

Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you '**Ophthalmal Focus**' which contains latest and interesting news in the field of Ophthalmology.

This issue contains

- A prospective randomised double-blind trial of the effect of cryotherapy on pain scores and patient satisfaction levels during cataract surgery under topical anaesthesia.
- The iridocorneal angle and related anterior segment structures: A study of paediatric anisohyperopic amblyopic eyes
- Dry Eye and Dysfunction of the Meibomian Gland in Neovascular Age-Related Macular Degeneration Patients Treated with Intravitreal Injections
- A Case Study of Hyperacute Iris Neovascularization After Cataract Surgery

Should you require any specific article or medical information, please feel free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,

Medical Team, Micro Labs Limited

A prospective randomised double-blind trial of the effect of cryotherapy on pain scores and patient satisfaction levels during cataract surgery under topical anaesthesia.

INTRODUCTION:

Cataract surgery is one of the most common surgical procedures performed on men and women aged 50 to 80. Phacoemulsification with topical anesthesia is the most commonly used method for cataract surgery. Topical anesthesia safeguards patients against the risk of globe perforation, optic nerve injury, and respiratory arrest. Systemic analgesic and hypnotic agents are now used to relieve patient discomfort and increase patient satisfaction with surgery. These agents, however, can cause dizziness, respiratory depression, hypotension, bradycardia, and cardiovascular depression. Furthermore, each of these agents may impair the patient's cooperation during surgery and work as less-than-ideal agents for conscious sedation management. As a result, the potential clinical benefits of the new approach in this setting must be evaluated. ^[1] The analgesic role of low temperatures during cataract surgery was described, even without the use of topical anesthetics. The possible mechanism of action of cryoanalgesia in pain reduction is associated with a decrease in the activities of polymodal sensitive neurons. ^[2]

Cryotherapy, used in conjunction with topical anaesthesia, reduced pain scores in patients during surgery. It also resulted in better operating conditions for surgeons. There was no statistically significant difference in postoperative pain scores or opioid consumption.

Thus, the cold intraocular irrigation solution would reduce the transmission of painful mechanical stimulus during phacoemulsification. Another study, on the other hand, found a dubious benefit of cryoanalgesia in phacoemulsification, but no difference in pain severity during phacoemulsification with topical anesthesia with or without cryoanalgesia. ^[3] The current study compared patient-reported pain intensity during cataract surgery with topical anesthesia versus topical combined with cryotherapy.

METHODS:

The study's objective was to evaluate the effects of cryotherapy on pain scores and patient satisfaction levels during cataract surgery under topical anesthesia. Eighty patients between the ages of 55 and 75 who were scheduled for cataract surgery were randomly assigned to one of two study groups: topical anesthesia with cryotherapy (TC) or topical anesthesia alone (T). Visual analogue pain scores, patient satisfaction levels, hemodynamic parameters, and operational quality were all recorded.

RESULTS:

During surgery, cryotherapy significantly reduced VAS pain scores. Although there was no significant difference in postoperative pain scores, opioid consumption, heart rate, or mean arterial blood pressure. In the TC group, the surgeon reported better operating conditions.

Cryotherapy, used in conjunction with topical anesthesia, reduced pain scores in patients during surgery. It also resulted in better operating conditions for surgeons. There was no statistically significant difference in postoperative pain scores or opioid consumption.

DISCUSSION:

According to the findings of this study, cryotherapy is a complementary method to topical anesthesia and has a significant positive effect on pain intensity during surgery and surgeon satisfaction. In another study, which was conducted on patients undergoing cataract surgery, no significant difference in the amount of pain was observed between topical anesthesia and topical combined with cryotherapy. [3]

Some of the contradictions appear to be explained by methodological differences in the studies. For example, the number of surgeons, surgery on one or both eyes, different age and gender groups of patients, different pain sensitivity and perception of patients, different tools to assess the amount of pain, and the type of medication prescribed to reduce patients' anxiety. Furthermore, the patients' advanced age and a lack of accurate questionnaire responses could be contributing factors to the discrepancies in the results. Nonetheless, it is well known that cryotherapy has anti-inflammatory and analgesic properties. [2]

Another mechanism proposed for cryotherapy's analgesic effects is cold-induced vasoconstriction, which can reduce blood flow to the target tissue while also reducing the release of inflammatory mediators and promoting the accumulation of local anesthetic in the target tissue. [2]

