Seminars in Ophthalmology, Early Online, 1–10, 2015

ISSN: 0882-0538 print / 1744-5205 online
DOI: 10.3109/08820538.2015.1009554

informa
healthcare

ORIGINAL ARTICLE

Follow-Up Study of Over Three Years of Patients with Uveitis after Cataract Phacoemulsification: Outcomes and Complications

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ABSTRACT

Purpose: To evaluate the rate and onset of intraoperative and postoperative complications post-phacoemulsification. *Methods*: One hundred sixty-two eyes of 145 patients with uveitis who underwent phacoemulsification between 2006 and 2009 were identified through surgical record review. Fifty-nine eyes of 46 patients met the inclusion criteria. Hazard ratio (HR) and Kaplan-Meier survival probability were calculated for each class of uveitis. *Results*: Macular edema (ME) resulted to be associated to chronic postoperative inflammation ($r = 0.6$; $p = 0.00$) and mostly related to patients who presented more than one postoperative relapse/year ($r = 0.2$; $p = 0.02$). Fuchs uveitis resulted to be a risk factor for posterior capsule opacification (PCO) (HR 3.36 IC95%1.0-10.5; $p = 0.03$). Hypotony and elevated intraocular pressure (IOP) were detected in the anterior uveitis group (0.02 EY). *Conclusion*: The HR to develop ME was significantly related to chronic anterior uveitis. PCO and elevated IOP are most frequent in Fuchs uveitis. The postoperative visual acuity result was good among all the uveitis groups.

Keywords: Cataract IOL, phacoemulsification, uveitis

INTRODUCTION

Cataract is one of the most common complications in many forms of uveitis with an incidence of up to 50%.[1] Several studies have only reported the complications regarding cataract and uveitis,[2,3] but it would be interesting to highlight the relationship among the types of uveitis and cataract outcomes. The uveitic cataract offers special challenges for the surgeon, such as a miotic pupil, iris atrophy, pupillary membrane formation, band keratopathy, and bleeding from abnormal fragile iris vessels. Surgery triggers a local production of inflammatory mediators, which can lead to a flare-up of a quiescent uveitis. Posterior chamber intraocular lens (IOL) implantation is successful regarding the vision of these patients.[4] A recent review based on several trials showed that there is an uncertainty as to which type of IOL provides the best visual and clinical outcomes in people with uveitis undergoing cataract surgery.[5] However, evidence of a superior effect of hydrophobic acrylic lenses over silicone lenses was already described in the literature.[6] Furthermore, PCO remains to be the single most common cause of reduced visual acuity after cataract surgery in uveitic patients because of their underlying pathology and possibly their younger age at the time of cataract surgery.[7] Visual and clinical outcomes may also vary with different surgical techniques for cataract extraction and IOL implantation.[8,9] The aims of the study were to value ocular intraoperative complications, detect the onset of ocular postoperative complications, and assess the postoperative best-corrected visual acuity (BCVA) in uveitis patients after phacoemulsification with IOL implantation among the different types of uveitis.

Received 16 September 2014; accepted 14 January 2015; published online 19 February 2015
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MATERIALS AND METHODS

Patients with a diagnosis of uveitis who underwent phacoemulsification at the Ocular Immunovirology Service of Sapienza University of Rome between 2006 and 2009 were identified through surgical records ($n = 145$; 162 eyes). From these, 59 eyes of 46 patients met the inclusion criteria. The University of Rome "Sapienza" Ethical Board Committee approved the retrospective revision and analysis, for scientific purposes, of the ophthalmological data obtained from the patients included in the present investigation. Informed consent was obtained from all patients involved in this research. The study was conducted in accordance with local and regional regulations, good clinical practices, and the tenets of the Declaration of Helsinki.

Inclusion criteria were diagnosis of uveitis, aged 18 or older at the time of cataract extraction. Exclusion criteria were ocular conditions such as an abnormal cornea including cornea guttata, endothelial dystrophy, corneal edema, glaucoma, macular degeneration, previous intraocular surgery, history of penetrating trauma, and endophthalmitis. Patients with a history of preoperative ME and non-implanted eyes were excluded as well as patients with diabetes mellitus. We only included patients where phacoemulsification with IOL implantation was performed by the same surgeon. The ophthalmological examination included BCVA using Snellen charts where each decimal notation was converted to logMar value, intraocular pressure (IOP) assessment using Goldmann applanation tonometer, slit-lamp biomicroscopy, and fundus examination using bilateral indirect ophthalmoscope. Cataract was defined using the classification LOCS III.[10] IOL calculation was provided using IOL Master (Carl Zeiss Meditec, Inc., Dublin, California) or A-Scan (Cinescan S Ophthalmic Ultrasound System, Quantel Medical, France) when the instrument was not able to calculate IOL power. Preoperative and postoperative uveitis relapses were evaluated counting the number of the relapses divided, respectively, for the preoperative and postoperative follow-up time. Intraoperative complications included the use of iris hooks, posterior capsule rupture, and anterior vitrectomy. Postoperative complications included ME, PCO, hypotony, and elevated IOP. ME was defined as the presence of macular thickening with or without cyst formation seen by clinical examination and/or spectral domain OCT.[11] PCO was evaluated following the dilation of the pupil using slit-lamp retroillumination.[12] PCO was only considered as a complication when significant opacity involved a large fraction of capsule area behind the IOL optic, causing visual acuity reduction.

