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"Evaluating the Outcomes and Complications of Cataract Surgery in Patients with Uveitis: A Retrospective Cohort Study with Six-Month Follow-Up"

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Abstract : Introduction: The purpose of this research is to assess the results of cataract surgery in uveitis patients, with a particular emphasis on intraoperative and postoperative complications as well as improvements in visual acuity over a six-month follow-up period., **Materials & Methods:** At a tertiary care referral center in western India, a retrospective observational cohort research was carried out which included 44 eyes from 38 individuals between April 2022 and September 2023. We examined data related to demographics, etiology, the anatomic site of uveitis, and vision. A single surgeon carried out every procedure, and patients were checked on one day, one week, one month, three months, and six months after the procedure., **Results:** There were 17 females and 21 males, with a mean age of 36.4 years. The most prevalent kind of uveitis was intermediate (40.9%). In 88.6% of eyes, postoperative best-corrected visual acuity (BCVA) improved, with 79.54% of eyes reaching BCVA ≥ 0.1. Maximum visual gains were observed with anterior uveitis. Cystoid macular edema (CME) occurred in six eyes (13.63%), mostly in the group with intermediate uveitis. For secondary glaucoma, one eye needed a trabeculectomy, and 3 eyes developed severe vitritis in postoperative period. All patients with uveitic cataract especially with anterior uveitis benefit greatly from cataract surgery. ($p < 0.00001$), **Conclusion:** The majority of people with uveitic cataract benefit from cataract surgery .To maximize visual prognosis, inflammation and CME must be identified and treated quickly and aggressively in the pre and post-operative period with long term close monitoring.

Key-words: Cataract, uveitis, complicated cataract, uveitic cataract, visual outcomes

Introduction: Due to its effectiveness in improving quality of life and restoring eyesight, cataract surgery continues to be one of the most common surgical procedures performed globally. However, uveitis, a complex inflammatory disease of the uveal tract, presents unique challenges and risks for those undergoing cataract surgery.

Because of the disease's chronic inflammation and the side effects of corticosteroid treatments, uveitis is a primary cause of cataract development (1). Patients with uveitis may have worsening inflammation, a higher risk of surgical complications such as cystoid macular edema, posterior synechiae, and changes in intraocular pressure, all of which affect cataract treatment (2). The outcomes for these patients have improved with advances in perioperative anti-inflammatory medicines and surgical techniques, but maintaining the delicate balance between promoting healing and reducing inflammation must be maintained (3,4,5,6).

This study aims to evaluate the results of cataract surgery, including intraoperative and postoperative complications, in patients with uveitis with a six-month follow-up. This research seeks to provide comprehensive insights into the safety and efficacy of cataract surgery in this high-risk group by analyzing complication rates, inflammation control, and visual acuity improvements.

Individualized preoperative and postoperative care techniques are important, as shown by the varied outcomes of previous studies (7, 8). By offering recommendations for improving surgical techniques and perioperative care to enhance patient outcomes, the study's findings will help clinical practitioners.

Materials and Methods: In a western Indian tertiary care referral facility, we conducted retrospective observational cohort research.We had adhered to declaration of Helsinki of 1964 throughout the study. We included all 44 eyes of 38 patients who had undergone cataract surgery performed by a single doctor between April 2022 and September 2023. Patient taking systemic drugs with potential retinal toxicity, extremes of refractive error (> +5D and > –6D), and other ocular co-morbidities that might impact the final visual results were excluded.

We conducted a retrospective analysis of case sheets to collect data on the demographics, etiology and anatomical location of uveitisas per the Standardization of Uveitis Nomenclature diagnostic criteria. We also gathered information on systemic medications, best corrected visual acuity (BCVA) by snellen's chart and decimal points, slit lamp examination, posterior segment examination (including indirect ophthalmoscopy, slit lamp biomicroscopy, and B-scan ultrasonography in cases of occlusiopupilae and media haze), before cataract surgery (within one week prior to surgery), one day, one week, one month, three months, and six months after surgery,

and performed statistical analysis. Before surgery, all eyes had at least three months of inflammation quiescence (<1+ cells in the anterior chamber [AC]).