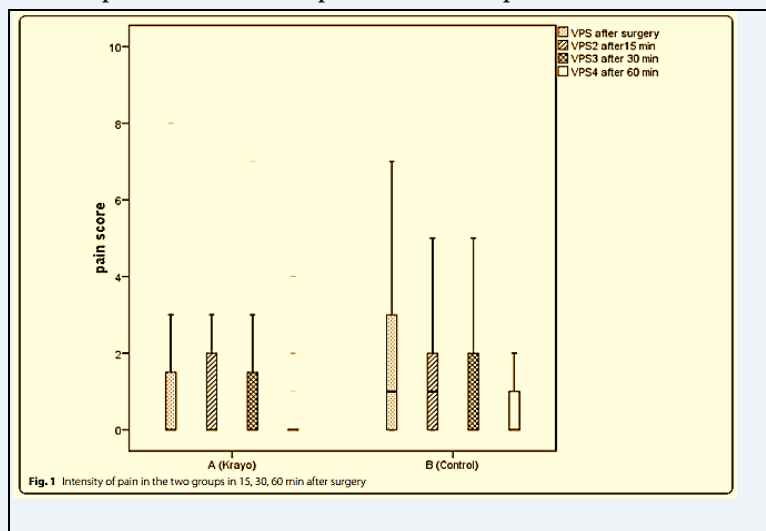
Another finding of this study was that the surgeon was more satisfied in the cryoanalgesia group. The lower pain scores of patients in the TC group during surgery appeared to be directly related to the surgeon's satisfaction.

CONCLUSION:

The current study found that using cryotherapy in conjunction with topical anesthesia could reduce patient pain during surgery while also increasing surgeon satisfaction.

REFERENCE:

1. Khezri MB, Akrami A, Majdi M, Gahandideh B. Effect of cryotherapy on pain scores and satisfaction levels of patients in cataract surgery under topical anesthesia: a prospective randomized double-blind trial. *BMC Research Notes*. 2022 Dec;15(1):1-6.
2. Silva DA, Peixoto GF, Rodrigues KM, Farias VX. Analgesic efficacy of the association of cryotherapy and transcutaneous electrical nerve stimulation. *BrJP*. 2018 Jul;1:274-8.
3. Coelho RP, Biaggi RH, Jorge R, Rodrigues MD, Messias A. Clinical study of pain sensation during phacoemulsification with and without cryoanalgesia. *Journal of Cataract & Refractive Surgery*. 2015 Apr 1;41(4):719-23.



The iridocorneal angle and related anterior segment structures: A study of paediatric anisohyperopic amblyopic eyes

INTRODUCTION:

The iridocorneal angle (ICA), axial length (AL), and anterior segment biometric parameters must be determined in order to plan anterior or posterior segment surgery and predict glaucoma progression. [1] Anisometropia (difference in spherical equivalent (SE)=dSE) is defined as one or more diopter (D) differences in SE between two eyes. Based on the refractive index, it is derived from anisomyopia, anisohypermetropia, or anisoastigmatism. [2]

Anisohypermetropic amblyopia is defined by a reduction in best-corrected visual acuity (BCVA) of at least two acuity test lines in the affected eye as a result of anisohypermetropia. Many studies have found that anisometropic amblyopia causes microvascular and structural changes in the fovea, choroid, optic nerve head, lateral geniculate nucleus, and visual cortex. [3] It is debatable whether hyperopic anisometropic eyes exhibit anterior segment structural changes. The researchers wanted to look into the iridocorneal angle, anterior segment structural differences, and their relationship in children with anisohyperopic amblyopia. [4]

Pentacam and IOLMaster 700 are appropriate for non-contact imaging of the iridocorneal angle and anterior segment structures in children. These biometric differences and their relationship should be considered whenever anterior or posterior segment surgery for paediatric anisohyperopic amblyopic eyes is contemplated.

METHODS:

This was a case-control study with an observational design. We evaluated paediatric patients who had recently been diagnosed with hyperopic anisometropic amblyopia. Using the Pentacam and IOLMaster 700 devices, the emmetropic fellow and control eyes' iridocorneal angle in four sectors, axial length, and anterior segment structures were compared. In hyperopic anisometropic amblyopic eyes, the anisohyperopia and iridocorneal angle related factors were determined.

