Results of Phacoemulsification and Intraocular Lens Implantation in Different Types of Uveitis

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ABSTRACT

Purpose: In our study, we aimed to evaluate the visual outcomes of phacoemulsification and intraocular lens implantation in uveitis cases and to determine the risk factors for postoperative complications.

Materials and Methods: We retrospectively analyzed 53 eyes of 41 patients with uveitis who underwent phacoemulsification and intraocular lens implantation in our clinic between January 2013 and December 2018. The clinical features, uveitis etiology, surgical complications and the management of complications were evaluated in all patients.

Results: In 41 patients included, the mean age was 45.3±16.3 years (8-75 years) and the postoperative follow-up period was 23.2±18.4 months (6-70 months). The best corrected visual acuity (BCVA) was 1.37±0.57 logMAR at preoperative period, and 0.42±0.37 logMAR at postoperative month 6 ($p<0.001$). Postoperative BCVA was found poorer in patients followed with Behçet's uveitis than those who underwent cataract surgery with other uveitis etiologies ($p<0.001$, 0.74±0.45 logMAR vs. 0.30±0.27 logMAR). Cystoid macular edema and posterior capsule opacification were observed in 10 (18.9% and 19 (35.1%) patients within the first six months after surgery, respectively. There was no correlation between preoperative steroid implantation and/or intraoperative triamcinolone acetonide injection to anterior chamber and the number of attacks ($p>0.05$).

Conclusions: Although cataract surgery is considered a safe and successful procedure in uveitis patients, postoperative visual outcomes may differ can in different uveitis etiologies. It should be kept in mind that the reduction in postoperative complication rates will yield better visual outcomes by determining the existing risk factors.

Keywords: Phacoemulsification, intraocular lens, cataract, uveitis.

INTRODUCTION

Cataract is an important complication which can be developed as a result of chronic inflammation in uveitis cases or due to topical/systemic steroid therapy used in the treatment.[1,2] Although depends on uveitis type, cataract leading loss of vision is observed in approximately 50% of cases.[3] Cataract surgery remains to be most common surgical procedure for visual gain and better assessment of posterior segment.[4]

Control of inflammation at preoperative period is important to decrease postoperative complications including cystoid macular edema, glaucoma, pupillary membran development and phthisis. Owing recent advances in cataract surgery and pharmacological therapeutics, better clinical outcomes can be achieved in uveitic cataract surgery.[5] Currently, different surgical methods are employed, including phacoemulsification and intraocular lens implantation, extra-capsular lens extraction and lensectomy plus vitrectomy. Although band keratopathy, weak pupil dilatation, posterior synechia, iris neovascularization and poor zonular support make surgery challenging and lead intensive inflammation at postoperative period, inflammation develops less commonly due to factors such as small-incision surgery, minimum iris contact and iris-intraocular lens contact during surgery and lack of suturing.[6,7,8] In addition, surgical success can vary according to uveitis etiologies and anatomic regions involved.[9,10]

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In our study, it was aimed to assess visual outcomes in patients with different uveitis etiologies who underwent phacoemulsification and intraocular lens implantation in our clinic and to identify risk factors for postoperative complications.

MATERIALS AND METHODS

In this study, we retrospectively evaluated 53 eyes of 41 uveitis cases who underwent phacoemulsification and intraocular lens in Uveitis Department of Ophthalmology Clinic of Ondokuz Mayıs University between January, 2013 and December, 2018. Surgical decision was made based on lack of active inflammation findings for at least 3 months, marked loss of vision due to cataract and experience of difficulty in fundus imaging. The study was approved by Institutional Ethics Committee (OMÜ KAEK 2021/45). The study was conducted in accordance with tenets of Helsinki Declaration.

The patients with history of ocular trauma and surgery, those with systemic diseases such as diabetes mellitus which may have ocular involvement, those using different lens material and those underwent glaucoma or retinal surgery in combination with cataract surgery were excluded. The patients were followed for at least 6 months after cataract surgery.

In all cases, demographic data, uveitis characteristics, uveitis etiologies and preoperative topical/systemic treatment used were retrospectively recorded. Best-corrected visual acuity (BCVA) measurement and comprehensive ophthalmological examination were performed before surgery and on first day, first week, third and sixth month after surgery. The visual acuity was measured using Snellen charts and converted to logMAR units. In all control visits, macular thicknesses were measured using optical coherence tomography (SD-OCT; Cirrus HD-OCT, Carl Zeiss, Dublin, California). The surgical complication was defined as inflammation within first 6 months after surgery, posterior synechia, posterior capsular opacification, macular edema and IOP elevation (>21 mmHg) which persisted beyond first month after surgery. IOP elevation more than 10% after surgery was considered as significant. Oral methyl prednisolone (0.5-0.1 mg/kg/day) starting 2 weeks before surgery was recommended in patients with history of macular edema and using immunomodulatory therapy (IMT).

