

New insights into cataract surgery in patients with uveitis: A detailed review of the current literature

Rakan S. Al-Essa, Abdullah M. Alfawaz

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Abstract:

Cataract is a common cause of visual impairment in uveitic eyes. The management of cataract in patients with uveitis is often challenging due to pre-existing ocular comorbidities that may limit the visual outcomes. A meticulous preoperative ophthalmic evaluation is needed to assess the concomitant ocular pathologies with special emphasis on the status of the macula and optic nerve. Preoperative control of inflammation for at least 3 months before surgery is a key prognostic factor for successful surgical outcomes. Perioperative use of systemic and topical corticosteroids along with other immunosuppressive medications is crucial to decrease the risk of postoperative inflammation and cystoid macular edema (CME). Phacoemulsification with intraocular lens implantation is the surgical option of choice for most patients with uveitic cataract. Uveitic cataracts are typically complicated by the presence of posterior synechiae and poor pupil dilation, necessitating manual stretching maneuvers or pupil expansion devices to dilate the pupil intraoperatively. Patients must be closely monitored for postoperative complications such as excessive postoperative inflammation, CME, raised intraocular pressure, hypotony, and other complications. Good outcomes can be achieved in uveitic eyes after cataract extraction with appropriate handling of perioperative inflammation.

Keywords:

Cataract, inflammation, phacoemulsification, uveitis

INTRODUCTION

Cataract is one among the most common complications in patients with chronic or recurrent uveitis that develops as a sequela of intraocular inflammation and/or chronic usage of topical and systemic corticosteroids.^[1,2] The incidence of cataract in patients with uveitis differs depending on the underlying etiology and location of intraocular inflammation;^[3,4] its incidence in patients with uveitis ranges between 8.5% and 35% in a heterogeneous group of uveitic entities.^[4-8] Uveitic eyes account for approximately 1.2% of all eyes undergoing cataract surgery.^[9] Cataract is responsible for 40% of all cases of visual loss among patients with uveitis; moreover, it is the most common indication for surgical intervention in uveitic eyes.^[1,10] Multiple studies have reported several risk factors for cataract development in uveitic eyes, including the presence of posterior

synechiae, hypopyon, keratic precipitate, duration and severity of intraocular inflammation at presentation, and corticosteroid use.^[5,11,12] Posterior subcapsular cataract is the most common morphological form of cataractous lens changes in uveitic eyes.^[13]

The management of cataract in uveitic eyes is challenging and is associated with less predictable postoperative outcomes compared with the management of nonuveitic senile cataract.^[9,14] Before the introduction of corticosteroids in the early 1960s, there were several reports of severe complications in eyes undergoing cataract surgery with uncontrolled perioperative inflammation, which result in vision loss, hypotony, and phthisis bulbi.^[15,16] However, more recent studies have indicated a marked reduction in the incidence of intraoperative and postoperative complications as well as significant improvements of visual outcomes in uveitic cataract surgeries; these are attributable to the increased ability to perioperatively control

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Department of Ophthalmology,
College of Medicine, King
Saud University, Riyadh,
Saudi Arabia

Address for correspondence:
Dr. Rakan S. Al-Essa,
Department of Ophthalmology,
College of Medicine, King
Saud University, Riyadh,
Saudi Arabia.
E-mail: rakan.alessa.md@
gmail.com

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inflammation using various immunosuppressants, recent advances in minimally invasive microsurgical techniques, and availability of biocompatible intraocular lens (IOL) material.^[2,11,17,18] This review aims to describe the preoperative evaluation, intraoperative considerations, and postoperative management of uveitic cataracts.