Ocular hypertension was defined as IOP elevation >21 mmHg and hypotony was defined as an IOP <5 mmHg. Severe postoperative inflammation was defined as the persistence of anterior chamber inflammation more than 3+ cells for a period longer than three months.

Preoperative treatment

Three days before surgery, steroid therapy was introduced or increased to 1/2 mg/kg/day in patients presenting an autoimmune uveitis. For herpetic uveitis, valaciclovir therapy was introduced on the day of surgery at 3 per 1 g/day for herpes zoster uveitis, and at 3 per 500 mg/day for herpes simplex uveitis. No additional therapy was given to Fuchs heterochromic cyclitis. Steroid therapy was progressively tapered or increased after surgery according to the postoperative inflammation. Topical steroids (0.1% dexamethasone phosphate) were applied six times per day during the first postoperative day and then progressively reduced according to the level of ocular inflammation.

Surgery

Preoperatively, tropicamide 1% and phenylephrine 10% were instilled every 30 minutes two hours before surgery. Surgery was performed using periocular anesthesia. A standard phacoemulsification technique with a corneal or limbal approach was used. Sodium hyaluronate 3.0%–chondroitin sulfate 4.0% (Viscoat®) or sodium hyaluronate 1.4% (Healon GV®) was used for synechiolysis and for creating the capsulorhexis. In some cases, iris hooks were used to dilate the pupil. Phacoemulsification was done using the divide and conquer technique. After cortical clean-up, the posterior surface of the anterior capsule was aspirated. The IOL was implanted in the capsular bag and in the case of posterior capsule rupture in the sulcus. Some incisions were sutured with 10-0 nylon in a configuration of the surgeon's choice. A subconjunctival injection of 4 mg betamethasone was given at the end of surgery.

Statistical analyses

Patient data were entered in a computer-based standardized data entry form for statistical analysis. Incidence rates were calculated as the number of events divided by the number of eyes at risk. Kolmogorov-Smirnov test was applied for all data samples in order to check normality. Bivariate correlations were evaluated using Pearson or Spearman correlation coefficients, depending on whether normality could be assumed or not. When parametric statistical analysis was possible, Student t test for paired data was applied to assess the significance of differences between preoperative and postoperative

data, whereas the Wilcoxon Rank Sum test was applied when it was not possible. For the comparison of several related samples, the Friedman test was used. The long rank test was used to compare Kaplan-Meier curves among the complications of the different uveitis types. For the risk factor analyses, HR using COX regress analysis was calculated. A p value <0.05 was considered significant. All of the analyses were performed using SPSS 21.0 statistical software (LEAD Technologies).

RESULTS

Characteristics of the study population are summarized in Table 1 and cataract distribution is reported in Table 2. Fuchs uveitis showed a statistically significant association with subcapsular form ($r = 0.2$; $p = 0.02$) and chronic anterior uveitis with nuclear form ($r = 0.3$; $p = 0.02$).

Hydrophobic acrylic IOLs were implanted. Acrysof® Alcon was implanted in 39 eyes (66.1%), Tecnis® ZCB00 Abbot® in 14 eyes (23.7%), and VA60BB Hoya® in six eyes (10.1%).

The intraoperative complications included one case (1.7%) of posterior capsule rupture with anterior vitrectomy and, in 18 eyes (30.5%), iris hooks were used to dilate the pupil. The use of iris hooks was significantly associated with the chronic anterior uveitis group ($r = 0.4$; $p = 0.01$) and in the nuclear cataract group ($r = 0.3$; $p = 0.01$). The subcapsular cataract group showed a negative association with the use of iris hooks ($r = -0.3$; $p = 0.01$).

Among the long-term complications, the incidence of ME was 0.02 EY. Six cases (10.2%) of ME were detected. Four cases in the anterior uveitis (6.8%) and two cases in the panuveitis (3.4%) group. The median time of onset after cataract surgery was 51.19 ± 16.9 months (95 IC% 50.39–51.80). In the anterior group, it was 52.36 ± 16.93 months (95 IC% 34.59–73.7) and, in the panuveitis group, it was 57.6 ± 23.15 months (95 IC% 0.31–265.59). The differences among the groups were not statistically significant ($p = 0.30$). No group of uveitis showed to be a specific risk for developing ME. It turned out to be highly associated with chronic postoperative inflammation ($r = 0.6$; $p = 0.00$) and most associated in patients who presented more than one postoperative relapse/year ($r = 0.2$; $p = 0.02$)

The incidence of PCO was 0.07 EY. Sixteen cases of PCO (27.1%) were identified. Eleven cases (18.6%) in the anterior uveitis group, two (3.4%) cases in the

TABLE 2. Cataract distribution and IOL implanted.

Cataract distribution	Number of eyes (%)
Nuclear	31 (52.4)
Cortical	9 (15.2)
Nuclear + subcapsular	1 (1.69)
Cortical + subcapsular	1 (1.69)
Nuclear + cortical + subcapsular	7 (11.8)
Subcapsular	10 (16.9)

TABLE 1. Characteristics of the study population.

