Automated vitrector-assisted iridectomy and phacoemulsification in eyes with coexisting cataract and adherent leucomas

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CLINICAL STUDY

Abstract

Purpose To describe a surgical technique as an alternative to allograft corneal transplantation for management of cases with cataract and corneal opacity.

Methods Seven eyes of seven patients with adherent leucomas and cataract underwent phacoemulsification with intraocular lens (IOL) implantation. An automated vitrector was used to release the adherent leucoma and create an optical iridectomy at the start of surgery. Phacoemulsification with IOL implantation was performed in all eyes. The release of the iris adherence along with creation of an optical iridectomy improved visualization during phacoemulsification.

Results Phacoemulsification and IOL implantation could be performed successfully in all seven eyes. The median best-corrected visual acuity (BCVA) improved from 1/60 (range: (light perception) 6/36) preoperatively to 6/18 (range: 6/36–6/12) at last follow-up (average: 41 days).

Conclusions This surgical technique is a viable option in cases with partial corneal opacification with coexisting cataract.

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Keywords: optical iridectomy; phacoemulsification; adherent leucoma; corneal opacity; vitrector-assisted iridectomy

Introduction

Corneal transplantation with cataract extraction and intraocular lens (IOL) implantation is

the preferred method for treating cases with corneal scars and coexistent cataract.^{1–3} The scarcity of donor corneal tissue and the risk of graft failure, particularly in high-risk keratoplasty, create the need for alternative techniques for restoring ambulatory vision in such cases. Moreover, the outcome of penetrating keratoplasty is not promising in cases with corneal scarring and adherent leucomas' postcorneal ulcers.⁴ We describe a new technique of automated vitrector-assisted optical iridectomy combined with phacoemulsification and IOL implantation in patients with cataract and coexisting partial corneal opacification.

Methods

A prospective study was conducted at the Rajendra Prasad Centre for Ophthalmic Sciences. Seven eyes of seven patients with adherent leucomas secondary to perforated corneal ulcers and age-related cataracts were enrolled for the study. All cases selected for the study had central or paracentral corneal opacities with at least one quadrant of clear peripheral cornea (Figure 1). Informed consent was obtained from the subjects, and Institutional Review Board approval was obtained. The preoperative evaluation included recording of uncorrected visual acuity (UCVA), best-corrected visual acuity (BCVA), visual acuity after dilatation of pupil, refraction using a stenopaic slit, and a detailed slit-lamp examination. Posterior segment evaluation was performed to rule out any posterior segment pathology. Eyes with inaccurate projection of

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Figure 1 Intraoperative photograph showing corneal opacity with central adherent leucoma and cataract.

light and those with posterior segment pathology were excluded from the study.

Surgical technique

Intravenous mannitol (1 gm/kg body weight) was given to all the patients 30 min before the surgery to prevent perioperative intraocular pressure surge. All surgeries were performed under peribulbar anaesthesia using 4-ml lidocaine hydrochloride (xylocaine 2%, Astra Zeneca, India) and 2 ml of bupivacaine hydrochloride 0.5% (Sensorcaine, Astra Zeneca, India). A 2.75-mm incision was made on the limbus radially opposite to the site of adherent leucoma using a keratome (Alcon Labs, Fortworth, TX, USA). A 1.2 mm side port was made about 2–3 h away on the clear cornea. Hydroxypropyl methylcellulose solution of 2% (Visilon, Shah and Shah, India) was injected in the space below the iris to lift it away from the crystalline lens towards the cornea. A 20-gauge aspiration-cutter vitrectomy probe (DORC International, the Netherlands) was inserted into the anterior chamber through the main port. Aspiration (100 mmHg) as well as cutting (700 c.p.m.) was used to release the adherent leucoma while maintaining the anterior chamber depth with the help of continuous infusion from the side port. The aspiration port was occluded by the iris stroma, and the iris was cut using the vitrectomy probe under direct visualization (Figure 2a). The probe was removed and the anterior chamber was irrigated with the help of balanced salt solution (BSS; Alcon, Fortworth, TX, USA) to remove the viscoelastic. Trypan blue 0.01% (Vision blue; DORC International BV, ZUIDLAND, the Netherlands) was used to stain the anterior capsule. The anterior chamber was filled with

Healon GV (AMO Inc., CA, USA). A continuous curvilinear capsulorrhexis (CCC) was initiated in all the cases using a bent 26-G needle. After partially completing the capsulorrhexis up to one edge of corneal opacity, the margin of capsulorrhexis flap was held firmly with a pair of Utrata forceps and CCC was continued under the corneal opacity by taking care not to lose hold of the capsulorrhexis flap. The edge of CCC flap was repeatedly grasped and capsulorrhexis was completed. This was followed by hydrodissection and hydrodelineation to achieve free rotation of the nucleus in the capsular bag. Phacoemulsification was performed using primary chop technique and using the Storz protégé machine (Storz Protégé, Bausch & Lomb, NY, USA; Figure 2b). All manoeuvres during phacoemulsification were performed in the clear window created at the start of the surgery using the automated vitrector. After completing phacoemulsification, bimanual irrigation and aspiration was performed for removal of cortical matter (Figure 2c). The capsular bag was filled with Healon GV (AMO Inc., CA, USA) and a single piece acrylic foldable IOL (ACRYSOF® SA60AT; Alcon laboratories, Fort Worth, TX, USA) was implanted. The viscoelastic was completely removed with irrigation and aspiration. At the end of the surgery, the 2.75 mm wound as well as the side ports were hydrated with BSS (Figure 2d). An air bubble was left inside the anterior chamber.