PREOPERATIVE CONSIDERATION

Preoperative evaluation

The visual potential of the eye should be evaluated before planning any surgical intervention, given that it directly influences the final visual outcomes. Preoperative assessment of uveitic eyes should include careful examination of the anterior and posterior segments. Due to the inflammatory processes, the anterior segment of uveitic eyes may manifest multiple structural abnormalities, including posterior synechiae, peripheral anterior synechiae (PAS), band keratopathy, inflammatory membranes, mitotic pupils, iris atrophy, and shallow anterior chamber. The extent of pupil dilation should be assessed to determine whether pupil expansion devices are required. There is a need for meticulous assessment of the optic nerve, macula, and retina before cataract extraction. The state of the macula should be carefully assessed for evidence of macular ischemia, atrophy, chronic macular edema, or choroidal neovascular membrane. The optic nerve should be evaluated for optic atrophy and glaucomatous optic disc cupping. The retina should be examined for ischemia and detachment. Atrophy of the optic nerve or retina involving the macula is associated with poor visual outcomes in uveitic eyes after cataract surgery.^[11,18] In patients with advanced, mature cataracts that prevent fundus examination, B-scan ultrasonography can be performed to rule out retinal detachment, choroidal thickening, and vitritis. Optical coherence tomography (OCT) is necessary for ruling out macular edema, atrophy, holes, and epiretinal membranes. A fundus fluorescein angiogram is obtained to yield evidence regarding macular or retinal ischemia, as well as to identify active posterior segment disease. In addition, specular microscopy may be performed to assess the risk of postoperative corneal decompensation, given several reports have shown that uveitis affects endothelial cell density and morphologic features compared with those in normal age-matched controls.^[19,20] Corneal topography can facilitate selection of the IOL type in patients with significant astigmatism. Assessing the minimum visual potential by performing a macular potential test using laser interferometry is often beneficial. Laser flare meter is useful in determining the flare amount in the anterior chamber and monitoring the degree of postoperative inflammation. Finally, ultrasound biomicroscopy can be performed to evaluate the status of the ciliary body and predict the risk of postoperative hypotony. These diagnostic modalities can be utilized according to the status of the eye and the judgment of the treating physician.

Indications for cataract surgery

In patients with uveitis, cataract surgery is mainly indicated in the following situations: (1) phacoantigenic uveitis (regardless of the visual potential and inflammation degree); (2) quiescent eyes with visually significant cataracts and good visual potential; (3) cataracts preventing visualization of the posterior segment for medical and surgical management; and (4) the possibility of performing cataract surgery as part of other intraocular surgeries, such as pars plana vitrectomy or glaucoma procedures.^[16] In eyes with a poor visual potential, the decision to operate is made at the surgeon's discretion with a very guarded prognosis.

Timing of cataract surgery

Multiple studies have shown that the most important factor for good visual outcomes after cataract extraction is having the uveitic eye quiescent for at least 3 months preoperatively since this decreases the risk of postoperative inflammation and CME.^[16,21,22] Ji *et al.* reported that cataract surgery can be safely and successfully performed in eyes with Vogt–Koyanagi–Harada disease with a quiescent period of only 1 month.^[23] On the other hand, Matsuo *et al.* recommended a minimum quiescent period of 6 months for patients with Behcet's uveitis before cataract surgery, given that the risk of postoperative recurrence is related to the frequency of attacks within 12 preoperative months.^[24] Cataract surgery for actively inflamed eyes should only be performed for phacoantigenic uveitis or if urgent vitreoretinal surgery is indicated and cannot be performed without cataract extraction.

Control of inflammation

Meticulous control of preoperative inflammation and underlying systemic diseases is necessary for successful cataract surgery in patients with uveitis [Figure 1]. Preoperative inflammation can be controlled using systemic steroids, biological agents, and steroid-sparing immunosuppressive medications. There are several proposed protocols to prepare uveitic eyes for cataract surgery. The most popular regimen includes prescribing 0.5–1 mg/kg/day of oral prednisolone, which is started up to 2 weeks before surgery adjunctive to ongoing immunosuppressive medications. The oral steroid dose is gradually tapered at 5 mg/week until a dose of 20 mg is reached; subsequently, the tapering can