At our clinic, all forty-four eyes belonging to 38 patients with uveitis-related cataracts underwent conventional procedures for phacoemulsification and manual small incision cataract surgery (MSICS) with in-the-bag implantation of a hydrophobic acrylic IOL.

For nondilating pupils and posterior synechiae, various iris procedures and devices were employed such as mechanical devices like iris retractors, and procedures likesynechiolysis, stretch pupilloplasty and sphincterectomy. Trypan blue dye was used to stain the anterior capsules to improve visibility. Only patients with stable systemic uveitis for more than three months were posted for cataract surgery.We did not do surgery on any patient who had disc edema or cystoid macular edema (CME), since these conditions often indicate inadequately managed inflammation, which may result in significant flare-ups during the postoperative phase.

Intravenous methylprednisolone 500 mg was administered for three days in a row, commencing the day before surgery, to patients who had active inflammation within six months of the procedure and for whom postponement of the procedure was not an option due to poor fundus visibility. Following surgery, all patients (n = 44) received oral prednisolone at a dose of 0.5 mg/kg body weight with tapering, depending on the degree of inflammation which typically lasted for 3-4 weeks. All complications, both during and after surgery, have been considered. Though, the transient rise of IOP within 2 weeks post-surgery was noted but not considered a complication. In order to increase accuracy in the diagnosis of CME in our research, we used optical coherence tomography (OCT) scans in addition to clinical examinations.

Standard deviation (SD) or median, together with the proper range, were provided in descriptive statistics. The chi-square test, the paired and unpaired t test, and the ANOVA test were employed correctly where applicable. Best-corrected visual acuity, measured using Snellen's chart, was the primary result of this study. A 5-letter improvement or a visual acuity score of 20/40 or higher was considered clinically meaningful for the purposes of this inquiry. Six months after surgery, the management of inflammation and any problems resulting from uveitis and cataract surgery were the secondary outcomes.

Results:_Demography, presenting features, anatomical location, and etiology of uveitis Twenty-one (47.73%) of the 38 patients were men, and seventeen (38.64%) were women. The study population ranged in age from 7 to 57. The study's mean age group was 36.4 years. Of the 44 eyes examined, 12 (27.27%) had experienced a single episode

of acute uveitis. There were 18 (40.91%) eyes with chronic uveitis. In the preoperative period, the remaining 14 eyes (31.81%) had recurring episodes of inflammation.

Intermediate uveitis (18 patients- 40.90%) was found to be most common type followed by anterior uveitis (13 patients- 29.54%), posterior uveitis (8 patients- 18.18%) and panuveitis (5 patients- 11.36%).

Etiology of uveitis in our patients was as per below. (Table 1)

Table 1: Etiology of uveitis

Type of uveitis	**Number of patients (Total n=44)**
Idiopathic	11
HLAB27 associated uveitis	7
Viral anterior uveitis	5
Fuchs anterior uveitis	6
Ocular TB	8
Ocular sarcoidosis	2
Behcet's uveitis	2
Juvenile idiopathic anterior uveitis	2
Toxoplasmosis	1

Systemic immunosuppressants were continued for 12 (27.27%) eyes on the day of surgery to control uveitis; of these, 7 were on antimetabolites, 3 were on biologics, and 2 were on calcineurin inhibitors. Three patients (6.81%) had a macular hole identified before surgery, while ten patients (22.72%) had an epiretinal membrane. Six months after surgery, appropriate treatment, including vitrectomy, was scheduled for the macular condition. Phacoemulsification was used in 32 eyes (72.72%), whereas MSICS was used in the remaining 12 eyes (27.27%). The non-dilating or unevenly dilating pupil necessitated further iris manipulation maneuvers in 36 (81%) of the eyes.