Patient-specific characteristics	Value
Number of patients	46
Male (%)	22 (47.8)
Female (%)	24 (52.2)
Number of eyes	59
Median follow up months ± SD (range)	42.10 ± 55.80 (9–396)
Median age at the time of uveitis diagnosis years ± SD (range)	43.35 ± 19.81 (4–78)
Median duration of uveitis inactivity before surgery months ± SD (range)	21.14 ± 11.56 (3–502).
Median age at the time of the cataract surgery years ± SD (range)	61.44 ± 18.16 (22.9–81.15)
Uveitis distributions	
Anterior	Associated to HLA- B27 1 (1.7)
Number of eyes (%) 33 (55.9)	Fuchs 7 (11.9)
	Herpetic uveitis 13 (22)
	Ulcerative colitis 4 (6.8)
	Tubercolosis 2 (3.4)
	Idiopathic 6 (10.2)
Intermediate	
Number of eyes (%) 3 (5)	
Posterior	Toxoplasma retinitis 2 (3.4)
Number of eyes (%) 10 (16.9)	Tubercolosis 3 (5.1)
	Vokt Koyanagi Harada disease 2 (3.4)
	Serpiginous choroiditis 1 (1.7)
	Multifocal choroiditis 2 (3.4)
Panuveitis	Behçet 6 (10.2)
Number of eyes (%) 13 (22)	Tubercolosis 1 (1.7)
	Idiopathic 6 (10.2)

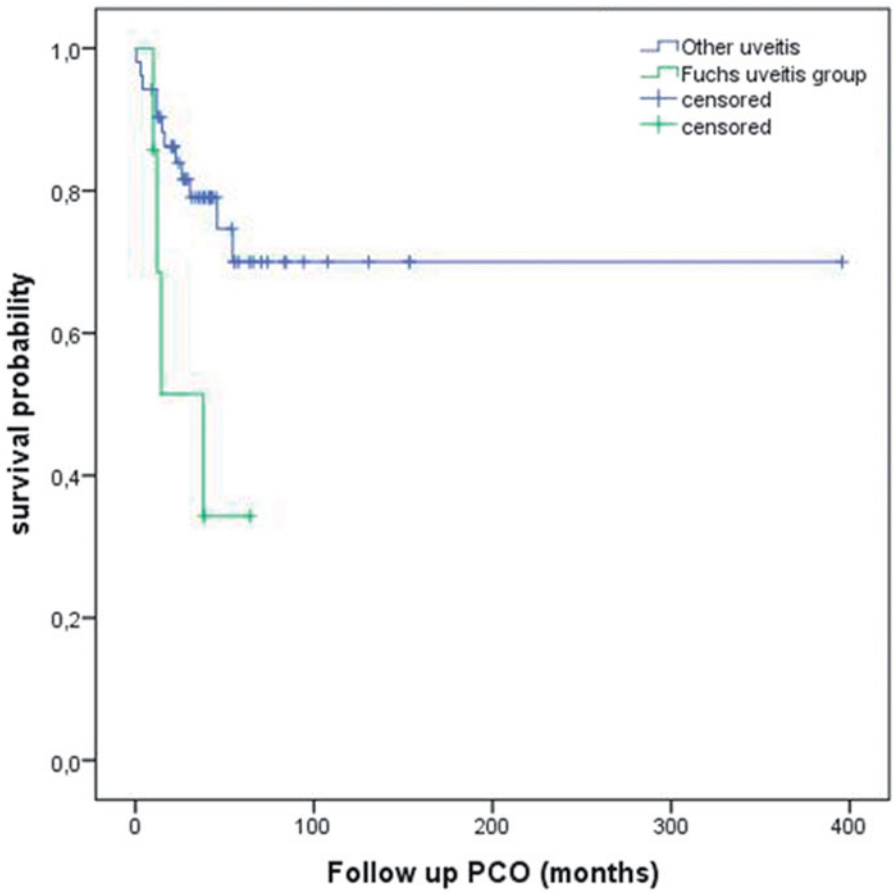

FIGURE 1. Kaplan-Meier curve of PCO follow-up after cataract surgery among the patients with diagnosis of Fuchs uveitis and other uveitis.

posterior and panuveitis groups, respectively, and one (1.7%) case in the intermediate group. The median time of onset after surgery was different among the types of uveitis. For anterior uveitis, a median onset was 12.32 ± 17.59 months (95% IC 0.41–24.04), in posterior and panuveitis it was 25.34 ± 10.13 (95% IC 0.22–116.4) and 22.29 ± 12.21 (95% IC 0.17–131.90), respectively. The differences among the groups were not statistically significant ($p = 0.42$). Fuchs uveitis was a risk factor for PCO (HR 5.5; 95%IC 0.9–30.39; $p = 0.05$) as well as anterior chronic uveitis. However, the value did not reach statistical significance (HR 3.6; 95% IC 0.69–19.61; $p = 0.1$). Kaplan-Meier analyses among the Fuchs and PCO is shown in Figure 1.