The surgical procedure was performed by a single surgeon (Y.S) under general anesthesia in patients aged <18 years and under topical and local anesthesia in patients aged >18 years. The anterior chamber was filled using viscoelastic material via 2.2 mm transparent corneal incision. Synechiolysis was performed in cases with posterior synechia. Iris retractors were used in eyes with insufficient pupil dilatation. Trypan blue was used for capsulorhexis in patients with mature cataract. Capsulorhexis, hydro-dissection and phacoemulsification were performed, respectively. Thereafter, hydrophobic-coated hydrophilic foldable intraocular lens (Acriva® UD 613, VSY Biotechnology) was implanted into capsule. At the end of surgery, cefuroxime axetil (10 mg /0.1 cc) was administered to anterior chamber in all cases while preservative-free triamcinolone acetonide (0.04 mg/0.1 ml; (Kenacort A; 40 mg/ml, Bristol-Myers Squibb Co, Princeton, NJ) was administered in the cases subjected to iris trauma during surgery. After surgery, topical prednisolone acetate 1% (Pred Forte®, Allergan) was started at dose given every hour and dose was adjusted according to inflammation findings at anterior chamber. In addition, all patients were given topical nepafenac (three times daily for 3 months) (Nevanac®, Alcon), tropicamide 1% (twice daily for 14 days) and moxifloxacin HCl 0.5% (six timed daily for 14 days) (Vigamox®, Alcon). The systemic immunosuppressive agents were continued at same doses during postoperative period.

Data were analyzed using IBM SPSS version 23.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics are presented as mean and standard deviation. Paired samples t test was used to compare preoperative and postoperative continuous variables while Spearman's correlation analysis was used to relations among parameters. A p value<0.05 was considered statistically significant.

RESULTS

Of the patients included, 26 (63.4%) were women while 15 (36.6%) were men. Mean age at time surgery was 45.3±16.3 years (8-75 years). There was anterior uveitis in 6 cases (11%), intermediate uveitis in 4 cases (8%) and panuveitis in 43 cases (81%). Table 1 presents the demographic and clinical characteristics.

Mean attack-free follow-up was 6.36±2.64 months (3-12 months) before surgery. The mean BCVA was 1.37±0.57 logMAR before surgery and 0.42±0.37 logMAR on postoperative sixth month (p<0.001). During follow-up, topical steroid was used during attacks in 47 of 53 eyes (88.7%) while no steroid was used in 6 eyes (11.3%). It was found that 26 patients (63.4%) received systemic steroid therapy during attack or maintenance dose while 15 patients (36.6%) received no systemic steroid therapy. Of 41 patients, 24 (58.5%) received IMT while 17 patients (41.5%) received no IMT. Table 2 presents IMT use. Mean follow-up period was 23.26±18.42 months (6-70) months after surgery.

Table 1: *Demographic and clinical characteristics of patient groups.*	
Female / Male, n (%)	26 (% 63.4) / 15 (% 36.6)
Mean age	
Mean age at surgery (years)	45.3±16.3 (8 – 75)
Mean follow-up (months)	23.2±18.4 (6 – 70)
Anatomic classification, (eye/%)	
Anterior uveitis	6 (11%)
Intermediate uveitis	4 (8%)
Panuveitis	43 (81%)
Uveitis-related systemic diseases, (eye/%)	
Behçet's disease	14 (% 26.4)
Sarcoidosis	9 (% 17.0)
Ankylosing spondylitis	4 (% 7.5)
VKH syndrome	2 (% 3.8)
JIA	1 (% 1.9)
Other, (eye/%)	
Fuchs uveitis syndrome	9 (% 17.0)
Sympathetic ophthalmia	1 (% 1.9)
Idiopathic uveitis	13 (% 24.5)
VKH syndrome: Vogt-Koyanogi-Harada syndrome, JIA: Juvenile idiopathic arthritis	

Table 2: *Immunomodulatory treatment in cases.*			
IMT		Number of patients	Percent (%)
	No IMT	17	41.5
	ADA	1	2.4
	ADA+MTX	1	2.4
	AZA	3	7.3
	AZA+CSA	10	24.4
	CSA	3	7.3
	INFX	4	9.8
	MTX	2	4.9
	Total	41	100.0
IMT: Immunomodulatory treatment, ADA: Adalimumab, MTX: Methotrexate, AZA: Azathioprine, CSA: Cyclosporine, INFX: Infliximab			

Before surgery, there was history of posterior synechia in 35 patients (66%), epiretinal membrane in 10 patients (18.8%) and macular edema in 14 patients (26.4%). Dexamethasone implant was administered into 10 eyes (18.8%) with cystoid macular edema one month before surgery while 0.5-1.0 mg/kg/day oral prednisolone therapy was initiated in 23 patients (56.1%) using IMT two weeks before surgery.