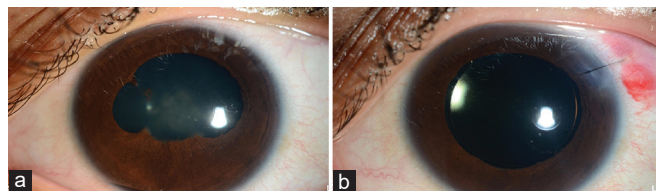


Figure 1: An 18-year-old female diagnosed as a case of bilateral idiopathic granulomatous panuveitis. (a) Slit lamp photograph of the left eye showing multiple posterior synechiae and posterior subcapsular cataract in a quiet eye with a visual acuity of 20/80. (b) Slit lamp photograph on the 1st postoperative day after cataract extraction and posterior chamber intraocular lens implantation showing a quiet pseudophakic eye with regular dilated pupil and visual acuity of 20/20

be reduced to 2.5 mg every 1–2 weeks depending on the degree of inflammation until a dose of 10 mg is reached. Next, the tapering is slowly increased by 2.5 mg every 2–4 weeks until the medication is stopped or the preoperative dose is reached. This protocol can be augmented using topical steroids 8–12 times daily prescribed 2 days before surgery with slow postoperative tapering, depending on the degree of inflammation. Alternatively, intravenous methylprednisolone 1 g/day (15–30 mg/kg of body weight for children) for 3 days can be used perioperatively to control inflammation.^[5,11,18,20,25] Meacock *et al.* reported that a single dose of intravenous methylprednisolone (15 mg/kg) at 30 min before surgery is equivalent to a 2-week course of oral prednisolone (0.5 mg/kg) with respect to visual outcomes and postoperative CME development.^[26] However, given the current availability of effective local therapeutic choices, including stronger topical steroids, intravitreal triamcinolone acetonide (TA) injection, and intravitreal dexamethasone implant, the need for systemic steroids has decreased. Intravitreal TA injection (4 mg in 0.1 ml) at the end of surgery has recently gained popularity. Dada *et al.* reported no significant difference between postoperative oral steroids and intraoperative intravitreal TA injections in terms of visual outcome, central macular thickness, and uveitis recurrence.^[27] In cases wherein the general health of the patient does not allow for the administration of high-dose systemic steroids, including poorly controlled diabetes, and periocular steroid injections, such as orbital floor or subtenon TA injections (40 mg in 0.1 ml), can be considered in noninfectious uveitis. Roesel *et al.* reported that an intraoperative single-dose orbital floor TA injection is as effective as 4 weeks of postoperative oral steroids in terms of visual outcome, inflammation degree, and central macular thickness.^[28] Few studies have investigated the efficiency of intracameral TA injections administered intraoperatively. Li *et al.* reported that intracameral TA injections (4 mg in 0.1 ml) at the end of cataract surgery may be more effective than intraoperative intravenous methylprednisolone and additional postoperative oral steroids in preventing postoperative fibrin formation after cataract surgery in patients with juvenile idiopathic arthritis (JIA) uveitis.^[29] However, this regimen can raise the intraocular pressure (IOP) and mask infection postoperatively; hence, it should be used with caution and close follow-up. Table 1 summarizes the dosage of steroids based on different routes of administration.

Table 1: Dosage of steroids based on different routes of administration

Treatment	Dosage
Intravitreal triamcinolone acetonide injection (mg/mL)	4/0.1
Intravitreal dexamethasone implant (Ozurdex) (mg)	0.7
Intracameral triamcinolone acetonide injection (mg/mL)	4/0.1
Subtenon triamcinolone acetonide injection (mg/mL)	40/0.1
Subconjunctival dexamethasone injection (mg/mL)	4
Oral prednisolone (mg/kg/day tapering)	0.5-1

Patients with underlying infectious etiologies, including ocular toxoplasmosis and herpes simplex uveitis, require preoperative antiviral or antiparasitic prophylaxis since surgery may trigger a recurrence of the infection.^[30,31] Bosch-Driessen *et al.* reported the recurrence of ocular toxoplasmosis in 36% of patients after cataract extraction and recommended using prophylactic antitoxoplasmic therapy during and after cataract surgery in patients at risk of visual loss due to lesions threatening the macula or optic nerve.^[31] However, a more recent study by Heringer *et al.* reported that intraocular surgery is not related to a significantly increased risk of the recurrence of ocular toxoplasmosis in the absence of preoperative prophylactic antiparasitic drugs.^[32] Several studies have reported that eyes with a history of herpes uveitis are at risk of recurrence after cataract surgery and have recommended initiating prophylactic antiviral therapy preoperatively to protect against recurrence.^[33-35]

At our center, the regimens used to control preoperative inflammation are mainly dependent on the type and etiology of uveitis. In patients with inactive isolated anterior uveitis, we start topical steroid drops four times daily 1 week before the day of surgery along with intracameral TA injection after surgery. Contrastingly, in patients with panuveitis, three doses of intravenous methylprednisolone (1 g/day) are administered (1 day before surgery, at the day of surgery, and 1 day after surgery) along with starting hourly topical steroid drops 1 day before surgery and continuing on the systemic immunosuppressive medications at the same preoperative dosage. Both intravenous and intracameral steroid injections are used in patients with high-risk uveitis who are prone to aggressive postoperative inflammation.