The incidence of PCO did not show statistically significant differences among the different groups of lenses implanted ($p = 0.65$). PCO was not related to chronic postoperative inflammation ($r = 0.03$; $p = 0.82$).

Hypotony was detected only among the anterior uveitis group. Three cases were detected (5.1%). The incidence of hypotony was 0.02 EY. The median time of onset was 13.2 ± 12.74 months (95% IC 0.31–43.34). Among the anterior uveitis group, only chronic uveitis showed a low risk related to hypotony (HR 0.4; 95% IC 0.03–4.63; $p = 0.04$). Hypotony proved to be more associated with postoperative chronic inflammation ($r = 0.35$; $p = 0.02$).

Elevated IOP was also more common in anterior uveitis. Six cases were reported (10.2%), five cases in the anterior uveitis group (8.5%) and one case in the panuveitis group (1.7%). No comparative statistical analysis among the different classes of uveitis was performed in this case. The incidence was 0.04 EY. The median time of onset was 2.77 ± 3.27 months (95% IC 0.17–6.20). Fuchs uveitis seems to be a risk for elevated IOP, but the value was not statistically significant (HR 2.79; 95% IC 0.39–19.97; $p = 0.30$). Elevated IOP was not associated with severe postoperative inflammation ($r = 0.1$; $p = 0.10$).

Table 3 summarizes the distributions of complications among the different groups of uveitis.

The Kaplan-Meier curve was applied to analyze the occurrence of complications among the different classes of uveitis (Figure 2A–D).

Severe postoperative inflammation was found in three eyes (5.1%). Two of them were affected by panuveitis (3.4%) and one by anterior uveitis (1.7%).

The mean preoperative relapse of uveitis per year was 0.4 ± 0.08 (range: 0–3.3) and the mean postoperative relapse per year was 0.2 ± 0.05 (range: 0–2.09). No statistically significant difference was

TABLE 3. Hazard risk of complications among different classes of uveitis.

	HR (95% CI)	*p* Value	HR (95% CI)	*p* Value	HR (95% CI)	*p* value	HR (95% CI)	*p* Value
Complications	Macular edema		Posterior capsule opacification		Elevated IOP		Hypotony	
Anterior	1.73 (0.3–9.7)	0.52	2.88 (0.2–13.1)	0.17	4.4 (0.5–37.8)	0.17	55.10 (0.05–63.1)	0.40
Fuchs	0.40 (0–16.5)	0.55	3.36 (1.0–10.5)	0.03*	5.72 (1.0–31.4)	0.04*	0.42 (0–54.4)	0.70
Herpetic uveitis	0.21 (0–95.7)	0.36	0.22 (0.48–1.1)	0.06	0.89 (0.1–5.3)	0.91	3.4 (0.3–38)	0.31
Chronic uveitis	29.2 (0.01–84.4)	0.02*	1.6 (0.49–5.57)	0.41	0.34 (0.38–3.08)	0.34	0.63 (0.57–6.99)	0.70
Intermediate	0.46 (0–75.7)	0.71	3.56 (0.32–39.5)	0.30	0.46 (0–28.0)	0.69	0.04 (0–15.1)	0.83
Posterior	0.03 (0–73.3)	0.38	1.36 (0.19–9.69)	0.75	0.03 (0–28.4)	0.46	0.03 (0–11.6)	0.61
Panuveitis	1.09 (0.19–6.03)	0.91	0.39 (0.09–1.72)	0.22	0.65 (0–5.64)	0.70	0.03 (0–25.8)	0.51
Behcet	0.40 (0–15.1)	0.55	1.17 (0.26–5.18)	0.83	0.42 (0–32.3)	0.58	0.42 (0–30.8)	0.69

*Statistical significant value.

