Combined lens and vitreoretinal surgery in patients with traumatic cataract and intraocular foreign body

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Foundation items: National Natural Science Foundation of China (No.30572000); Army Medical Hygiene Research Foundation (No. 06Z025)
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Received:2008-12-07 Accepted:2009-01-12

Abstract

AIM: To analyze the postoperative anatomical and functional outcomes as well as complications after combined phacoemulsification, pars plana vitrectomy (PPV), removal of the intraocular foreign body (IOFB) and intraocular lens (IOL) implantation in patients with traumatic cataract and intraocular foreign body.

METHODS: Medical records of 13 patients (13 eyes) with traumatic cataract and IOFB who had undergone combined phacoemulsification, PPV, foreign body extraction and IOL implantation were retrospectively analyzed. The postoperative follow-up ranged from 2 to 12 months. The main measurements of outcomes were the extraction success of cataract and intraocular foreign body, intraoperative and postoperative complications and the final best corrected visual acuity (BCVA).

RESULTS: The mean age of 13 patients (10 male, 3 female) was 36.8 years (range: 17-65 years). All eight IOFBs were removed. Four intraocular lenses were implanted after vitrectomy intraoperatively. In 5 cases, intraocular lenses were implanted during the second operation. Intraocular lenses were not implanted in 4 cases. BCVA at last ranged from 0.8 to hand movement. BCVA was 0.5 or better in four eyes, 0.1 to 0.4 in five eyes, less than 0.1 in four eyes. Intraoperative complications were encountered in 3 patients. They had vitreous hemorrhage. Postoperative complications were encountered in 2 patients. They had retinal detachment. The reoperations of the two patients were successful.

CONCLUSION: The combined phacoemulsification, PPV, removal of IOFB and IOL implantation is safe and effective for patients with traumatic cataract and intraocular foreign body. The visual outcome depended primarily on the corneal or scleral wound and underlying posterior segment pathology and sites.

KEYWORDS: traumatic cataract; intraocular foreign body; phacoemulsification; vitrectomy; intraocular lens


INTRODUCTION

Penetrating eye injuries caused by intraocular foreign bodies are often complicated with traumatic cataract. The primary indication for the removal of cataract is significant lens opacification that diminishes visualization of the posterior segment and hinders the operation of foreign body extraction. Phacoemulsification has many advantages over lensectomy and extracapsular cataract extraction. Smaller incision induces less astigmatism, and makes the globe more stable. Postoperative rehabilitation is also faster[1,2]. Lensectomy is the removal of the cataract during a vitrectomy procedure. The lens is usually removed completely, with its anterior and posterior capsule. Pars plana vitrectomy (PPV) is the leading method for the management of intraocular foreign bodies[3,4]. This study retrospectively reviewed the visual outcome and the intraoperative and postoperative complications in patients with penetrating eye injury with an intraocular foreign body and traumatic cataract. These patients had combined phacoemulsification, pars plana vitrectomy, intraocular foreign-body extraction. Some patients had intraocular lens (IOL) implantation.

PATIENTS AND METHODS

We reviewed 13 patients with penetrating eye injury and retained intraocular foreign body. The patients had clinically significant lens opacification and intraocular for-
foreign body with concomitant vitreoretinal pathology. Ten
patients were male and three patients were female. The
mean age was 36.8 years (range: 17-65 years). The right
eye was involved in 9 patients and the left eye in 4 patients.
All patients underwent a complete general ophtham-
ological examination before the surgical procedure. Ultrasound
examination (B-scan, Figure 1) and computerized
tomography (CT) (Figure 2) were performed to assess
posterior segment status and evaluate the intraocular for-
eign body. The intraocular lens (IOL) power was cal-
culated by the SRK II formula. The normal fellow eye was
used to calculate the IOL power when fundus pathology
precluded the accurate measurements.