RESULTS:

There were 43 hyperopic anisometropic amblyopic eyes, 43 fellow eyes, and 44 control eyes. The mean axial length, anterior chamber volume, and anterior chamber depth in the study eyes were significantly lower than in the fellow and control eyes. The average iridocorneal angle in the study eyes was significantly lower than in the fellow and control eyes. In the study eyes, the iridocorneal angle correlated with anterior chamber depth, anterior chamber volume, anterior radius of curvature, posterior radius of curvature, and lens thickness. The interocular difference in axial length, anterior chamber depth, and anterior chamber volume were all related to anisohyperopia.

DISCUSSION:

This is the first study to look at ICA variations in four sectors and their relationship to anterior segment structures in hyperopic anisometropic amblyopic eyes. The aICA was found to be lower in the study eyes than in the fellow and control eyes. The mean ICA was reduced in all sectors, but it was significantly lower in the nasal quadrant only when compared to the fellow and control eyes. The aICA in the study eyes was affected by LT, ARC, PRC, ACD, and ACV but not by AL, WTW, SE, CT, or dSE. Furthermore, dSE was linked to dAL, dACD, and dACV but not to dLT, dARC, dPRC, dWTW,

dCT, or dICA. ICA determination is critical in cataract or refractive surgery planning and predicting glaucoma progression. [5]

In the study eyes, aICA was found to be negatively correlated with LT, ARC, and PRC, and positively correlated with ACD and ACV. The ACD and ACV were found to be significantly lower in hyperopic anisometropic amblyopic eyes than in fellow and control eyes. Furthermore, in the study group, dACD and dACV were positively correlated with dSE. According to the study, increased anisohyperopia resulted in more significant interocular differences for ACD and ACV, resulting in shallower ACD and lower ACV in more hyperopic eyes.

CONCLUSION:

To summarise, the Pentacam and IOLMaster 700 are appropriate and simple to use for non-contact imaging of ICA and anterior segment structures in paediatric patients. When planning anterior or posterior segment surgery for congenital or acquired pathologies in paediatric subjects, the ICA, AL, and anterior segment biometric differences in anisohyperopic amblyopic eyes should be considered. Long-term prospective studies are required to determine the effect of amblyopia treatment and improved visual acuity on these structures.

REFERENCE:

1. Karabulut M, Karabulut S, Simsek HC, Karalezli A. The iridocorneal angle and related anterior segment structures in pediatric anisohyperopic amblyopic eyes. *SAGE Open Medicine*. 2022 Jun;10:20503121221107474.
2. Istek Ş. Anisometropia magnitude and amblyopia depth in previously untreated unilateral amblyopia patients. *Open Access Library Journal*. 2017 Apr 5;4(4):1-0.
3. Terada N, Miyata M, Muraoka Y, Hata M, Fujimoto M, Yokota S, Nakanishi H, Suda K, Yoshikawa M, Ooto S, Ohtsuki H. Abnormal outer Choroidal vasculature in amblyopia. *Journal of Ophthalmology*. 2019 Jan 10;2019.
4. Singh N, Rohatgi J, Kumar V. A prospective study of anterior segment ocular parameters in anisometropia. *Korean Journal of Ophthalmology*. 2017 Apr 1;31(2):165-71.
5. Riva I, Micheletti E, Oddone F, Bruttini C, Montescani S, De Angelis G, Rovati L, Weinreb RN, Quaranta L. Anterior chamber angle assessment techniques: a review. *Journal of clinical medicine*. 2020 Nov 25;9(12):3814.

