

Original Article

# The combination of phacoemulsification surgery and intravitreal triamcinolone injection in patients with cataract and diabetic macular edema



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## Abstract

**Purpose:** To assess the safety and efficiency of combined phacoemulsification (PHACO) surgery and intravitreal triamcinolone (IVTA) injection with or without macular grid laser photocoagulation in patients with cataract and diabetic macular edema.

**Material and methods:** This prospective study included 41 eyes of 36 diabetic patients with cataract and coexisting clinically significant macular edema (CSME). After PHACO and IVTA injection eyes were divided into two groups: the laser and IVTA group (Group 1) and only IVTA group (Group 2). Preoperative and postoperative best corrected visual acuity (BCVA), central macular thickness (CMT), and intraocular pressure (IOP) were recorded. Paired sample t-test was used to compare data in the groups and C square test for qualitative variables.

**Results:** Postoperative BCVA was significantly higher than the initial BCVA during the follow-up period in both groups ( $p < 0.01$ ). The BCVA 6 months after surgery was significantly higher in group 1 than in group 2 ( $p < 0.01$ ). There was no statistically significant difference in IOP between two groups preoperatively and postoperatively during the follow-up period ( $p > 0.05$ ). There was no statistically significant difference between both groups in mean CMT preoperatively and 2nd week, 2nd month and 3rd month after surgery ( $p > 0.05$ ). The mean CMT 6 months after surgery was statistically significantly lower in group 1 than in group 2 ( $p < 0.01$ ).

**Conclusions:** PHACO surgery combined with IVTA injection improves BCVA and provides a decrease in CMT in diabetic patients with CSME. Additional macular grid laser photocoagulation after surgery helps to preserve this improvement in BCVA and decrease in CMT.

**Keywords:** Phacoemulsification, Diabetic macular edema, Triamcinolone

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## Introduction

Diabetic macular edema is characterized by intraretinal and subretinal accumulations of fluid, resulting principally from retinal vascular leakage and is the main cause of visual

impairment in diabetic patients.<sup>1,2</sup> Cataract is another ocular complication of diabetes and 20% of all cataract surgeries are performed on diabetics.<sup>3</sup> Macular edema at the time of surgery has been suggested to be risk factor for poorer visual outcome. Royal College of Ophthalmologists' guidelines for

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cataract surgery in diabetics state that if clinically significant macular edema (CSME) is identified before surgery, it should be treated at least 12 weeks prior to surgery.<sup>4,5</sup> But it is common to see patients with significant cataract that impedes the treatment or even diagnosis of CSME. Some studies have found an increased risk of retinopathy progression and in particular macular edema exacerbation with cataract surgery. However, some patients with diabetic CSME are refractory to conventional photocoagulation.<sup>6–11</sup>

Triamcinolone acetonide is a corticosteroid with anti-inflammatory and antiangiogenic properties. Intravitreal injection of triamcinolone (IVTA) injection is an alternative for treating CSME especially in patients with advanced cataract.<sup>4,5,12,13</sup>

In this study, we aimed to assess the safety and efficiency of combined phacoemulsification (PHACO) surgery and IVTA injection with or without macular grid laser photocoagulation in patients with cataract and diabetic macular edema.

## Material and methods

This prospective study included 41 eyes of 36 multiethnic Turkish diabetic patients with cataract and coexisting clinically significant macular edema (CSME). All patients were diagnosed with CSME according to the ETDRS criteria. All patients filled up informed consent form. The study was carried out according to the tenets of the Declaration of Helsinki. Institutional Review Board approval has been obtained. The age of the patients ranged between 54 and 79 years (mean age 66.39). Twenty-two of them were female (53.7%) and 19 were (46.3%) male. HbA1c at the time of surgery differed from 6.2 to 7.3 (HbA1c 6.65). The duration of diabetes mellitus differed from 6 to 23 years (mean 14.05 years). Preoperative clinical characteristics of the groups are summarized in Table 1. As seen in Table 1 there is no statistically significant difference in patient characteristics between the two groups ( $p > 0.05$ ).

At baseline examination, best corrected visual acuity (BCVA), central macular thickness, and intraocular pressure (IOP) were recorded. Patients who had visually significant cataract and either diffuse central macular edema of at least 250  $\mu\text{m}$  demonstrated by optic coherence tomography (OCT) or persistent diabetic macular edema unresponsive to laser treatment were included in the study. None of the patients had received any previous intravitreal injection. Exclusion criteria were a history of either ocular hypertension or glaucoma, previous ocular trauma or surgery, and intraoperatively complicated PHACO surgery with vitreous loss.

