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Phacoemulsification, Vitrectomy and the Implantation of an Intraocular Lens in Diabetic Patients

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A B S T R A C T

The purpose of this study was to evaluate results of combined phacoemulsification, intraocular lens implantation and pars plana vitrectomy in patients with advanced diabetic retinopathy. We retrospectively evaluated postoperative outcomes and complications in 102 eyes of 102 patients who underwent a combined procedure. All patients had a visually significant cataract. Forty two patients had vitreous hemorrhage and mild proliferative diabetic retinopathy. Sixty patients had a mild tractional retinal detachment. The median follow up was 14 months (range 6–36 months). 80% of patients had an increase of visual acuity of at least 2 Snellen lines. The most frequent early postoperative complication was elevated intraocular pressure, followed by mild fibrinous reaction. The most frequent late postoperative complication was the presence of posterior synechia, followed by glaucoma. Eleven patients required a repeated pars plana vitrectomy. Combined phacoemulsification, posterior chamber intraocular lens implantation and pars plana vitrectomy can be successfully performed in selected diabetic patients with favorable postoperative outcome.

***Key words**: phacoemulsification, vitrectomy, implantation, intraocular lens, diabetes type II*

Introduction

Vitrectomy has been in use for treatment of retinal complications in diabetic patients for more than 25 years. Persons with diabetes are at increased risk for cataract. Cataract appears to be related to the duration of diabetes and level of glycemic control[1,2]. Diabetic patients more than 50 years of age are more likely to have visually significant cataract before surgery[3]. These lens opacities will eventually worsen after vitrectomy requiring another surgical procedure. Combined procedure of phacoemulsification and vitrectomy has several advantages over sequential procedure: improved visualization of fundus, faster visual rehabilitation, and the elimination of a cataract that would inevitably progress after vitrectomy[4]. Finally, cataract operation is much more difficult to perform after previous vitrectomy, because of an absence of anterior vitreous support[5,6]. This retrospective study reports the outcome of combined surgery by phacoemulsification with implantation of the posterior chamber intraocular lens, and pars plana vitrectomy, performed in eyes with coexisting cataract and vitreoretinal complications of diabetes.

Patients and Methods

We retrospectively reviewed 102 charts of patients who underwent a combined procedure of phacoemulsification, posterior chamber intraocular lens implantation and pars plana vitrectomy at the Eye Clinic, University Hospital »Sestre milosrdnice« from January 2000 to December 2003. There were 55 men and 47 women, with a median age of at the time of surgery of 61 years (range 21–76 years). The median follow up was 14 months (range 6–36 months). Inclusion criteria was the presence of visually significant lens opacity (nuclear sclerosis grade 2–6, posterior subcapsular opacification grade 2–5), the presence of vitreous hemorrhage with or without coexisting proliferative diabetic retinopathy. Patients with mild tractional retinal detachment were also included in the study.

We excluded patients with advanced proliferative diabetic retinopathy, rubeosis iridis, neovascular glaucoma, moderate and advanced tractional retinal detachment. All patients were operated by two surgeons (Z.M. and Z.V.). 85 patients were operated in general anesthe-

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sia, whereas 17 were operated under the peribulbar block. In all cases, phacoemulsification was performed before the vitreoretinal procedure. Pupils were dilated with a combination of 2.5% phenylephrine (2.5% Neosynephrine; Sanofi-Aventis, Strassbourg, France), and 1% tropicamide (1% Mydriacyl; Alcon Laboratories, Hemel Hempstead, UK) eye drops. A clear cornea incision was created, to follow with continuous curvilinear capsulorhexis, and hydrodissection. Sodium hyaluronate (Healon GV, Pharmacia, Uppsala, Sweden) was injected in the anterior chamber.