Effect of anatomical location and aetiology on visual acuity

39 eyes (88.6%) had an improvement in the postoperative BCVA, 4 (9.1%) had no change, and 1 (2.3%) had a decline. A final BCVA of 0.5 or greater was obtained in 16 eyes (36.36%), and a BCVA of 0.1 or better was obtained in 35 eyes (79.54%). The mean BCVA changed from 0.23 in the preoperative period to 0.38 in the postoperative period. A strong association was observed between the preoperative and postoperative BCVA (p value <0.00001). The preoperative and final BCVA did not vary across the genders or age groups (p = 0.425; p = 0.170).

Tables 2 and 3 provide the pre- and postoperative BCVA in connection to the anatomical location of uveitis over the 6-month follow-up period, respectively. There were differences in the postoperative BCVA across different anatomical localizations of uveitis; anterior uveitis showed the greatest visual outcomes (61.53%; 8 out of 13 eyes with anterior uveitis had BCVA > 0.5). While 40% (2/5) of the panuveitis-affected eyes had a BCVA of 0.1 or below, only 20% (1/5) of the affected eyes had a final BCVA of >0.5. As 9 out of 18 (50%) eyes with intermediate uveitis stayed in this range (p = 0.009; Table 2), a final BCVA between 0.5 and 0.1 was usual for eyes with intermediate uveitis.

Table 2: Preoperative visual acuity with correlation with anatomical localization of uveitis

Anatomical localization of uveitis	**BCVA ≥ 6/12**	**6/60 <= BCVA < 6/12**	**BCVA < 6/60**	**Total**
	>=0.5	**<0.5 and >=0.1**	**<0.1**	
	N **(%)**	***N*** **(%)**	***N*** **(%)**	***N*** **(%)**
Intermediate	5 (28)	6(33)	7(39)	18(100)
Anterior	3(23)	8(61)	2(15)	13 (100)
Posterior	1 (12)	4 (50)	3(37)	8(100)
Panuveitis	No	2(40)	3 (60)	5 (100)
total	9	20	15	44

Table 3: Postoperative (6 months) visual acuity with correlation with anatomical localization of uveitis

Anatomical localization of uveitis	**BCVA ≥ 6/12**	**6/60 <= BCVA < 6/12**	**BCVA < 6/60**	**Total**
	>=0.5	**<0.5 and >=0.1**	**<0.1**	
	N **(%)**	***N*** **(%)**	***N*** **(%)**	***N*** **(%)**
Intermediate	5 (28)	9(50)	4(22)	18(100)
Anterior	8(61)	4(31)	1(8)	13

				(100)
Posterior	2(25)	4 (50)	2(25)	8(100)
Panuveitis	1 (20)	2(40)	2(40)	5 (100)
total	16	19	9	44

Except for Fuch's and HLA B27 related uveitis, which showed superior final BCVA (p = 0.034), we could not find statistically significant association between etiology and BCVA gain post cataract surgery. The total BCVA was significantly affected by the duration of uveitis; eyes with a single acute episode and those with repeated cases of uveitis had a better final BCVA than those with chronic disease. (p < 0.001). There were no variations in the visual outcomes between patients receiving various types of systemic treatments, such as patients who received intravenous methylprednisolone and patients without any systemic therapy (p = 0.342). The final BCVA did not differ between patients requiring or not requiring additional iris procedures and use of iris retractors (p = 0.278). Furthermore, a previous macular abnormality did not significantly affect the final BCVA (p = 0.263).

Complications: Six (13.63%) eyes developed CME in postoperative period and none of them were in the anterior uveitis group. The greatest rates of postoperative CME (3 instances; 50%; p = 0.01) were seen in the eyes with intermediate uveitis. In our sample, there was no correlation between the development of postoperative CME and etiology (p = 0.310), systemic medication (p = 0.342), or iris manipulation during surgery (p = 0.278). One (2.27%) eye had secondary glaucoma that required trabeculectomy six months after cataract surgery. Within 10 days following cataract surgery, 3 eyes (6.81%) developed severe vitritis, which was treated with stepped-up oral steroids with slow tapering. Among these eyes, two had panuveitis and one had posterior uveitis preoperatively.