All patients were operated on under the peribulbar block.
In 3 cases, the foreign body entered through the sclera.
Scleral wounds were sutured with interrupted 8-0 ab-
sorbable sutures. In 4 patients, corneal penetrating
wound was self-sealed and required no further treatment.
In 6 cases, corneal penetrating wound was closed with
interrupted 10-0 nylon sutures (Table 1).

Phacoemulsification for cataract was performed before
the vitreoretinal procedure. A scleral incision was fol-
lowed by continuous curvilinear capsulorhexis and hy-
drodissection. Phacoemulsification was done in the cap-
sular bag, followed by the irrigation/aspiration of the re-

Figure 1 B-scan ultrasonography of an intraocular foreign
body (arrow) embedded in the retina of the patient No. 5

Figure 2 Computerized tomography of an intraocular foreign
body (arrow) embedded in the retina of the patient No. 5

mainly cortical lens material. Very low phaco-power
was used for the nuclei that were relatively soft. In some
cases, only irrigation and aspiration mode of the pha-
coemulsification machine was used for the cataract re-

calculating the IOL power when fundus pathology

Postoperative follow-up ranged from 2 to 12 months.
The intraoperative and postoperative complications, post-
operative anterior segment findings in slit-lamp biomi-

croscopy, intraocular pressure, posterior segment find-
ings in indirect ophthalmoscopy and the final BCVA

RESULTS

All IOFBs were removed. In 5 cases, only irrigation and
aspiration mode of the phacoemulsification machine was
used for the cataract removal. An enlargement of the
posterior capsule tear was observed in only 1 case (No.
6). Lenscortexy was performed. Four intraocular lenses
were implanted after vitrectomy intraoperatively. Intraoc-

ular lenses were implanted during the second operation
in 5 cases. Intraocular lenses were not implanted in 4
cases. Wound leakage, IOL decentration or capsule con-

lar incision of pars plana was expanded for bigger intraocu-
lar foreign body), peeling of the posterior hyaloid mem-
brane, epiretinal membrane peeling, photocoagulation,
cryotherapy, fluid-gas exchange and gas or silicone oil
injection in appropriate cases. Endolaser was used in
cases with a retinal rupture or where an intraocular for-

eign body was found embedded in the retina. A foldable
acrylic intraocular lens was implanted in some cases af-

after vitrectomy. After surgery, sclerotomies and conjuncti-

val incisions were closed, and dexamethasone was inject-
ed subconjunctivally. Postoperatively all patients re-

ceived topical tobramycin+dexamethasone drops for 2
weeks.
traction were not seen in any of our cases. In 6 cases fluid-gas exchange with perfluorocarbon (C₃F₈) was performed. In one case silicone oil tamponade was performed.

BCVA at the last follow-up ranged from 0.8 to hand movement. BCVA was 0.5 or better in four eyes, 0.1 to 0.4 in five eyes, less than 0.1 in four eyes. The BCVA of sclera injury was better than that of cornea (Table 1). The best postoperative visual acuity of No. 6 and No. 11 patients were poor even though the time to surgery is 12 hours and 21 hours. Because the IOFB injured the central cornea and the macular region. The IOFB of No.7 patient was in the vitreous and it injured sclera (1mm wound size), so his BCVA was 0.8. Vitreous hemorrhage was observed in the three patients. Raising the infusion bottle increased the intraocular pressure, and the hemorrhage subsided in both patients. All these intraoperative complications were solved immediately without further consequences. Postoperative complications were observed in 2 patients. In patients No. 2 and No.6, retinal detachment occurred on the postoperative day 69 and 115 respectively. In both patients reoperations were performed with vitrectomy and endolaser. In the patient No. 2 the vitreous was filled with perfluorocarbon (C₃F₈). The other case was filled with silicone oil tamponade. In these two patients, visual acuity was less than 0.1 at the last follow-up.