After surgery the enrolled eyes were divided into two groups, the laser and IVTA group (Group 1) and the only IVTA group (Group 2). Patients in group 1 underwent IVTA, PHACO surgery and macular grid photocoagulation 4 weeks after the surgery. Patients in group 2 underwent only IVTA and PHACO surgery.

Phacoemulsification and in-the-bag intraocular lens implantation were performed under topical anesthesia using 0.5% proparacaine HCl drop with a self-sealing corneal tunnel. At the end of cataract surgery 4 mg in 0.1 ml of preservative free triamcinolone acetonide (Kenacort A, Bristol Myers Squibb) was injected via the inferotemporal pars plana (3.5 mm from limbus), using 27 G needle. Patients were instructed to semi-sitting position in the immediate postop-

**Table 1.** Preoperative clinical characteristics of the groups.

	Group I Mean $\pm$ SD	Group II Mean $\pm$ SD	$p$
<sup>a</sup> Age	66.71 $\pm$ 5.14	66.05 $\pm$ 5.06	0.679
<sup>a</sup> HbA1c	6.60 $\pm$ 0.34	6.70 $\pm$ 0.30	0.344
<sup>a</sup> Duration of DM	14.19 $\pm$ 3.93	13.90 $\pm$ 4.71	0.831
Number of patients	$n$ (%)	$n$ (%)	
<sup>b</sup> Sex	Female 11 (52.4%)	11 (55.0%)	0.867
	Male 10 (47.6%)	9 (45.0%)	

<sup>a</sup> Student's  $t$  test.

<sup>b</sup> C square test.

erative to avoid macular staining by the Triamcinolone. Postoperatively, 1% prednisolone acetate eye drop and 0.5% ofloxacin eye drop were applied four times daily 1 week, and then tapered weekly over 3-week period.

Grid laser photocoagulation 4 weeks after surgery was applied only in group 1 under topical anesthesia with fundus contact lens. The laser spots were applied with argon green wavelength, duration of 100 msn, diameter of 100  $\mu\text{m}$ , and the power increased from 75 mW to produce a mild gray burn on all areas of capillary nonperfusion and retinal thickening based on the findings of fundus fluorescein angiography and OCT.

Patients were examined 1 day, 1 week, 2 weeks, 2 months, 3 months and sixth months after surgery. The response to treatment was monitored functionally by BCVA assessment by Snellen chart and anatomically measuring the central macular thickness by OCT. Biomicroscopic examinations and IOP monitoring were performed on each visit. Topical antiglaucomatous treatment was initiated if IOP was more than 21 mmHg.

Statistical analysis was performed. The results were analyzed with NCSS 2007&PASS 2008 Statistical Software (Utah, USA). Student's  $t$  test was used for comparing quantitative data and also for comparing the data of two groups. Paired sample  $t$  test was used to compare data in the group and C square test for qualitative variables. Results were 95% reliable and the value of  $p < 0.05$  was considered as significant.

## Results

There was no statistically significant difference in BCVA between two groups preoperatively and 1 day, 1 week, 2 weeks, 2 months and 3 months postoperatively ( $p > 0.05$ ) (Table 2). The BCVA at the 1st day, 1st week, 2nd week, 2nd month, 3rd month and 6th month visit after surgery was significantly higher than the initial BCVA in both groups ( $p < 0.01$ ). On the other hand the BCVA 6 months after surgery was significantly higher in group 1 than in group 2 ( $p < 0.01$ ) (Table 2 and Fig. 1).

There was no statistically significant difference in IOP between two groups preoperatively and 1 day, 1 week, 2 weeks, 2 months, 3 months and 6 months postoperatively ( $p > 0.05$ ). The differences between preoperative IOP and all postoperative intervals until 6 months were not statistically significant in both groups ( $p > 0.05$ ) (Tables 3 and 4).

There was no statistically significant difference between both groups in mean CMT preoperatively and 2nd week, 2nd month and 3rd month after surgery ( $p > 0.05$ ). The mean CMT 6 months after surgery was statistically significantly lower in group 1 than in group 2 ( $p < 0.01$ ) (Table 5).

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