At the 6-month follow-up after surgery, 16 eyes (36.36%) had ultimate visual acuity >=6/12, and 8 out of the 16 eyes had anterior uveitis at its highest. At the end of the of the follow-up, nine eyes (20.45%) with preoperative macular abnormalities had vision <=6/60.

Discussion: The majority of patients with uveitis benefit from cataract surgery, despite the procedure being more technically difficult. Our research demonstrates that the BCVA improved in 88.6% of the eyes, and the ultimate BCVA of >=6/60 was obtained in 35 (79.54%) of the eyes. We further present the association between a poorer visual prognosis and chronic and intermediate uveitis. Intermediate uveitis was positively correlated with the development of postoperative CME. The ultimate BCVA of >=6/18

varied from 47 to 87% in those earlier studies, which our findings are consistent with [9, 10, 11, 12, 13, 14, 15, 16].

Moreover, our findings are consistent with the earlier reports that individuals with anterior uveitis had the greatest visual prognosis. [11, 12, 13, 15, 16, 16]. The anatomical entities posterior uveitis and panuveitis are often linked to worse visual outcomes than anterior uveitis [13, 17]. Interestingly, 28% of patients with intermediate uveitis had a BCVA of >=6/12, which is consistent with earlier findings. Previous research evaluating the results of cataract surgery in patients with intermediate uveitis [9, 11, 12, 13, 15, 16] revealed inconsistent results, which were probably caused by greater rates of postoperative CME, which affected up to 50% of patients [18]. Three of the six eyes in our study's group with intermediate uveitis developed CME during the postoperative phase.

A total of 78 eyes from 78 individuals were examined by Jevnikar et al. In 86% of patients, there was an improvement in best-corrected visual acuity (BCVA), with 57 patients (73%) reaching a BCVA of 0.5 or higher. A noteworthy connection was seen between preoperative and postoperative BCVA (Spearman r = 0.521, p < 0.01). The final BCVA differed (p = 0.047) across anatomical forms of uveitis, with anterior uveitis exhibiting the highest results. Acute recurrent uveitis was associated with a better ultimate BCVA than chronic uveitis (p = 0.001). Iris manipulation during surgery and systemic treatment before surgery were not linked to visual outcomes; however, preoperative CME and intermediate uveitis were associated with a worse prognosis. Preexisting CME (p < 0.001) and intermediate uveitis (p = 0.01) were strongly associated with the development of postoperative CME. (19) Our findings were consistent with those of Jevnikar et al., although because we had excluded eyes that had preoperative macular edema, we were unable to connect the development of postoperative CME. Since preoperative CME was taken into consideration as a proxy marker for ongoing active ocular inflammation, we came to the conclusion that intensive CME therapy during the preoperative period is essential for favorable visual results, particularly in cases with intermediate uveitis.

471 eyeballs from 371 people were used in research conducted at a tertiary health care facility in New Zealand. Median quiescence was 1.0 years (IQR 1.5), and median uveitis was 3.0 years (IQR 5.2) prior to cataract surgery. Intraoperative complications were seen in 32 eyes, or 6.8%. Consultants conducted most procedures (82.5%). At 12 months, 248 eyes (79.7%) had vision of 20/50 or better. Uveitis flare-ups accounted for 56.5% of surgical complications. Quiescence reduced the likelihood of a flare (HR 0.794, P =.003), according to a Cox proportional hazards analysis. A multivariate analysis of 45 eyes (9.6%) revealed no signs of postoperative cystoid macular edema (CME). (20)

According to some writers, phacoemulsification with pars plana vitrectomy may enhance the results of cataract surgery for patients with intermediate uveitis [21, 22]. However, the lack of eyes in our research that had undergone combination surgery prevented us from drawing this conclusion.

