Coll. Antropol. **29** (2005) Suppl. 1: 63–66
UDC 617.741-089.16
Original scientific paper

Phacoemulsification and Silicone Oil Removal Through The Planned Posterior Capsulorhexis

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A B S T R A C T

The purpose of the study was to present operative technique and results of a passive hydrodynamic expression of silicone oil through planned posterior capsulorhexis during cataract surgery in patients after pars plana vitrectomy. The retrospective analysis was done on 57 eyes with cataract after a previous pars plana vitrectomy, operated on between 2001 and 2004 at the Clinical hospital »Sestre milosrdnice« Zagreb. Preoperative and postoperative best corrected visual acuity (BCVA), preoperative and postoperative intraocular pressure (IOP), and postoperative complications were reviewed. Visual acuity improved or stabilized in all patients with an attached retina. Retinal detachment occurred in 11 eyes. Transient vitreous hemorrhage, that resolved within 1 week of surgery without treatment, was observed in 4 eyes. Asymptomatic intraocular lens (IOL) decentration occurred in 2 eyes. Our findings suggest that silicone oil removal and cataract surgery can be performed as a single procedure in selected patients in the absence of macular pucker and retinal reproliferation, and in a presence of a stable retina.

Key words: *phacoemulsification, silicone oil removal, capsulorhexis*

Introduction

Pars plana vitrectomy combined with intraocular silicone oil tamponade has become common technique for repair of complicated retinal detachments since first introduced by Cibis[1] in 1962. and later by Scott[2] and Watzke[3]. The induction of posterior subcapsular cataract in silicone oil-filled eyes is a well documented phenomenon that occurs in nearly 100% of the eyes in whom the silicone oil remains in situ for more than 3 months[2–7]. When the lens appears relatively clear at the time of oil removal, clinically significant cataract will develop over 2 years in as many as 60% of these eyes with continued progression of the cataract, even after silicone oil removal[8,9]. Even early removal of silicone oil (within 6 weeks of injection) is associated with a high incidence of late cataract[10]. Silicone oil serves as intraocular tamponade after pars plana vitrectomy, but due to incidence and severity of its complications (cataract, raised intraocular pressure, silicone oil emulsification, keratopathy) it is recommended that silicone oil be removed as soon as its tamponade effect is no longer needed[11–13].

Despite the highly publicized and well-designed multicentered clinical trial, the Silicone Oil Study, there are still no consensus guidelines regarding either the indications, method of instillation, indications for removal, timing, or even method of removal of silicone oil. To optimize treatment, the silicone oil can be removed at the time of cataract surgery. Various techniques of combined phacoemulsification and silicone oil removal have been described[14–17] and a less invasive method obviating the use of a pars plana infusion line and based on hydrodynamic expression of the oil through a planned posterior capsulorrhexis has recently been recommended and adopted[18–19]. This simplified method described in small series of cases offers the advantage of quicker and less invasive surgery with faster visual rehabilitation. Theoretical disadvantage lies in the violation of the posterior capsule integrity, but it is the way to prevent secondary cataract.

Received for publication January 11, 2005

Patients and Methods

The retrospective analysis was done on 57 eyes (27 women, 30 men) with cataract after a previous pars plana vitrectomy, operated on between 2001 and 2004 at the Clinical hospital »Sestre milosrdnice«. The mean age of the patients was 42.6±7.1 years at the time of cataract surgery (range 18–70 years). All patients were operated on under peribulbar anesthesia by the same surgeon (Z.M.)

Previous posterior segment surgery was performed by a single surgeon (Z.V.), and included a pars plana vitrectomy with ocular endotamponade by infusion of 1000–1300 centistokes(cs) silicone oil. Average duration of silicone oil tamponade was 8.6±4.1 months. We excluded all patients with possible vitreoretinal reintervention, cataract graduation to LOCS III (lens opacities classification system) classification NC (nuclear color) 4–6, posterior subcapsular 3–5, and aphacic and pseudophakic eyes. Previous pars plana vitrectomy was done because of rhegmatogenous retinal detachment in 27 eyes, proliferative diabetic retinopathy in 22 eyes, and traumatic rhegmatogenous retinal detachment in 8 eyes.