In 25 eyes (47.2%) with posterior synechia who underwent intensive iris manipulation, 0.04 mg/0.1 ml preservative-free triamcinolone acetonide was administered to anterior chamber during surgery. Fibrin reaction and membran formation were observed in anterior chamber in 4 eyes at early postoperative phase; in addition, it was seen that no triamcinolone acetonide was administered in these eyes. In 13 eyes (52%) given triamcinolone acetonide, intraocular pressure (IOP) elevation (5.2±2.4 mmHg in average) was observed within first 2 days after surgery; dorzolamide hydrochloride 0.2% plus timolol maleate 0.05% was given to 6 patients with IOP measurement >21 mmHg. No persistent IOP elevation was observed in the control visit on week one.

Mean central macular thickness (CMT) was 272.08±105.29 mm before surgery while it was 259.28±49.35 mm on month 6 after surgery. No significant difference was observed in CMT in all time points. Clinically relevant cystoid macular edema (CME) was observed in 10 eyes (18.8%) within first 6 months after surgery; CME regression was observed in 5 patients with local and systemic steroid therapy. Additional immunosuppressive therapy was started in 4 cases in which local and systemic steroid therapy failed to control CME (Table 3).

At least one attack was developed in 19 eyes (35.8%) within first 3 months after surgery. When prophylactic dexamethasone implant and IMT use were assessed, it was

seen that they had no effect on attacks at postoperative period (p=0.89 and p=0.83, respectively). Nd:YAG capsulotomy was applied in 5 (35.8%) of 19 eyes developed posterior capsule opacification during follow-up. Mean time to YAG capsulotomy was 11.80±7.29 months (5-24 months). Additional surgery was required for capsular phimosis in a patient with sarcoidosis uveitis who underwent bilateral phacoemulsification and bilateral intraocular lens implantation.

DISCUSSION

When compared to many patient groups, the cataract surgery performed in patients with uveitis can lead unexpected consequences due to technical challenges during surgery and unpredictable inflammatory sequels and complications. Although phacoemulsification plus intraocular lens implantation is preferred method, there is no consensus on optimal surgical procedures and in perioperative therapeutic regimens for different etiologies of uveitis. In our study, it was aimed to describe visual gain as well as perioperative and postoperative complication in uveitic eyes undergoing cataract surgery. Preoperative visual acuity and etiology can affect postoperative visual prognosis.[11] In previous studies, the BCVA≥20/40 was achieved in 91.1-94.5% of cases; this rate was as low as 57.4% in cases with posterior/panuveitis, 67.1-68% in VKH cases, 12.2-16.7% in cases with Behçet's uveitis.[12,5,12,14] In agreement with literature, we observed improvement in visual acuity in all groups after surgery. Although visual gain was smaller in cases with Behçet's disease when compared to remaining groups, it was found as statistically significant. In addition, other than postoperative topical therapy, no systemic medical therapy was used in 9 eyes with Fuchs uveitis syndrome; however, successful visual outcomes were achieved.

The control of perioperative inflammation is another important factor affecting visual prognosis in uveitic patients. The duration and severity of uncontrolled inflammation after surgery may lead many complications including posterior synechia, intraocular lens subluxation, glaucoma, pupillary-ciliary membrane, cystoid macular edema and phthisis bulbi; it requires aggressive therapy. Narrow pupil width due to posterior synechia is a common finding in uveitic patients; in our study, iris retractors following mechanical synechiolysis with viscoelastic material were used in patients failed to achieve sufficient pupil size. To control potential inflammation in rapid and effective manner, preservative-free triamcinolone acetonide (0.04 mg/0.1 ml) was administered to anterior chamber during surgery in 25 eyes (47.2%) with posterior synechia subjected to intensive intraoperative iris manipulation. In a study evaluating fibrin formation after cataract surgery in patients with juvenile idiopathic arthritis-related uveitis, Li J et al. administered intracameral triamcinolone acetonide in 14 of 27 cases with no fibrin formation in these cases, emphasizing that intracameral triamcinolone acetonide is superior to intraoperative intravenous methyl prednisolone and postoperative oral prednisolone.[15] In our study, no fibrin reaction was observed in any eye given triamcinolone acetonide. In addition, fibrin reaction was observed in anterior chamber in 4 eyes not received intraoperative triamcinolone acetonide.

Intracameral triamcinolone acetonide had been given in all 13 eyes with ≥10% IOP elevation within first 2 days after surgery; dorzolamide hydrochloride 0.2% plus timolol maleate 0.05% was recommended to 6 patients with IOP measurement >21 mmHg. In control visit on first week, no persistent IOP elevation was observed. It is thought that IOP elevation observed may have been associated with intracameral triamcinolone acetonide.