Postoperatively, all patients received prednisolone acetate 1 % eye drops (Predacetate, Allergan, India) every 4 h and moxifloxacin hydrochloride 0.5% eye drops (Vigamox, Alcon, India) three times a day. Timolol maleate 0.5% eye drops (Lotim, FDC, India) were prescribed twice a day whenever required. Patients were evaluated on days 1 and 7, and 6 weeks following surgery.

Results

The release of iris adherence along with creation of optical iridectomy at the beginning of surgery improved visualization of intraocular structures during cataract surgery (Table 1). Phacoemulsification and IOL implantation could be performed successfully in all seven eyes (Figure 3). No intraoperative or postoperative complications were seen in any patient. The median BCVA improved from 1/60 (range: (light perception) 6/36) preoperatively to 6/18 (range: 6/36–6/12) at last follow-up (average: 41 days). Two patients complained of glare in bright light in the postoperative period. It was managed adequately after they were prescribed photochromatic glasses.

Figure 2 (a) Pupil enlarged with the automated vitrector to create clear area for performing phacoemulsification (intraoperative photograph). (b) Phacoemulsification being performed in the clear area created previously (intraoperative photograph). (c) Bimanual irrigation aspiration for the removal of cortical lens matter (intraoperative photograph). (d) Foldable intraocular lens implanted in the capsular bag (intraoperative photograph).

Table 1 Summary of patients undergoing automated vitrector-assisted iridectomy with phacoemulsification and intraocular lens implantation

Patient	Age (years)/sex	Preoperative BCVA	Postoperative BCVA
1	47/M	6/60	6/18
2	60/M	1/60	6/36
3	70/M	6/36	6/12
4	45/M	Light perception	6/36
5	85/M	6/60	6/18
6	68/M	1/60	6/18
7	60/M	Light perception	6/36

Discussion

Allograft corneal transplantation combined with extra capsular cataract extraction and IOL implantation is the preferred method for treating cases with adherent leucomas and co-existent cataract. However, the scarcity of donor corneas, the risk of graft failure, secondary glaucoma, and suture-related problems after a triple procedure necessitate the development of alternative surgical techniques for cases with partial corneal opacification and cataract. Patients with nebulomacular

Figure 3 Postoperative clinical photograph showing optical window created after automated vitrector-assisted optical iridectomy and intraocular lens in place (6 weeks).

corneal opacities and visually debilitating cataract may become regain ambulatory vision with cataract surgery alone.^{5,6} However, a successful phacoemulsification may be difficult in cases of leucomatous corneal opacity with adherent leucoma because of poor visualization of the

lenticular morphology due to the presence of dense corneal opacification.

An optical iridectomy created at the beginning of cataract surgery helps in visualization during phacoemulsification. Cataract surgery in cases with coexistent corneal opacities has been described along with pupillary sphincterotomy,⁵ but in these cases pupillary sphincterotomy is created at the end of cataract surgery as opposed to automated vitrector-assisted optical iridectomy, which is created at the beginning of phacoemulsification, and therefore aids in visualization intraoperatively. Moreover, the use of a large incision and forceps can result in postoperative inflammation and hyphema in addition to the possible damage to the angle structures due to the stretch on the root of the iris.

Capsular staining has been used to enhance visualization during surgery in cases of mature white cataracts^{6–9} and cataracts with coexisting corneal opacities. The intraoperative use of trypan blue dye enhances the visibility of the anterior capsule during surgery.^{10,11} The use of dye facilitates the delineation of the lenticular morphology and helps in performing the capsulorrhexis and its visualization during phacoemulsification in cases of corneal opacities.

In our technique phacoemulsification is performed through a 2.75-mm incision followed by the implantation of a foldable IOL. Direct visualization of all the vital structures helps in decreasing the chances of any bleeding or any angle damage. The complete surgical procedure is undertaken under a viscoelastic cover, which protects the corneal endothelium. An optical iridectomy is performed at the beginning of the surgery, which provides a clear optical window. The use of a small incision in automated vitrector-assisted optical iridectomy along with the sutureless phacoemulsification wound prevents any further opacification of the clear cornea. All these minimally invasive surgical manoeuvres reduce the chances of postoperative inflammation therefore resulting in a faster visual recovery. Although a triple procedure may confer a better visual acuity in such cases, our technique allows salvaging viable vision without the use of allograft corneal tissue. We, therefore, believe that our technique

is a feasible alternative to a conventional triple procedure in patients with partial central or paracentral corneal opacification and coexisting age-related cataract.

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