectomy/IOFB removal/IOL implant/± anterior capsulectomy).

IOL power was calculated from biometry of the fellow eye and previous refraction results, wherever available.

Frequency of post-operative examinations was based on the eye findings. The data collected included visual acuity, post-operative complications, IOL stability and the duration of follow-up.

Results

Between June 1992 and July 1995, 29 patients presented to the two hospitals with ocular trauma due to IOFB. Of these, 10 male patients aged 21–44 (mean 32.3) years were deemed suitable to have vitreoretinal surgery with simultaneous posterior chamber IOL implant. Only 2 of

the 10 patients were wearing some form of protective eye glasses at the time of the injury. All were work-related injuries. The right eye was involved in 6 patients and the left in 4. Nine patients presented to the casualty within 6 h and the tenth within 12 h. The corneal entry wound was less than 3 mm in 9 patients and 5 mm in the remaining patient. Two of these patients had a primary repair of the corneal wound. All 10 patients had cataract to a varying extent. In 7 patients the IOFB was located on the retina and 3 in the vitreous. Six patients had retinal breaks and one a vitreous haemorrhage.

The vitreoretinal surgery with IOL implant had been performed within 24 h in 4 patients, 24–48 h in 2 patients, 3–5 days in 3 patients and at 14 days in 1 patient. Additional operations included one explant for retinal tear, cryopexy/laser to retinal breaks and IOFB impaction sites. Three patients needed intraocular sulphur hexafluoride gas injection. Operative complications included retinal tear posterior to the sclerostomy in one patient and an iatrogenic retinal detachment during separation of the posterior hyaloid face in another.

The patients have been followed post-operatively for 5–30 (mean 13.3) months. One patient developed post-operative endophthalmitis 3 days following the surgery. The organism was identified as *Staphylococcus epidermidis* and was treated accordingly. One patient had severe post-operative uveitis that needed intensive topical steroids. Three patients needed surgery for retinal detachment in the post-operative period. One of these patient re-detached his retina thrice due to new retinal breaks. Another had a recurrent retinal detachment due

Table 1. Surgery and post-operative results

Patient no.	Primary repair	Surgical procedure	IOL fixation	Visual acuity		Follow-up (months)	Post-operative complications
				Pre-op.	Post-op.		
1	1 day: corneal suture	2 days: L, V, FB, IOL, A, cryo	Sulcus	6/36	6/6	5	None
2	None	4 days: L, V, FB, IOL, A	Sulcus	6/12	6/9	30	Endophthalmitis, RD (cryo+explant), recurrence of RD (revision of explant)
3	None	2 days: corneal suture, L, V, FB, IOL, A	Sulcus	6/12	6/5	13	Severe post-operative uveitis
4	None	3 days: corneal suture, L, V, FB, IOL, A, cryo, SF ₆ gas	Sulcus	PL	6/9	14	Cellophane maculopathy
5	None	3 days: L, V, FB, IOL, laser around localised RD	Capsular bag	6/24	6/5	6	Dense vitreous haemorrhage
6	None	1 day: L, V, FB, IOL, A	Sulcus	6/24	6/5	18	None
7	<1 day: corneal suture	14 days: lens aspiration, V, FB, IOL, cryo	Capsular bag	6/18	6/9	6	Early posterior capsule thickening
8	None	<1 day: corneal suture, L, V, FB, IOL, cryo +SF ₆ gas	Capsular bag	<6/60	6/18	8	Post-oral tear (cryo + gas), RD (cryo + explant + gas), YAG capsulotomy
9	None	1 day: L, V, FB, IOL, A; iatrogenic RD (cryo + explant + SF ₆ gas)	Sulcus	6/6	6/4	5	None
10	None	<1 day: corneal suture, L, V, FB, IOL, A, laser + SF ₆ gas	Sulcus	6/60	6/24	28	RD (vitrectomy + internal drain + cryo), recurrence of RD × 3 (internal search, vitrectomy, cryo, explant, SF ₆ gas)

L, pars plana lensectomy; V, pars plana vitrectomy; FB, removal of IOFB; IOL, intraocular lens; A, anterior capsulectomy; SF₆, sulphur hexafluoride; RD, retinal detachment; Cryo, retinal cryopexy; PL, perception of light.

to an improperly placed explant. One patient developed cellophane maculopathy and another a dense vitreous haemorrhage. The post-operative visual acuity in the operated eye had either improved or remained the same compared with its pre-operative level. The corrected visual acuity in the affected eye was 6/6 or better in 5 patients, 6/9 in 3 patients, 6/18 in 1 patient and 6/24 in 1 patient. Hence the visual acuity in the eye undergoing surgery was 6/9 or better in 8 patients (80%).