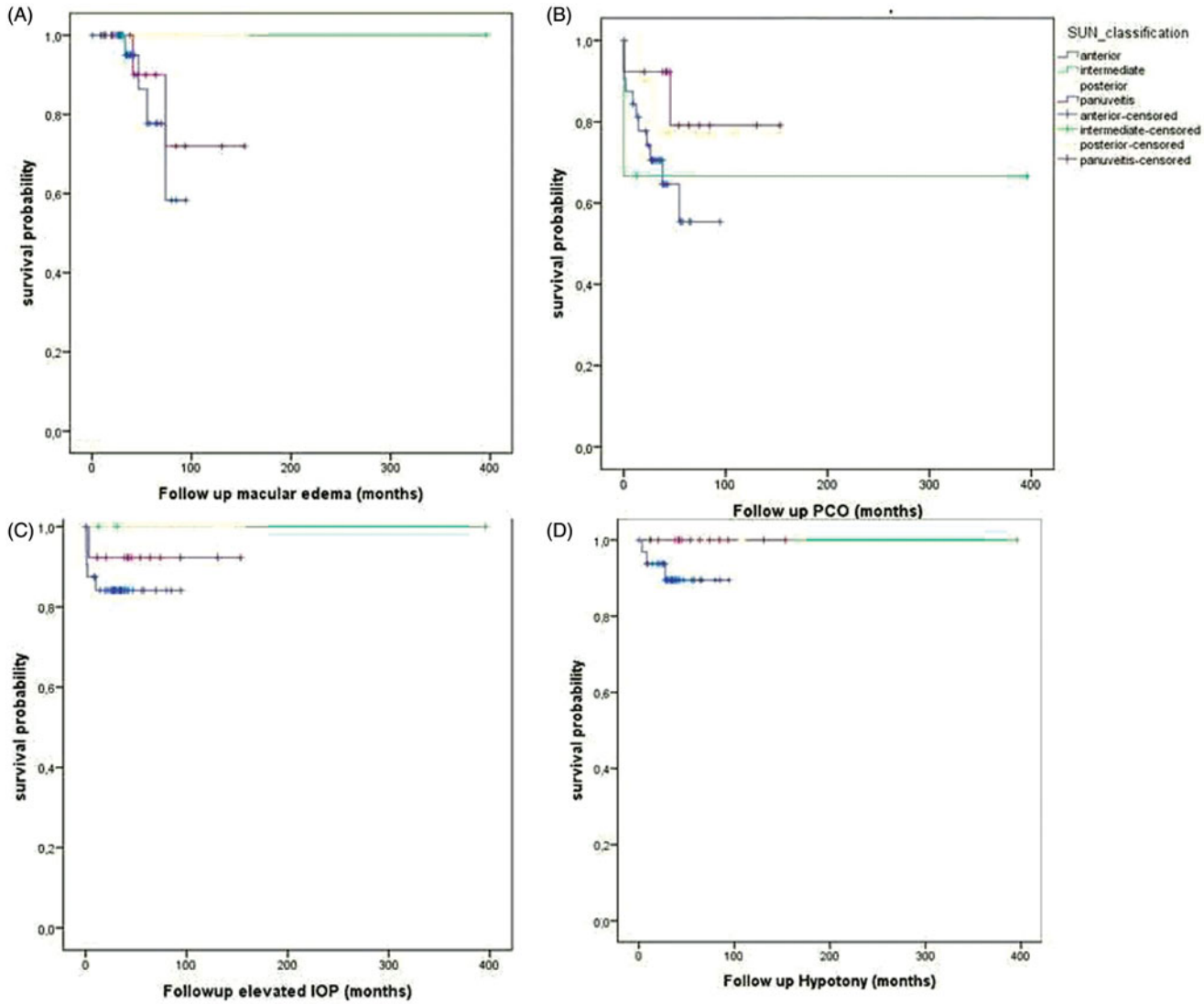

FIGURE 2. Kaplan-Meier curve of (A) ME, (B) PCO, (C) elevated IOP, (D) hypotony among patients of different uveitis groups after cataract surgery.

found between the preoperative and postoperative relapse ($p = 0.09$). Five eyes had more than one postoperative relapse/year. The risk of developing postoperative complications in these groups is reported in Table 4.

The mean preoperative BCVA at the preoperative visit was 0.49 ± 0.42 logMar and, at the end of the follow-up, 0.20 ± 0.31 logMar. The difference between the visual acuity was significant ($p = 0.00$) Fuchs uveitis was significantly associated with the best

TABLE 4. Risk factor for developing postoperative complications among patients with more than one postoperative relapse year.

Complications	HR (95% CI)	*p* Value
Macular edema	7.7 (1–55.9)	0.04*
Posterior capsule opacification	1.8 (0.3–10.8)	0.5
Elevated IOP	5.3 (0.8–32.0)	0.06
Hypotony	7.2 (0.6–8.3)	0.1

*Statistical significant value.

TABLE 5. Risk factors for vision loss during follow-up.

Complications	HR (95% CI)	*p* Value
Posterior capsule rupture	3.0 (0.80–11.4)	0.28
Use of iris hook	5.0 (0.25–99.9)	0.10
Macular edema	1.0 (0.11–9.91)	0.96
Elevated IOP	0.7 (0.9–6.9)	0.83
Hypotony	0.1 (0–7.3)	0.99
Postoperative severe inflammation	2.3 (0.5–11.3)	0.06
More than 1 relapse year	3.3 (0.5–20.3)	0.13