Counseling

Discussing the visual prognosis with the patient preoperatively is of paramount importance to tailor the patient's expectations, particularly if the disease involves the posterior segment. The general complications of cataract surgery, in addition to the unique complications associated with uveitic cataract, should be thoroughly discussed. Moreover, it is crucial to explain that surgery may take a longer time than regular cataract surgery given the higher risk of intraoperative complications and the abnormal anatomy of uveitic eyes. Moreover, patients should be counseled regarding the longer recovery period, importance of compliance with postoperative medications, and frequent follow-up visits. Most patients with uveitic cataract are young; therefore, they should be made aware of the need for reading glasses after cataract extraction since they will not be able to accommodate. In addition, the type, design, and material of the IOL implant should be discussed with the patient.

INTRAOPERATIVE CONSIDERATIONS

Type of anesthesia

Selecting the most appropriate anesthesia type is dependent on multiple factors, including the surgeon's preference, facilities at the center, and the presence of structural abnormalities.

Generally, topical anesthesia is not recommended for uveitic cataracts since these cases require a longer surgical time and pain avoidance during iris manipulation. Regional anesthesia, including peribulbar block and intracameral injection of preservative-free lidocaine 1%, is preferable since it provides adequate analgesia. General anesthesia is preferred for children or adults requiring prolonged surgeries.

Type of surgery

Phacoemulsification is the most preferred method for nucleus extraction in uveitic eyes since it induces less inflammation and iris trauma, as well as possesses superior anterior chamber stability compared with extracapsular cataract extraction (ECCE).^[36,37] ECCE may be a safer option for eyes with associated structural abnormalities, including corneal opacity, severe zonulopathy, and low endothelial cell count in the context of dense cataract. Bhargava *et al.* reported comparable outcomes between phacoemulsification and small-incision cataract surgery (SICS, a modified technique of ECCE) with respect to complications and endothelial cell loss.^[38] Similarly, another study by Bhargava *et al.* reported comparable results between phacoemulsification and SICS, with 90% and 88% of patients achieving a best-corrected visual acuity of 20/60 or better, respectively.^[39]

Intraoperative techniques

Incision

A scleral incision or clear corneal incision can be used in uveitic eyes. Scleral tunnels are preferred in eyes with a history of corneal melt. A clear corneal incision allows better access and a more stable anterior chamber; moreover, it is preferred in eyes with scleritis to avoid postoperative scleral melting. The main incision should be of reasonable length to prevent iris prolapse and maintain anterior chamber stability.

Pupil dilation

A small pupil is a great challenge when operating uveitic cataracts. In cases wherein the cataract is not complicated with synechiae or membranes, pupil dilation with intracameral injection of balanced salt solution (BSS) and adrenaline (1:1000, 0.5 mL) in 500 mL of BSS can be performed; however, pupil dilation is often inadequate. An adaptive ophthalmic viscosurgical device (OVD) can be injected to open the iris wider and keep it dilated. In case the pupil fails to dilate with an OVD, it can be dilated through manual stretching using Kuglen hooks. In brief, two Kuglen hooks are introduced through the main incision 180° apart to push and pull the iris simultaneously in opposite directions [Figure 2]. This maneuver is then repeated in the perpendicular meridian to horizontally and vertically expand the pupil. Caution should be taken in eyes with atrophic or thin iris given that excessive stretching may cause iris sphincter tears. Moreover, a Beehler pupil dilator (two or three pronged) can be used to enlarge small pupils by mechanically stretching the iris. In case the pupil is still small, pupil dilation devices, such as iris hooks, and pupil expansion devices, such as Malyugin ring, can be used. Self-retaining iris hooks are less traumatic and may be