Phacoemulsification was done in the capsular bag, followed by the irrigation/aspiration of the remaining cortical lens material. More sodium hyaluronate (Healon GV) was injected in the anterior chamber to deepen the capsular bag. A foldable acrylic intraocular lens (Acrysof, Alcon, Forth Worth, TX, USA) was implanted in the capsular bag before vitrectomy. Corneal incision was temporarily closed with a single 10-0 nylon suture. A standard 3 port pars plana vitrectomy was performed using a 20-gauge vitreous cutter and handheld light source under a noncontact wide-angle viewing system (BIOM; Oculus Optikgerate GmbH, Wetzlar, Germany). Three sclerotomies were placed at 10, 2 and 4 o'clock position. Vitrectomy was then performed, with membrane dissection and delamination technique in order to remove as much fibrovascular tissue and tangential traction as possible. Iatrogenic retinal breaks were marked with an internal bipolar cautery. A 360^0 scleral depression was performed to remove the peripheral vitreous and relieve anterior-posterior traction. Endolaser was performed in all cases in order to close iatrogenic retinal breaks if necessary, and to treat the retina with panretinal photocoagulation. Posterior capsulorhexis, the size of which corresponded with the anterior capsule opening, was performed in all cases. Retinal endotamponade with a silicone oil (Oxane 1300 cs; Bausch and Lomb, Rochester, NY, USA) was performed in 36 cases. In 15 cases fluid-gas exchange with perfluoropropane (C3F8, Alcon, Forth Worth, TX, USA) was performed. Patients who had undergone fluid-gas exchange were instructed to remain in a face down position for 10 days. 51 patients required no retinal endotamponade at the end of the surgery. After surgery, sclerotomies and conjunctiva were closed, and 0.4% dexamethason and gentamycine sulphate 20 mg were injected subconjunctivally. Postoperatively, all patients received topical dexamethasone-neomycine drops and ointment for 3–4 weeks, with gradual tapering.

Results

One hundred and two diabetic patients with coexisting cataract and vitreoretinal complications underwent combined surgery. Preoperative clinical findings included vitreous haemorrhage and mild proliferative diabetic retinopathy in 42 patients. 60 patients had a mild tractional retinal detachment. The average preoperative best corrected visual acuity was 0.075, and the average postoperative visual acuity was 0.2. 80% of patients retained an average increase in vision of 2 Snellen lines or more, after a 12 month follow-up. Distribution of visual acuity is presented in Table 1. Intraocular lens was successfully implanted in the posterior chamber in all cases. Intraoperative, as well as postoperative complications are presented in Table 2.

TABLE 1
DISTRIBUTION OF PREOPERATIVE AND POSTOPERATIVE VISUAL ACUITY

Visual acuity	Preoperative, % (n)	Postoperative, % (n)
> 0.4	5 (5)	39 (40)
0.1–0.4	35 (36)	36 (37)
< 0.1	60 (61)	25 (25)

Intraoperative complications, such as iatrogenic retinal tear, or hemorrhage were treated immediately. In the early postoperative period, the most frequent complication was the occurrence of a raised intraocular pressure in 24% of our patients, which was treated with topical antiglaucomatous therapy. In five patients elevated intraocular pressure persisted one month after the surgery. Two eyes developed iris-bombe 6 weeks after the surgery. Nd:YAG laser iridotomy was performed in both cases, one case required a repeated Nd:YAG laser iridotomy. The second most frequent complication was mild fibrinous reaction in 12% of our patients, which subsided after topical steroids that were administered for a period of three weeks.

TABLE 2
INTRAOPERATIVE AND POSTOPERATIVE COMPLICATIONS

	Frequency in % (n)
Intraoperative complications	
Iatrogenic retinal tear	3.8 (4)
Hemorrhage	9.8 (10)
Lens fragment dislocation	1.0 (1)
Early postoperative complications	
Fibrinous reaction	11.7 (12)
Elevated intraocular pressure	23.5 (24)
Vitreous hemorrhage	7.8 (8)
Hyphema	1.0 (1)
Late postoperative complications	
Posterior synechiae	7.8 (8)
Glaucoma	5.0 (5)
Neovascular glaucoma	2.0 (2)
Epiretinal membrane	3.0 (3)
Retinal detachment	2.0 (2)
Intraocular lens dislocation	1.0 (1)

The most frequent anterior segment late complication was the presence of posterior synechia in 8% of cases. Five patients developed glaucoma, all of them with a silicone oil endotamponade. In three of those five patients intraoucular pressure normalized after three months. In one patients silicone oil had to be removed because of an uncontrollable intraocular pressure. After silicone oil removal, vitreous hemorrhage and IOL decentration occurred. In the last patient a filtering procedure had to be carried out. Neovascular glaucoma developed in two patients, and in both of those patients cyclocryo procedure was performed. Eleven patients required a repeated pars plana vitrectomy due to recurrent vitreous hemorrhage, retinal detachment, and the development of proliferative vitreoretinopathy.

Discussion

Combined cataract extraction and pars plana vitrectomy is a procedure that is being reported very often in the recent literature[7–10]. Combined procedure is preferred because cataract development in the phakic eye after pars plana vitrectomy is very common, with rates varying from 20% to 80%[4]. The rate of cataract development in cases where intraocular tamponade with silicone oil is used, can be as high as 100%[11]. Combined surgery offers additional advantages during the surgery, namely better visualization of the anterior retina, which in turn results in an easier approach to peripheral retina, without the fear of damaging the lens with an instrument. Peripheral retina can be more thoroughly relieved of vitreous strands and tractional membranes, which may reduce the incidence of postoperative complications[12]. Postoperative treatments, such as laser photocoagulation, are also facilitated with clear optical media. Thirdly, combined procedure allows for a quicker visual recovery.