Information obtained by a chart review before combined cataract surgery /silicone oil removal included preoperative Snellen best corrected visual acuity (BCVA), primary diagnosis for which retinal surgery was scheduled, preoperative retinal diagnosis, interval between silicone oil placement and cataract extraction, type of cataract (LOCS III classification), bilateral biometry and IOL calculation, postoperative complications and postoperative BCVA. The preoperative IOL power was calculated by SRK/T formula using a sitting position combined with axial length measurements with MRI. All procedures consisted of a sclerotomy performed with a 20 gauge blade followed by initial placement of a 4.0 mm infusion cannula 3.5 mm from the limbus in the inferotemporal quadrant. Next, standard small incision phacoemulsification was performed through a clear corneal tunnel centered at or slightly temporal to the 12 o'clock position. A paracentesis was created at the 2 o'clock position. Emulsified silicone oil present in the anterior chamber was aspirated with automated irrigation/aspiration (I/A) probe. Sodium hyaluronate 1.4% (Healon GV®, Pharmacia, Uppsala, Sweden) was injected into the anterior chamber, and anterior capsulorhexis was performed with a bent needle or an Utrata forceps (Katena Products, Denville, NJ, USA). Hydrodissection and hydrodelineation of the nucleus were performed, followed by phacoemulsification and irrigation/aspiration of the lens material. A posterior capsulorhexis with capsulotome or needle was created in the central region of the posterior lens capsule. Pressure was placed on the posterior lip of the corneal section, and the inferotemporal infusion cannula was turned on. The silicone oil flowed freely through the posterior capsulorhexis and exited the eye via the superior corneal incision.The infusion flow was continued until all oil was removed. A fundus evaluation was done with an ophthalmoscope to ensure that the retina was attached and the silicone oil completely removed.

A foldable acrylic IOL (Acrysof MA60BM, Alcon, Forth Worth, TX, USA), was placed in the bag, viscoelastic material flushed out from the anterior chamber, infusion cannula was removed, and sclerotomy closed with a 6.0 absorbable suture (Vicryl® Ethicon GmbH, Norderstedt, Deutschland). Subconjunctival dexamethasone were given. Postoperative evaluations were performed at first day, first week, first month, and then at 3 and 6 months after the surgery. At each follow-up visit BCVA was measured, an ophthalmoscopic examination was performed, and postoperative complications were noted. Difference in preoperative and postoperative visual acuity as well as preoperative and postoperative intraocular pressure was tested with Wilcoxon Signed Rank Test. P value of less than 0.05 was taken as statistically significant.

Results

We analyzed 57 eyes of 57 patients, who were followed for a minimum of 6 months.

The mean age of our patients was 42.6±7.1 (range 18–70 years), there were 27 female (47.4%) and 30 male patients (52.6%).

Previous pars plana vitrectomy was done because of rhegmatogenous retinal detachment in 27 eyes, proliferative diabetic retinopathy in 22 eyes and traumatic rhegmatogenous retinal detachment in 8 eyes. Preoperative BCVA ranged from 0.0125–0.2. 42% of our patients had a visual acuity less than 0.075. Postoperatively, 84% of patients had a visual acuity better than 0.2, with 24% of them attaining a visual acuity of 0.6 or better. The difference between preoperative and postoperative visual acuity was statistically significant (p=0.002). Comparison between preoperative and postoperative BCVA is presented in Figure 1.

Preoperatively, 15 patients had high intraocular pressure in spite of the antiglaucomatosus therapy, which can be explained by secondary silicone macrophagocy-

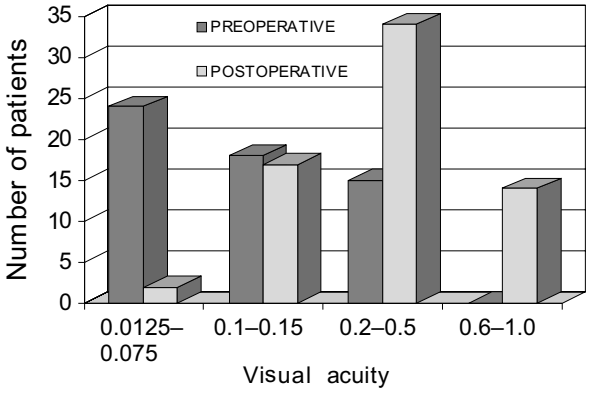

Fig. 1. Preoperative and postoperative best corrected visual acuity (BCVA).

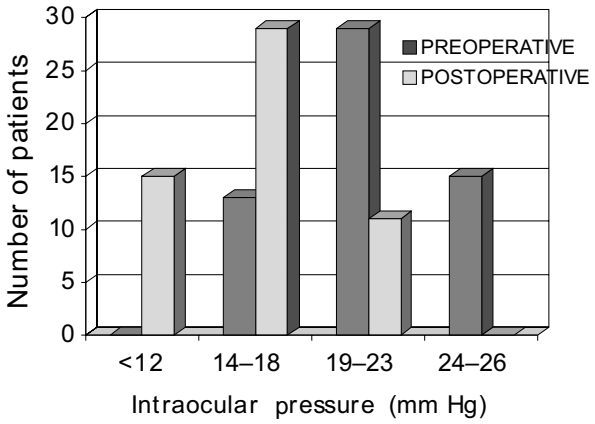

Fig. 2. Preoperative and postoperative intraocular pressure.

ctic open-angle glaucoma caused by oil emulsification (Figure 2.). Postoperatively 11 patients required topical antiglaucomatous therapy. There was a statistically significant drop in intraocular pressure after silicone oil removal (p=0.04). We encountered following postoperative complications: retinal redetachment in 11 eyes (19.3%), transient vitreous hemorrhage in 4 eyes (7%), and asymptomatic IOL decentration occurred in 2 eyes (3.5%).