the best alternative for eyes with small pupils and shallow anterior chambers. Four iris hooks are inserted in a diamond configuration through multiple corneal paracenteses [Figure 3]. Inserting an extra subincisional iris hook is helpful for preventing iris prolapse and keeping the iris away from the phaco probe. Tension levels in each iris hook can be adjusted to ensure adequate pupil dilation. The Malyugin ring is a good choice for eyes with small pupils, deep anterior chambers, and healthy irises. The Malyugin ring is injected through the main wound to the anterior chamber; subsequently, it is manipulated to attach the scrolls to the iris edge, which creates a fixed 6- or 7-mm dilated round pupil [Figure 4]. Alternatively, multiple small sphincterotomies can be performed using intraocular scissors to enlarge the pupil. Synechiolysis and membrane excision should be performed in cases wherein synechiae and pupillary membranes prevent pupil dilation. When both posterior synechiae and PAS are present, PAS should be addressed first. An OVD cannula is used to sweep the iris away from the peripheral cornea with simultaneous OVD injection into the angle of the anterior chamber to lyse the PAS. Caution should be taken not to detach the Descemet's membrane or cause iridodialysis during manipulation. Subsequently, posterior synechiae is released by injecting an OVD against the adherent iris to separate the iris from the anterior capsule. In addition, the OVD cannula or Kuglen hooks can be used to detach the adherent iris away from the anterior capsule. In case the posterior synechiae is extensive or in the presence of a pupillary membrane, a 27-gauge cystotome or 23-gauge microforceps and microscissors can be used to release the adherent iris and peel the membrane.

Capsulorhexis

Staining the anterior capsule with trypan blue dye may be used to enhance visualization during capsulorhexis and differentiate the anterior capsule from the pupillary membranes, particularly if there is a corneal scar or mature white cataract. If the cataract is complicated with broad, segmental posterior synechiae, it is recommended to inject the dye under the iris to stain the anterior capsule before any type of iris manipulation. Forming the anterior chamber with an adequate OVD amount is necessary to flatten the anterior capsule and control the capsulorhexis edge to prevent radial extension given that most of these patients are young with elastic capsules. A continuous, circular, central capsulorhexis with a diameter of 5–6 mm that covers the edge of the IOL optic is recommended. An excessively small rhexis is associated with postoperative phimosis and recurrent synechiae formation. An excessively large rhexis increases the risk of postoperative IOL instability and iris chafing during the removal of the nuclear pieces from the capsular bag, which can cause intraoperative meiosis and severe postoperative inflammation. Creating a centered capsulorhexis with a size smaller than that of the optic size and removing the OVD from behind the IOL to promote its adhesion to the posterior capsule are crucial factors in decreasing the risk of posterior capsular opacity (PCO) development. A femtosecond laser is valuable for performing central and well-sized capsulorhexis, even

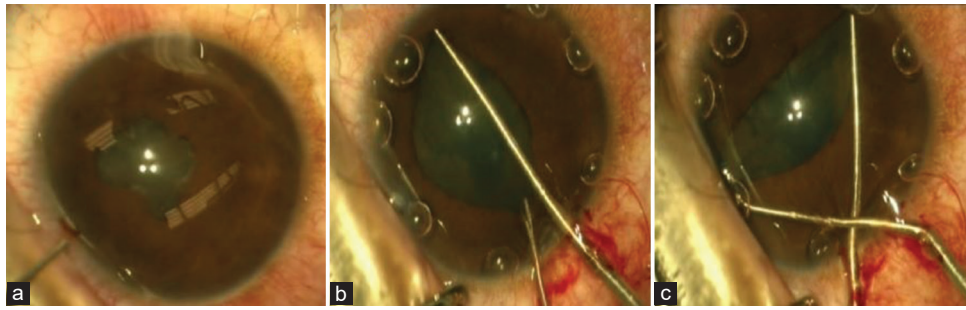


Figure 2: (a) Preoperative photograph of uveitic eye with multiple posterior synechiae in a patient with presumed intraocular tuberculosis with a visual acuity of 20/60. (b and c): Intraoperative use of Kuglen hooks to dilate the pupil and break posterior synechiae