**DISCUSSION**

We reviewed outcomes and complications of 13 patients with significant lens opacification and intraocular foreign body with concomitant vitreoretinal pathology, who underwent phacoemulsification, PPV, removal of the IOFB and implantation of the intraocular lens in some cases. Removal of a cataract is necessary for safe performance of vitrectomy to get an adequate view and better access to the vitreous base, especially in the inferior quadrants during vitrectomy. Removal is also helpful for the fast visual rehabilitation after vitrectomy. Cataract surgery by phacoemulsification was performed before the vitrectomy in this series. It is possible that small incision phacoemulsification surgery with foldable IOLs allow better retinal visualization after cataract extraction than older techniques[5,6]. However, it has also been stated that phacoemulsification is not suitable in the presence of a lens-vitreous mixture, evidence of zonular dehiscence or large posterior capsule tear. In these circumstances, phaco-probe aspiration of vitreous would cause excessive vitreous traction and might tear the retina[7,8]. In our cases, we observed an enlargement of the posterior capsule tear in only 1 case (No.6). Lensectomy was performed. An important consideration in cases of combined surgery is the timing of IOL implantation. We suggested that IOL implantation should be delayed until the vitrectomy was completed, as this avoids light reflexes and the prismatic effects from the lens that might complicate visualization of the posterior pole, especially the most peripheral retina. Another aspect of combined surgeries is the type of the incision and the IOL to be used. Silicone oil

<table>
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<th>Patient No.</th>
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<td>6</td>
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<td>3</td>
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C: cornea; S: sclera; HM: hand movement; LP: light perception

Table 1 Characteristics of the patients
tends to condense on silicone IOLs. Therefore, silicone IOLs must be avoided in combined operations. Instead, acrylic polymer IOL should be used. Scleral tunnel with hydrophobic acrylic IOLs were used in all our cases. Scleral incisions were safe in the combined surgery and were associated with less postoperative inflammation. We performed intraocular lenses implantation in 9 eyes. In 4 cases, intraocular lenses were implanted after vitrectomy intraoperatively. In 5 cases, intraocular lenses were implanted after operation secondly. Using biometry of the injured eye after primary repair was more accurate than using biometry of the fellow eye to determine the power of the lens for IOL implantation in various open-globe injuries. Patients received secondary IOL implantation in a separate procedure several months after the original vitreoretinal surgery for primary repair of the corneal or scleral wound. According to the varied degree of trauma and risks of infection, secondary IOL implantation after the repair of a corneal or scleral wound is optimal to prevent complications of a simultaneous procedure. However, because of various ongoing ocular injuries, visual improvement after IOL implantation was limited by such events as irregular astigmatism resulting from central or paracentral corneal scar, vitreoretinal pathology. We used acrylic intraocular lenses in 9 patients, as it is a better choice in patients where retinal endotamponade with silicone oil can be expected. Combined simultaneous cataract and vitreous surgery with modern foldable intraocular lenses offers faster visual rehabilitation. The vision of 13 patients with traumatic cataract in open-globe injury was improved after surgical intervention and subsequent IOL implantation.

Vitrectomy should be performed within 14 days after ocular trauma. Early vitrectomy can lower the probability of proliferative vitreoretinopathy and retinal detachment, which are frequent in severe trauma. Foreign bodies that hit the retina stayed in the retina resulting in retinal damage in No. 6 patient. We believe that further damage to the retina by surgery during foreign-body extraction and fibrotic tissue scars caused by endophotoagulation prevented more favorable visual acuity results. Five out of 13 patients had a visual acuity of 0.1 to 0.4. Four patients had a visual acuity of 0.5 or better. In 4 patients, visual acuity was less than 0.1. The BCVA of sclera injury was better than that of corneal. The reasons for poor visual outcome were central or paracentral corneal scar, intraretinal foreign body in the macular region, retinal detachment, massive retinal fibrosis despite a careful removal of the posterior vitreous body.

In conclusion, combined phacoemulsification, PPV, removal of IOFB and IOL implantation was safe and effective in cases of penetrating ocular trauma resulting from an intraocular foreign body. Visual outcome was mainly related to the corneal or scleral wound and the underlying posterior segment pathology and sites.

REFERENCES