Discussion

The use of silicone oil with vitrectomy to repair complex retinal detachment is becoming more common. Although the exact mechanism of cataract formation in these cases is controversial, the placement of the silicone oil against the posterior lens capsule and the instigation of lens epithelial proliferation may pay a role[1,11,14]. There are several benefits of silicone oil removal via a planned posterior capsulorhexis, a technique reserved for patients who require both cataract extraction and silicone oil removal[18], all patients in our study required both. The use of phacoemulsification for cataract removal ensures control of intraocular pressure (IOP) during lens removal. The infusion cannula plays an important role in the safe removal of the silicone oil by preventing choriodal detachment. The creation of a posterior capsulorhexis prevents formation of secondary cataract. In addition, posterior capsule plaques, which are commonly encountered in previously vitrectomized eyes with silicone oil, are simultaneously removed. A posterior capsulorhexis should be performed carefully and only by an experienced surgeon as unusually large posterior capsulorhexis may preclude in-the-bag IOL implantation or lead to IOL displacement into the vitreous postoperatively. The central defect in the posterior lens capsule theoretically may cause higher risk for postoperative rhegmatogenous retinal detachment or cystoid macular edema. In eyes with the vitreous body removed, however, the vitreous can no longer exert traction on the retina so that a rhegmatogenous retinal detachment is no longer possible. It suggests that a defect in the posterior lens capsule in eyes after pars plana vitrectomy may not be associated with an increased risk of postoperative retinal detachment.

We encountered retinal redetachment in 11 patients (19.3%). This rate is similar to those reported by other authors[18,20]. The cause of retinal redetachment was reproliferation of epiretinal membranes, and peripheral retinal defects. Regardless of how the silicone oil is removed, small silicone bubbles usually remain in the eye. These bubbles may irreversibly adhere to silicone IOLs[21]. We implanted acrylic IOLs in all patients, and their use has been described in conjunction with pars plana vitrectomy[22]. The acrylic IOL allows good control during haptic placement within the capsular rim and slow unfolding in the bag and requires only small enlargement of the original incision for insertion. Small and partially emulsified droplets of silicone oil are actively aspirated through the I/A probe, whereas larger bubbles of silicone oil are flushed out by the hydrodynamic expression of the irrigating fluid as it leaves the corneal incision.

This probably also helps ensure virtually complete removal of the silicone oil from the vitreous cavity and anterior chamber. The passage of silicone oil through the anterior chamber may cause damage to the corneal endothelium. Persisting corneal endothelial decompensation with secondary bullous keratopathy did not occur in any eye included in the study. The best corrected visual acuity improved in 82% of our patients. These results are comparable to those reported by Boscia[20] and Assi[23] (88.2% and 71.2% respectively). Visual acuity rehabilitation was fast, suggesting earlier clearing of the optic media. It also suggests that transpupillary silicone oil removal through the anterior chamber may not have markedly damaged the corneal endothelium. Our findings suggest that silicone oil removal and cataract surgery can be performed as a single procedure in selected patients in the absence of macular pucker and retinal reproliferation and in the presence of a stable retina.

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FAKOEMULZIFIKACIJA I VAĐENJE SILIKONSKOG ULJA KROZ PLANIRANU STRAŽNJU KAPSULOREKSU

S A Ž E T A K

Svrha ove studije je prikazati operativnu tehniku i rezultate pasivne hidrodinamičke ekspresije silikonskog ulja kroz planiranu stražnju kapsuloreksu za vrijeme operacije katarakte kod bolesnika nakon pars plana vitrektomije. Retrospektivna analiza je učinjena kod 57 očiju sa kataraktom nakon predhodne pars plana vitrektomije operiranih između 2001–2004 u Kliničkoj bolnici »Sestre milosrdnice« Zagreb. Razmatrane su preoperativna i postoperativna vidna oštrina, preoperativni i postoperativni intraokularni tlak i postoperativne komplikacije. Vidna oštrina je poboljšana ili stabilizirana kod svih bolesnika sa priljubljenom mrežnicom. Odljepljenje mrežnice zabilježeno je u 11 očiju. Prolazna vitrealna krvarenja primjećena su kod 4 oka, a resorbirana su unutar 1 tjedan od operativnog zahvata bez tretmana. Asimptomatska dislokacija intraokularne leće zabilježena je kod 2 oka. Naša studija pokazuje da se vađenje silikonskog ulja i operacija katarakte može obaviti istovremeno kod odabranih bolesnika kod kojih nema makularne fibroze i mrežničnih reproliferacija i kod prisustva stabilne mrežnice.