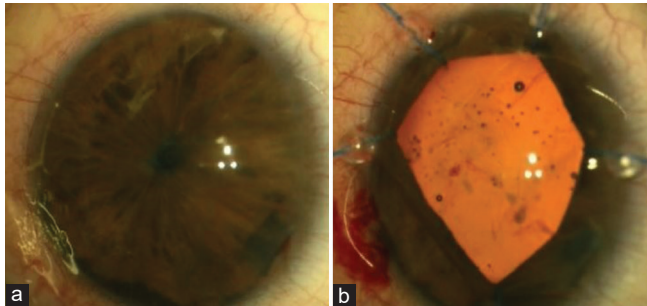


Figure 3: (a): Preoperative photograph of uveitic eye with seclusio pupillae and thin atrophied iris in a patient with Vogt–Koyanagi–Harada with a visual acuity of 20/28.5. (b) Intraoperative use of self-retaining iris hooks placed in a diamond configuration

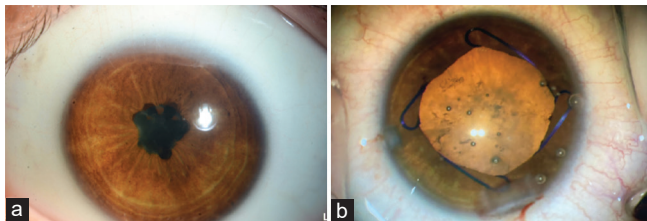


Figure 4: (a) Preoperative photograph of uveitic eye with 360° broad posterior synechiae and cataract in a patient with granulomatous panuveitis with a visual acuity of 20/200. (b) Intraoperative use of pupil dilating device (Malyugin® ring)

in the presence of weak zonules. Friedman *et al.* compared femtosecond laser-assisted capsulorhexis and manual capsulotomy and reported that capsulotomy created using a femtosecond laser is more precise and accurate than manual capsulotomy.^[40] However, there has been no study regarding the efficacy of femtosecond laser-assisted cataract surgery for uveitic cataracts since most of these eyes have poor dilation preoperatively.

Lens removal

Hydrodissection and delineation are important steps given that most of the uveitic cataracts are soft, which allow for easier nucleus removal. Phaco parameter settings should be lowered in soft cataracts to avoid postocclusion surges and posterior capsule ruptures. In small pupils, vertical phaco-chop is the safest technique since the pieces are chopped within the center of the pupil and kept in view all the time to avoid traumatizing

the iris and zonules. Further, irrigation and aspiration should be thoroughly performed to remove all cortical materials along with adequate polishing of the anterior and posterior capsules, especially at the equator, to reduce the risk of severe postoperative inflammation and PCO formation.

Intraocular lens implantation

Conventionally, IOL implantation was considered a contraindication in eyes with chronic uveitis or high-risk uveitis, including posterior and intermediate uveitis. Recently, several studies have demonstrated the safety and efficacy of IOL implantation at the time of surgery in patients with uveitis with a low risk of complications, as long as the inflammation is well controlled.^[41-45] However, in patients with chronic uncontrolled uveitis such as JIA uveitis, IOL implantation should be deferred. Alió *et al.* conducted a randomized controlled trial comparing different IOL types and showed that a single-piece, square-edged acrylic (either hydrophilic or hydrophobic) IOL is the best alternative for patients with uveitic cataracts since it is associated with a lower incidence of postoperative inflammation and PCO compared with silicone IOL.^[46] Furthermore, they reported a higher incidence of postoperative macular edema and posterior synechiae formation in eyes with silicone IOLs. Roesel *et al.* reported no difference in visual outcomes and PCO formation between hydrophobic and hydrophilic acrylic IOLs.^[47] In cases wherein posterior capsule rupture occurs without sulcus support, the anterior chamber IOL should be avoided in patients with uveitis. The patient can be left aphakic; further, scleral-fixated IOL implantation can be performed after resolving postoperative inflammation.