Posterior chamber IOL was placed in the capsular bag in 3 patients and in the sulcus, in front of the anterior capsule, in 7. The IOL was stable in all patients. One patient needed YAG laser capsulotomy. The surgery and results are summarised in Table 1.

Discussion

Posterior segment ocular trauma due to IOFB often frustrates attempts to prevent severe and sometimes permanent visual loss.⁶⁻⁹ Vitreous microsurgery offers a chance to abort the process of proliferative vitreoretinal changes, thus improving anatomical and functional results.¹⁰⁻¹³ Timing of this surgery is also crucial as delay can increase the risk of infective endophthalmitis.¹⁴ Most of our patients (60%) had vitreoretinal surgery performed within 2 days. Late surgery tended to be due to unavoidable referral delays from other ophthalmic units.

Posterior segment foreign bodies that pass close to or through the crystalline lens causing significant cataract make lensectomy essential to permit visualisation during vitreoretinal surgery.¹⁵ Vitrectomy-lensectomy procedures leave the patients with a functional disability due to monocular aphakia. These patients are mainly young, male^{10,16} workers who, due to either one normal sighted eye or a dirty working environment, do not maintain contact lens wear, hence losing binocular vision. Secondary IOL implant requires an additional operation and is accompanied by a significant incidence of complications^{17,18} and financial loss to the patient. It can also be technically difficult to perform, particularly if posterior synechiae have developed. Few reports have been published of primary IOL implant in the setting of ocular trauma.^{15,19} Rubsamen *et al.*²⁰ published a series of patients who underwent lensectomy and primary IOL implant along with repair of the penetrating injury. They had good post-operative visual results and the IOL was stable in all cases. In our study all the patients had posterior segment trauma due to IOFB. We feel that in selected cases of combined anterior and posterior segment trauma, preservation of lens capsule, with simultaneous posterior chamber IOL implant is a relatively safe procedure.

The advantages of simultaneous IOL implant are early visual rehabilitation, binocular visual function and a single operative procedure. In three of our cases the IOL also provided a barrier to intraocular gas from entering the anterior chamber, thus preventing gas-endothelial touch. The IOL implant is carried out before gas exchange, with the infusion fluid turned off or the bottle

very low, so that the viscoelastic can be retained in the anterior chamber and the iris prevented from prolapsing.

The post-operative corrected visual acuity was good with 8 (80%) patients achieving 6/9 or better in the affected eye. Biometry of the fellow eye is a fairly accurate method of assessing IOL power in patients without a history of anisometropia.¹⁵ The technique of lensectomy should preserve as much capsule as possible until support for posterior chamber IOL has been assessed. If there was sufficient posterior capsule support, the IOL was placed in the capsular bag. Without sufficient support, the IOL is then placed in the sulcus, performing a central anterior capsulotomy with the vitreous cutter via the pars plana. The IOL remained stable in all cases. Simultaneous IOL implant is probably better avoided in patients with evidence of ocular infection and large cornea-scleral lacerations. Its major disadvantages are an increased possibility of post-operative inflammation and infection and possible difficulties in the management of subsequent vitreoretinal complications in the presence of an IOL. One of our patients who developed post-operative endophthalmitis did not have any pre-operative indicators of infection. He recovered a corrected visual acuity of 6/9. Three patients needed repeat surgery for repair of retinal detachment. Posterior chamber IOL did not interfere with the required surgical procedures. One of the patients needed three more surgical procedures to treat the recurrence of retinal detachment due to new retinal breaks. It was thought that these were partly due to incomplete separation of the posterior hyaloid face during the initial surgery.

In summary, simultaneous posterior chamber IOL implant appears to be a safe procedure in selected cases of penetrating ocular trauma due to IOFB. This allows the relatively young patients early visual rehabilitation and avoids further surgery.

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