Postponing surgery until the BCVA falls sufficiently might lead to diminished posterior segment visibility, perhaps to the point where issues linked to uveitis cannot be accurately identified and managed. This could have a detrimental impact on the long-term prognosis. This process might perhaps account for the significant correlation between preoperative and postoperative BCVA, as shown in our dataset and in other investigations [23].

Sen et al. found no correlation between poorer preoperative visual acuity ($P < 0.05$) and postsurgical recovery ($P > 0.05$), but rather a relationship with black race, a longer duration from the beginning of uveitis, and hypotony. Systemic therapy and fluocinolone intravitreal implants were the two treatment groups; after adjusting for other risk factors, there was no statistically significant difference in the improvement in visual acuity between them. (24)

Reliable evaluation according to the etiology of uveitis could not be carried out due to the small number of patients in various etiologic categories. Consistent with other observations [11, 12, 13, 15, 17, 25] is the frequency of various complications, including elevated intraoperative pressure and the emergence of postsurgical chronic pain. Perioperative systemic medicines may be associated with an increased risk of postoperative CME development, as Zhang et al. [26] have shown; however, this result could not be verified in our group. The mismatch may be attributed to the different cohorts; Zhang's cohort had 6 instances of Vogt Koyanagi Harada and 10 patients with Behcet's illness, which may have had an impact on their results. Our results are in contradiction with those of previous research, which suggested that iris hook insertion increased postoperative inflammation [13]. This discrepancy may potentially be due to variations in the study cohort's makeup and in the peri- and postoperative care received.

A visual acuity of ≥20/40 was achieved in 68% of cases following phacoemulsification, 72% after extracapsular cataract extraction, and 40% after pars plana lensectomy in a meta-analysis conducted by Mehta et al. in uveitic eyes with little to no inflammation at the time of operation. After IOL implantation, more psedophakiceyes than aphakic eyes (71% vs. 52%) had postoperative visual acuity of ≥20/40. Patients who received either acrylic or heparin-surface-modified (HSM) polymethylmethacrylate IOLs showed improved visual outcomes. Since we only employed foldable hydrophobic PMMA IOLs in all of our instances and did not leave any patients aphakic in our trial,

we were unable to corroborate the latter two results. Mehta and colleagues also found a negative correlation between poorer visual outcomes and uveitis that is active during cataract surgery. In contrast to cases associated with Behçet disease, Vogt-Koyanagi-Harada sickness, sympathetic ophthalmia, and posterior uveitis, individuals with Fuchs heterochromic cyclitis in their research had a greater proportion of obtaining 20/40 or better vision. (17) Our results and this were associated as well.

The retrospective nature of our research, and the small sample size are among the limitations of this study. As such, there is no reliable way to compare the prognosis of different uveitis etiologies. One of our patients' advantages was that we only used one surgeon for every operation. Since we only had a small sample of patients, findings need to be verified in a broader patient population using multivariate analysis to rule out any confounders.

Conclusions: Although cataract surgery for uveitis is complicated, the rates of intraoperative complications are minimal when performed by a skilled surgeon. The majority of people with uveitis benefit from cataract surgery. With different uveitis subtypes, the visual outcome varies. Both intermediate and chronic uveitis were associated with a poor visual prognosis. As such, individuals with intermediate uveitis may benefit from strict inflammation control as well as early and intensive treatment for CME. We must use every tool in our arsenal to minimize inflammation, and cataract surgery should be scheduled only when the eye has been dormant for three to six months or assessment of posterior segment becomes difficult due to cataractous media. Failure to do so might result in unrecognized uveitis activity and permanent harm. Given the high risk of uveitis recurrence and CME that we present, the main concern is monitoring postoperative care. Since difficulties might arise unexpectedly and later than anticipated, careful observation is essential.

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