POSTOPERATIVE COMPLICATIONS AND MANAGEMENT

Excessive postoperative inflammation

Excessive postoperative inflammation is one among the most common complications of cataract surgery for uveitic eyes. Uncontrolled postoperative inflammation may cause major sequelae that can affect surgical outcomes, including CME, PCO, posterior synechiae (PS), glaucoma, IOL decentration, epiretinal membranes, ciliary membrane formation, and hypotony. Therefore, patients with uveitis require meticulous postoperative care and close follow-up. In case inflammation remains uncontrolled after prophylactic oral steroids are

preoperatively administered with maximal topical steroid drops, the oral steroid dose should be increased to control inflammation. If the patient does not preoperatively receive oral steroids, a pulse dose of oral steroids should be administered. Alternatives include intravitreal or periocular steroid injections if they were not intraoperatively administered to avoid adjusting the dose of systemic immunosuppressive drugs.^[48] Gupta *et al.* reported that 100% of patients who postoperatively received an intravitreal dexamethasone implant in addition to standard of care therapy achieved a visual acuity of >20/40 compared with 70% of patients who only received standard of care therapy. Moreover, none of the patients who received an intravitreal dexamethasone implant developed CME compared with 37.5% of patients who received standard of care therapy only. There was no significant difference in terms of IOP increase between the two groups. Therefore, they concluded that intravitreal dexamethasone implant is safe and effective in controlling postoperative inflammation compared with standard of care therapy alone.^[49] The postoperative course can be complicated by the formation of fibrinous membranes in the anterior chamber, especially in young patients or patients who had excessive manipulation intraoperatively, which is an indication for increasing the frequency of topical steroids and injecting intracameral recombinant tissue plasminogen activator (10 µg/0.1 ml).^[50,51]

In our patients, we remove the eye patch 4 h after surgery to start the administration of topical steroid drops (once every hour) as well as topical antibiotics (four times a day), topical steroid ointment (at bedtime), and cycloplegic drops. Cyclopentolate 1% or atropine 1% eye drops (three times a day) is used as cycloplegia for preventing posterior synechiae formation. Atropine maintains the pupil in constant dilated state for 7–14 days, which may cause the formation of posterior synechiae when the pupil is large. In contrast, cyclopentolate has a shorter duration of action (12–24 h), which allows for pupil movement to break posterior synechiae. The patient will complete the three doses of IV steroid (if needed) and continue the same dose of the immunosuppressive medications. Table 2 summarizes the most important tips in managing patients with uveitic cataracts.

Table 2: Tips in managing patients with uveitic cataracts

Timing	Considerations
Preoperative	Careful diagnostic assessment and testing to identify the underlying etiology of uveitis and to rule out infectious causes Adequate control of inflammation for at least 3 months before surgery is the most important prognostic factor for good surgical outcomes Determining the extent of pupil dilation and anticipating the need for pupil expansion devices
Intraoperative	Be ready with all needed instruments and devices Use the least traumatic approaches and minimize excessive manipulation
Postoperative	Strict postoperative control of inflammation with steroids (local or systemic) and immunosuppressive medications Close monitoring and follow-up for postoperative complications

Cystoid macular edema

CME is a common complication in uveitic eyes after cataract extraction secondary to disruption of the inner blood–retina barrier due to the release of inflammatory mediators.^[52] The risk of developing postoperative CME is dependent on the underlying uveitis etiology. CME is more prevalent in eyes with intermediate uveitis, posterior uveitis, and panuveitis. The incidence of CME in uveitic eyes is 33%–56% and 12%–59% following ECCE and phacoemulsification, respectively.^[53–55] Preoperative inflammation control is a key in predicting and preventing postoperative development of CME. Topical nonsteroidal anti-inflammatory drugs are the first-line treatment for preventing and treating postoperative CME in conjunction with topical prednisolone acetate or difluprednate.^[56] A study reported that topical nepafenac 0.1% combined with topical steroids significantly reduced the incidence of uveitic CME after cataract extraction.^[57] Schallhorn *et al.* investigated the efficacy of topical difluprednate in uveitic CME and reported improvement or resolution of uveitic CME in most eyes.^[58] In cases wherein CME is refractory to conventional treatment, intravitreal TA injections, intravitreal dexamethasone implant, or periocular steroid injection can be considered. Kok *et al.* reported that 51% of eyes with CME had a second-line improvement in visual acuity with intravitreal TA injections.^[59] Multiple recent studies have reported promising results regarding intravitreal dexamethasone implantation in uveitic CME.^[60–62] Leder *et al.* reported clinical resolution in 57% of eyes with CME after receiving a single periocular TA injection.^[63]