The indications for the combined surgery in our study was the presence of visually significant cataract, vitreous haemorrhage with or without signs of proliferative diabetic retinopathy, and mild tractional retinal detachment. We performed phacoemulsification with posterior chamber »in the bag« intraocular implantation in all patients. Intraocular lens was implanted before performing vitrectomy. Some authors state that the intraocular lens can also be implanted after vitrectomy, in cases where clear visibility of the periphery is crucial, and where the edges of the intraocular lens would distort the view. They warn, however, that in such cases, the intraocular lens should be implanted before performing fluid-air exchange and intraocular tamponade in order to reduce the risk of anterior chamber shallowing, and dislocation of the intraocular lens from the posterior chamber[10].

Average postoperative visual acuity was 0.2, which can be attributed to diabetic maculopathy, particularly in patients with tractional retinal detachment. However, 80% of patients retained an average increase in vision of 2 Snellen lines or more, after a 6 month follow-up. Those results are comparable to those previously reported by Chung et al.[9] Pollack et al.[10] (84,6% and 85,8% respectively). Honjo and Ogura[13] reported a 2 line visual acuity improvement in 78 % of operated eyes. With respect to postoperative complications, the most common early postoperative complications were raised intraocular pressure in 24%, mild fibrinous reaction in 12%, and recurrent vitreous hemorrhage in 8 %. Similar results were published by other authors[10,13]. Most of those early postoperative complications were either medically controlled, or subsided spontaneously.

We also performed posterior capsulorhexis in all patients. In our view, this prevents any further deterioration of visual acuity from posterior capsule opacification. One other study[13] also reported performing posterior capsulorhexis in patients who did not need fluid-air exchange at the time of surgery. In those patients where posterior capsulorhexis could not be performed at the time of surgery, 81% required a Nd:YAG laser capsulotomy within 5 months after the surgery. In the late postoperative period 5 patients developed glaucoma as a result of silicone oil tamponade. This is more frequent than the results reported by Chung et al[9]. There were only two patients with neovascular glaucoma in our study, despite the fact that the posterior capsule was partially removed in all patients. This would suggest that the posterior capsule breach is not a risk factor for the progression to neovascular glaucoma, as reported previously[14–17].

We are aware of the limitations of our study, namely, its retrospective design, and the absence of a control group. We are aware that there are many challenges presenting themselves during and after such surgery, but our results show that the combined phacoemulsification, posterior chamber intraocular lens implantation, and pars plana vitrectomy can be successfully performed in selected diabetic patients, with favorable postoperative outcome.

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FAKOEMULZIFIKACIJA, VITREKTOMIJA I IMPLANTACIJA INTRAOKULARNE LEĆE KOD DIJABETIČARA

S A Ž E T A K

Cilj ove studije bio je ocijeniti rezultate kombiniranog zahvata fakoemulzifikacije, implantacije intraokularne leće i pars plana vitrektomije kod pacijenata s uznapredovalom dijabetičkom retinopatijom. Retrospektivno smo ocijenili postoperativne ishode i komplikacije kod 102 oka od 102 pacijenta koji su bili podvrgnuti kombiniranom zahvatu. Svi su pacijenti imali značajno zamućenje leće. Četrdeset i dva pacijenta su imala krvarenja u staklovini i blagu proliferativnu dijabetičku retinopatiju, dok je preostalih šezdeset pacijenata imalo blagu trakcijsku ablaciju mrežnice. Srednje vrijeme praćenja je iznosilo 14 mjeseci (raspon od 6 do 36 mjeseci). Osamdeset posto pacijenata imalo je porast vidne oštrine za bar 2 reda prema Snellenovim optotipovima. Najčešća rana posijeoperacijska komplikacija je bila povišenje očnog tlaka, a zatim blaga fibrinozna reakcija. Najčešća kasna poslijeoperativna komplikacija je bila prisutnost stražnjih sinehija, a nakon toga pojava glaukoma. Jedanaest pacijenata podvrgnuto je ponovnoj pars plana vitrektomiji. Kombinirana fakoemulzifikacija, implantacija intraokularne leće u stražnju sobicu i pars plana vitrektomija mogu se uspješno načiniti kod selektiranih pacijenata oboljelih od dijabetesa, s uspješnim poslijeoperacijskim ishodom.