In uveitic patients, postoperative cystoid macular edema is one of the major causes of impaired vision after surgery; it has been reported in 18-56% of the patients.[16,17,18] Although many studies have reported effectiveness of several perioperative steroid administration methods, there is no standard protocol. In our study, prophylactic dexamethasone implant was administered one month before surgery in 10 eyes with cystoid macular edema (18.8%) while oral prednisolone therapy (0.5-1.0 mg/kg/day) two weeks before surgery in 23 patients (56.1%) with history of macular edema and IMT use.

At least one attack was developed within first 6 months after surgery in 19 eyes (35.8%). When preoperative prophylactic dexamethasone implant and IMT use were assessed, it was found that they had no effect on attacks during postoperative period. In addition, a positive correlation was detected between postoperative attack development and macular edema as supported by many studies.[19,20] Clinically relevant cystoid macular edema (CME) was observed in 10 eyes (18.8%) within first 6 months after surgery; CME regression was observed in 5 patients with local and systemic steroid therapy. Additional immunosuppressive therapy was started in 4 cases in which local and systemic steroid therapy failed to control CME (Table 3).

In our study, the most common complication was posterior capsule opacification (PCO) seen in 19 eyes (35.8%) which underwent cataract surgery with hydrophobic-coated hydrophilic foldable IOL implantation. Factors such as IOL material, IOL design, surgical technique and ocular anatomy can contribute PCO development.[21,22,7] In a study evaluating relationship between PCO development,

Table 3: *Patient characteristics ad treatment approaches in patients with macular edema.*

Case No	Diagnosis	Preoperative steroid prophylaxis	IMT	Preoperative BCVA	Postoperative month 6 BCVA	Did macular edema occur during attack?	Attach treatment
1	Behçet's	Oral steroid	AZA+CSA	0.1	0.15	+	Switched from AZA+CSA to IFN-a+topikal steroid
2	Behçet's	Oral steroid	AZA+CSA	0.05	0.1	(–)	Topical steroid
3	Behçet's	Oral steroid	AZA+CSA	0.05	0.1	(–)	Topical steroid
4	Behçet's	Oral steroid	İNFX	0.1	0.6	+	Subtenon+topical steroid
5	Idiopathic	Oral+IV implant steroid	AZA+CSA	0.1	0.2	+	Topical+IV implant steroid
6	Idiopathic	Oral steroid	(–)	0.05	0.4	+	Oral+topical steroid
7	Idiopathic	Oral steroid	(–)	0.1	0.5	+	Subtenon+topical steroid
8	Idiopathic	Oral steroid	(–)	0.3	0.6	+	Oral+topical steroid
9	Idiopathic	Oral steroid	CSA	0.2	0.5	+	Subtenon+topical steroid
10	Idiopathic	Oral steroid	CSA	0.1	0.5	(–)	Topical steroid
11	Idiopathic	Oral steroid	AZA+CSA	0.01	0.01	(–)	Oral+topical steroid
12	Sarcoidosis	Oral+ IV implant steroid	MTX	0.1	0.3	+	Switched from MTX to ADA
13	Sarcoidosis	Oral steroid	MTX	0.1	0.3	(–)	Oral+topical steroid
14	Sarcoidosis	Oral steroid	(–)	0.05	0.4	+	MTX was initiated. Topical+oral steroid was given.
15	Sarcoidosis	Oral+IV implant steroid	AZA+CSA	0.05	0.7	+	Switched from AZA+CSA to ADA+topical steroid
16	Sarcoidosis	Oral+IV implant steroid	ADA	0.1	0.7	(–)	Oral+Topical steroid
17	Fuchs	(–)	(–)	0.1	0.2	(–)	Low dose topical steroid+Anti-glaucomatous
18	Fuchs	(–)	(–)	0.1	0.2	(–)	Low dose topical steroid+Anti-glaucomatous
19	JIA	Oral steroid	ADA+MTX	0.1	0.6	(–)	Topical steroid

JIA: Juvenile idiopathic arthritis,, IMT: Immunomodulatory treatment, ADA: Adalimumab, MTX: Methotrexate, AZA: Azathioprine, CSA: Cyclosporine, İNFX: Infliximab

Kawaguchi et al. found lowest PCO rate in acrylic IOL (15%) and the highest PCO rate was linked to PMMA IOLs.[7]

In this study, major limitations are lack of standardized treatment approaches after cataract surgery and need for larger sample groups for uveitis subgroups.

In conclusion, cataract surgery is accepted as a safe and successful procedure in patients uveitis despite potential complications. Different postoperative approaches yields different visual outcomes in eyes with uveitis resulting from different etiologies. It should be kept in mind that visual prognosis may be improved by identification of risk groups and appropriate preoperative and postoperative treatment approach. Further studies with larger sample size using standardized treatment approaches are needed.

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