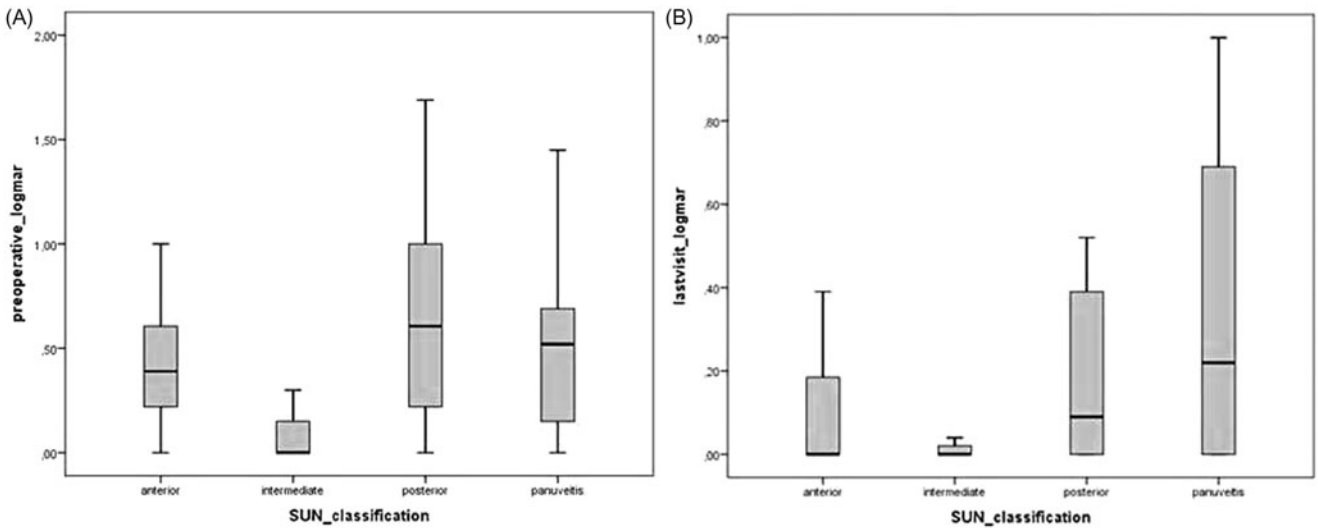

FIGURE 3. Graph A reports the preoperative visual acuity differences among classes of uveitis. In anterior uveitis, it was 0.4 3 ± 0.28 logMar (0–1); in the intermediate uveitis, 0.1 ± 0.17 logMar (0–0.3); in the posterior uveitis, it was 0.6 ± 0.58 logMar (0–1.69); in the panuveitis, it was 0.50 ± 0.44 logMar (0–1.69). Graph B reports the visual acuity at the last follow-up examination. In the anterior uveitis group, the visual acuity was 0.17 ± 0.33 logMar (0–1); in the intermediate uveitis, 0.01 ± 0.02 logMar (0–0.4); in the posterior uveitis, it was 0.23 ± 0.32 logMar (0–1); in the panuveitis, it was 0.30 ± 0.35 logMar (0–1). The differences among the groups of uveitis were not statistically significant. Preoperative visual acuity ($p = 0.22$) and postoperative visual acuity ($p = 0.25$) (Kruskal Wallis) are shown.

visual outcome ($r = 0.2$; $p = 0.04$). Final BCVA did not show a statistically significant difference among the different groups of lenses implanted ($p = 0.64$). The preoperative and postoperative visual acuity reported for the different groups of uveitis are shown in Figure 3. Risk factors of developing a BCVA lower than 0.3 logMar during the follow-up are reported in Table 5.

DISCUSSION

The postoperative and long-term complications for eyes with uveitis and cataract treated by phacoemulsification and IOL implantation have been reported in several articles,[13,14] without an evaluation of the postoperative and long-term risk associated with the different types of uveitis diagnosis.

Chronic anterior uveitis showed a statistically significant association with cataract nuclear form ($r = 0.38$; $p = 0.02$) and Fuchs uveitis with the subcapsular form ($r = 0.2$; $p = 0.02$). This data can be correlated to those found in the literature.[15]

Intraoperative Complications

The intraoperative use of iris hooks to dilate the pupils has proved to be a useful technique during cataract surgery.[16] Synechiolysis and removal of pupillary membrane were performed. Then, the iris hooks were placed and removed through multiple corneal paracentesis. In 18 eyes (30.5%), iris retractors were used. The use of iris hooks was significantly associated with the group of chronic anterior uveitis ($r = 0.4$; $p = 0.01$) and their use was more related to postoperative severe inflammation ($p < 0.05$). Final BCVA lower than 0.3 logMar was not significantly associated with the use of iris hooks. ($p = 0.20$).

The intraoperative complications included one case (1.7%) of posterior capsule rupture which

required anterior vitrectomy. Other authors reported posterior capsule rupture, with vitreous loss the most common intraoperative complication in this group of patients. According to these results, it was seen in 3% of patients who underwent phacoemulsification.[17]

Postoperative Complications

Macular edema

In this study, ME post cataract surgery was detected in 8.47% of eyes. No group of uveitis showed to be at a statistically significant risk for developing ME. The incidence of postoperative ME in uveitic eyes was 10% in previous studies.[13] Agrawal et al. reported an increased risk of developing ME postoperatively in eyes with previous episodes of ME.[16]

The incidence of ME following phacoemulsification has been reported to range from 12% to 59% in eyes with pars planitis.[18] In our study, the sample of intermediate uveitis was too small to relate with other data. We observed six cases of ME after cataract surgery. This value could appear to be low, but it is important to remember that eyes with previous episodes of ME and patients with diabetes were excluded from the study.

ME following cataract surgery or Irvine-Gass syndrome is induced by inflammatory mediators and consists of intraretinal perifoveal fluid accumulating in the outer plexiform and inner nuclear layers, forming cystic spaces and decreases in retinal function.[19] Irvine-Gass syndrome normally occurs four to six weeks postoperatively, but can even occur in the first week after surgery.[20] Its incidence following modern cataract surgery is 0.1%–2.35%.[21] The median time of ME onset observed after cataract surgery in our group of uveitic patients was 51.19 ± 16.9 months (95% IC 50.39–51.80).