Posterior capsular opacification

PCO is the most common late complication of cataract surgery in uveitic eyes.^[44,45] PCO is more prevalent in patients with uveitis and younger patients. Its incidence was reported as 48% by Okhravi *et al.*,^[64] 19% by Yamane Cde *et al.*,^[65] 35.3% by Albloushi *et al.*,^[5] and 34.2% by Küçükerdönmez *et al.*^[66] The incidence of clinically significant PCO requiring yttrium aluminum garnet (YAG) laser capsulotomy was reported as 15.9% by Bhargava *et al.*,^[39] 28.7% by Ram *et al.*,^[67] and 31% by Estafanous *et al.*^[54] Cleaning the posterior capsule using a YAG laser is indicated if visual acuity or quality of vision is affected or if there is an impaired view of the posterior pole due to PCO. YAG laser capsulotomy should be deferred until postoperative inflammation is controlled, preferably 6 months after surgery. Controlling inflammation before YAG laser capsulotomy is important for preventing the recurrence of PCO.

Increased intraocular pressure

An increase in IOP in the early postoperative period may be secondary to excessive inflammatory debris blocking the trabecular meshwork or retained OVD. On the first few postoperative days, high IOP can be managed by releasing aqueous humor by gently pressing the posterior lip of the main wound under aseptic conditions. Systemic and topical antiglaucoma medications can be used for controlling IOP.

Prostaglandin analogs are not preferred in uveitic eyes since they may be related to CME development.^[68,69] In the late postoperative period, an increased IOP may be associated with steroid response. The dose of topical steroids should be tapered in case of a suspected steroid response with a possible increase in the dose of oral immunosuppressive drugs if the inflammation is not controlled. The IOP increase after cataract surgery usually completely resolves without permanent consequences. However, some patients may have a persistently high IOP and require glaucoma surgery. Okhravi *et al.* reported an increase in IOP in 13.3% of the included eyes, with only 2.2% of these eyes requiring glaucoma surgery.^[64] Similarly, Yoeruek *et al.* reported that 22.8% and 2.2% of the eyes had increased IOP and required glaucoma surgery, respectively.^[70]

Hypotony

A low IOP is a rare, yet severe complication of cataract surgery in uveitic eyes. Severe postoperative inflammation, tractional ciliary body membranes, and ciliary body detachment secondary to contraction of anterior lens capsules should be considered as the potential causes of hypotony after ruling out wound leakage.^[71,72] Increasing the frequency of topical and systemic steroids is typically required to increase IOP. Long-term treatment with steroids may be required for eyes with recurring hypotony on tapering or discontinuing steroids.

Intraocular lens depositions and dislocation

The appearance of deposits on the anterior IOL surface is more prevalent in eyes with chronic uncontrolled inflammation and often appears in the late postoperative period. Yoeruek *et al.* reported that 12.5% of eyes developed deposits on the anterior IOL surface.^[70] Another study by Suresh and Jones showed that 19% of eyes had visually significant deposits on the anterior IOL surface.^[73] These deposits can be cleaned using a YAG laser when the inflammation is well controlled whenever they cause light scattering and visual impairment. IOL dislocation is another late complication of cataract surgery in patients with uveitis. Dislocation in the early postoperative period can occur secondary to the loss of zonular support during cataract surgery or improper intraoperative haptic insertion. Late IOL dislocation has been attributed to the progressive zonular dehiscence or capsular contracture. Ganesh and Mistry reported late IOL dislocation in 1.9% of eyes with chronic anterior uveitis.^[74] Another study comparing IOL decentration between uveitic and nonuveitic eyes showed that 40% and 6.6% eyes, respectively, developed IOL decentration.^[75]

CONCLUSION

Cataract is a common complication in uveitic eyes requiring special consideration and care. Its management in uveitic eyes requires proper preoperative evaluation, meticulous surgical approach, and careful monitoring of postoperative complications. Good outcomes can be achieved after cataract

extraction if perioperative inflammation is appropriately managed with close postoperative observation.

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Conflicts of interest

There are no conflicts of interest.

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