These patients developed ME with a late onset compared to Irvine-Gass syndrome. The different pathogenesis theory in these two different presentations of postsurgery ME should probably be considered. It is possible that different factors increase inflammation or capillary permeability in uveitic and nonuveitic eyes. The eye with the posterior capsule rupture presented postoperative ME 21 months after cataract surgery. Posterior capsule rupture is a known risk factor for developing ME.[19] Furthermore, in our study, ME proved to be highly associated with chronic postoperative inflammation ($p = 0.00$), mostly occurring in patients who presented more than one postoperative relapse/year ($r = 0.2$; $p = 0.02$). The risk of developing it among these patients is highly statistically significant (HR 7.7; IC 95% 1–55.9; $p = 0.04$).

Another study demonstrated that the development of severe uveitis in the first week postsurgery was associated with a greater incidence of ME.[22]

We can speculate that iris retractors prove to be associated with postoperative severe inflammation. Some authors reported that iris manipulation at the time of surgery was not related to an increased risk of postoperative ME, but iris incarceration and the use of iris-fixated lenses are associated with increased risk.[19] Also, Nd-YAG capsulotomy is considered to be a risk for ME. Among our patients who underwent Nd-YAG capsulotomy (25.42%), only one (6.66%) developed ME. Capsulotomy was performed in this patient 47 months after cataract extraction.

In our study, 80% of patients who presented postoperative ME had cystoids macular edema (CME), and only 20% had diffuse macular edema, according to the ME classification in uveitis with SD-OCT proposed recently in the literature.[23]

Munk et al. described the progression and resolution of uveitis-associated CME using SD-OCT and found predictive factors for successful intravitreal triamcinolone acetonide therapy. In their study, none of the eyes developed serous subretinal detachment (SRD) of the neuroepithelium detachment during ME relapse.[24] In our study, 50% of eyes with ME had a relapse, and 20% of these eyes had an ME relapse associated with SRD. In the Munk study, the main effect variables SRD and absence of epiretinal membrane (ERM) were associated with greater BCVA improvement.[24] In our series, only one eye presented SRD during an ME relapse with an excellent visual recovery following therapy, and two eyes affected by ERM did not present relapse. Five eyes were treated by a series of posterior sub-Tenon injections of repository corticosteroids. The number of injections ranged from two to five, depending on the response to the therapy evaluated with BCVA and SD-OCT. One eye was treated with a systemic steroid, tapering the steroid dosage each week.

Roesel et al. demonstrated that a single intraoperative orbital floor injection of triamcinolone acetonide is as effective on postoperative inflammation, ME, and visual outcome as a four-week course of postoperative oral prednisolone in cataract surgery with IOL implantation in uveitic patients.[25] In our study, all treated eyes had a good response to therapy with regression or significant reduction of central foveal thickness, demonstrating that posterior sub-Tenon injections of repository corticosteroids is an effective therapeutic alternative in the treatment of postoperative ME.

Posterior capsule opacification

Most previous publications found that uveitic eyes with placement of an IOL in the bag had a higher risk for PCO compared to non-uveitic eyes. The incidence in non-uveitic eyes with an acrylic IOL is closer to 10-15%.[26] In eyes having standard phacoemulsification. the hydrophobic acrylic IOL had a median capsulotomy-free survival >150 months,[27] considerably higher than median PCO

onset in uveitic eyes in our study. Even if postoperative inflammation is commonly considered to be a risk factor for PCO, in our study PCO was not associated with chronic postoperative inflammation ($p = 0.82$). Suresh et al. reported that PCO occurred in 42% of eyes in patients who had undergone phacoemulsification with IOL implantation with five years of follow-up and Nd-YAG capsulotomy was required in 21% of uveitis.[28] In our study, the rate of postoperative PCO resulted in 27.12% (16 eyes) and Nd-YAG capsulotomy was performed in 15 eyes (25.42%). Usually, 1.5 to 2mJ per pulse from Q-switched Nd-YAG laser was sufficient to open the posterior capsule. After the laser procedure, one drop of timolol maleate 0.5% eye drops and brimonidine tartrate 0.2% was applied. We used oral carbonic anhydrase inhibitors, acetazolamide 250 mg, at the end of the procedure and repeated it after four hours. Dexamethasone 0.1% was supplied as one drop four times daily and then tapered depending on the degree of cellular reaction. In one eye the Nd-YAG laser was not performed because the patient chose to postpone the procedure. The median age at the time of surgery of our patients was 47 years (range: 19–89 years). Compared to Suresh data, the lower incidence of PCO of our sample is probably due to the higher median age at the time of surgery. Fuchs heterochromic iridocyclitis proved to be a risk factor for PCO (HR 5.5; IC 95% 0.9–30.39; $p = 0.05$). Javadi et al. reported that PCO was a common complication in Fuchs uveitis and developed in the follow-up period of 17.8 ± 8.7 months.[29] Anterior chronic uveitis group did not demonstrate statistical significance related to PCO (HR 3.6; IC 95% 0.69–19.61; $p = 0.1$), even though anterior chronic uveitis represented 18.6% cases of postoperative PCO. In other studies, between 12.7% and 28.7% of the cases with PCO were observed in the anterior uveitis group.[13,14] In anterior uveitis, a PCO median onset was 12.32 ± 17.59 months (95% IC 0.41–24.04); in posterior and panuveitis, it was 25.34 ± 10.13 (95% IC 0.22–116.4) and 22.29 ± 12.21 (95%IC 0.17–131.90), respectively. The differences among the groups were not statistically significant ($p = 0.42$). However, PCO was manifested earlier in the anterior uveitis group compared to the others. A possible bias could be that the anterior uveitis group was of a younger age at the time of surgery compared to the others, and this data could be a bias in this evaluation. A statistically significant difference between the different groups of hydrophobic acrylic IOL implanted and incidence of PCO were not revealed ($p = 0.65$).

Elevated IOP

Another potential postoperative complication is elevated IOP. 10.1% of eyes after surgery developed elevated IOP. The elevated IOP was controlled by the application of eye drops in four eyes. Timolol maleate 0.5% one drop two times a day was enough in one eye (1.7%), and timolol maleate 0.5% and dorzolamide 2% one drop two times a day in three eyes (5.1%). Two eyes (3.4%) underwent filtration surgery treatment because the systemic therapy was not enough and the visual field worsened.

Fuchs uveitis seemed to be a risk factor for postoperative elevated IOP, but the value was not significant (HR 2.79; IC 95% 0.39–19.97; $p = 0.3$).

Permanent IOP elevation after cataract extraction was reported to develop in 3% to 35% during the follow-up period.[30] We reported 8.47% of eyes with elevated IOP among anterior uveitis. Kosker et al. described a raised IOP in 7.27% of eyes with anterior uveitis.[13] In our series, elevated IOP was not associated with severe postoperative inflammation ($p = 0.1$).

Hypotony

In our series, 5.08% of eyes showed postoperative hypotony. This complication proved to be more frequent in patients with postoperative chronic inflammation ($p = 0.02$). Hypotony was detected only among the anterior uveitis group, but with a low risk association (HR 0.4; 0.03–4.63; $p = 0.04$). Previous studies had an incidence of 1.8% of postoperative hypotony.[13] Difficult control of uveitis is a high risk of severe postoperative inflammation and hypotony. Therefore, careful ultrasonic biomicroscopy could be required in eyes with relative preoperatory hypotony to assess the state of the ciliary body. The risk of hypotony is high if the ciliary body proved atrophic.[16]

Posterior synechiae

In our series, there was no evidence of postoperative posterior synechia. Other studies present very high rates of posterior synechia (25%).[14] In our study, the low rate could be the result of the use of hydrophobic acrylic IOL.

Visual acuity outcome

The mean preoperative BCVA at the preoperative visit was 0.49 ± 0.42 logMar and, at the end of follow-up, 0.2 ± 0.31 logMar. The difference between the visual acuity was significant ($p = 0.00$). Postoperative severe inflammation did not reach a statistical significant value, even if it seemed to be a risk of BCVA reduction. Patients with more than one postoperative relapse year seemed to have a risk of developing a visual acuity reduction, but the value was not statistically significant (HR 3.3; IC 95% 0.5–20.3; $p = 0.1$).

Javadi et al. reported in Fuchs uveitis a postoperative visual acuity of 0.3 logMar or better in all 41 eyes that underwent phacoemulsification and lens implantation.[29] No statistical significant difference between the different groups of hydrophobic acrylic IOL implanted and final BCVA was found ($p = 0.64$).

Alió et al. found that 46.3% of eyes had a best-corrected visual acuity of 0.3 logMar or better at one year using a variety of IOL materials and designs.[6]

Ram et al. reported in their group with a mean age of 42.3 years ± 13.98 consisting of 108 eyes with a BCVA improvement postoperatively of 0.3 logMar or better in 71.30% of the patients. 15.74% had a final BCVA of 0.48 to 0.80 logMar and 5.55% of 1.00 logMar.[14]

In our study, 74.57 % of patients had a final BCVA better than 0.48 logMar. The high rate of significant postoperative improvement in BCVA was influenced by the fact that the exclusion criteria considered diseases that affected preoperative macular involvement.

One limitation of this study is that the group of intermediate uveitis was quite small compared to the other groups. Therefore, no significant comparisons could be made with this group. However, we did also include the description of this group to provide an overview of all uveitis classes.

In summary, this study reports the outcomes and complications of the cataract surgery for patients with uveitis. The data related to the preoperative and postoperative complications suggest that phacoemulsification is safe and needed for a good visual recovery in most uveitic patients with cataract. Similar results were also reported by a recent metanalysis.[31] The HR to develop ME is significantly associated with the group of chronic anterior uveitis, and PCO and elevated IOP are more frequent in Fuchs uveitis. The postoperative visual acuity had good results among all the uveitis groups. No statistical difference was identified among them. The medical management and parasurgical procedures used in postoperative complications of phacoemulsification with IOL implantation help widely in the persistence of visual recovery due to cataract surgery. Good visual outcomes and low complication rates can be obtained when ocular inflammation is under control.

ACKNOWLEDGMENT

The study has not been supported by any funding organization. Grant support and/or funding sources were not received for this study. No conflicting relationship exists for any authors. A.A. had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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