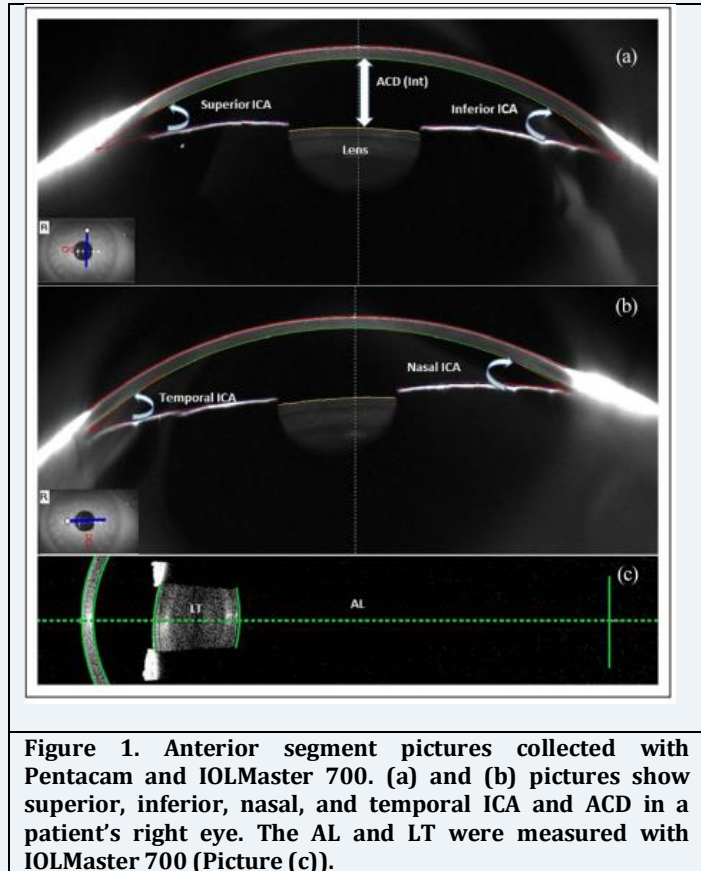


Figure 1. Anterior segment pictures collected with Pentacam and IOLMaster 700. (a) and (b) pictures show superior, inferior, nasal, and temporal ICA and ACD in a patient's right eye. The AL and LT were measured with IOLMaster 700 (Picture (c)).

Dry Eye and Dysfunction of the Meibomian Gland in Neovascular Age-Related Macular Degeneration Patients Treated with Intravitreal Injections

INTRODUCTION:

Age-related macular degeneration (AMD) is a leading cause of blindness in older people in developed countries, and the neovascular type requires anti-vascular endothelial growth factor (anti-VEGF) inhibitors to treat. [1] Because of its broad antimicrobial activity and low cost, ophthalmic povidone-iodine is commonly used to prevent endophthalmitis. [2] Dry eye is a multifactorial ocular surface disease that has a negative impact on patients' quality of life. One of the most common causes of dry eye syndrome is meibomian gland dysfunction. Meibomian glands can be imaged using a variety of tools during meibography, and gland loss can be assessed using scoring systems defined in previous studies. [3] Ocular surface inflammation is thought to be a

Multiple factors, including povidone-iodine and topical eye drop preservatives, may cause inflammation and ocular surface damage in patients receiving multiple intravitreal injections. Because the treatment requires multiple injections, exposure to these factors may aggravate the ocular surface inflammation. In these patients, dry eyes and meibomian gland dysfunction should be considered.

major cause of aqueous deficiency and evaporative type dry eye disease, with the latter being linked to meibomian gland dysfunction. Dry eye disease may be caused by exaggerated and abnormal immune stimulation or disrupted immunoregulatory mechanisms, resulting in dysregulation of the ocular surface immune system. Previous research has found a link between inflammation-related diseases and meibomian gland dysfunction.

METHODS:

Sixty eyes from 30 patients were included in the study. Each patient had one eye treated with multiple monthly intravitreal injections for neovascular AMD (Group 1), while the other healthy eye received no treatment (Group 2). Tear film break-up time, Schirmer 1 test, Oxford scale, and Ocular Surface Disease Index were used to assess the presence of dry eye (OSDI). Meibography was used to assess the loss rate of meibomian glands, which was graded and scored (meiboscore) for each eyelid from grade 0 (no loss of glands) to grade 3 (loss of more than two-thirds of total meibomian glands).

RESULTS:

The mean Schirmer 1 and tear film break up-time measurements in Group 1 were lower, and the mean OSDI score was higher, but the differences were not statistically significant. There was no statistically significant difference between the groups in mean Oxford scale scores or meiboscore of the upper eyelids. Group 1 had a significantly higher meiboscore for lower eyelids.

DISCUSSION:

Dry eye is an ocular surface disease that has a multifactorial pathogenesis that includes an inflammatory component. It causes hyperosmolarity and increased levels of inflammatory mediators in the tear film, which causes ocular surface damage such as epithelial cell apoptosis and goblet cell death, resulting in even more inflammation. In developed countries, neovascular AMD is a leading cause of blindness in the elderly. 19 Anti-VEGF agents, such as ranibizumab or aflibercept, are the gold standard of treatment for nAMD, and almost all patients require multiple intravitreal

injections. Treatment with intravitreal anti-VEGF injections is a time-consuming, repetitive procedure that leaves many patients with dry eye symptoms. As the treatment and antiseptic precautions are repeated, the ocular surface experiences increased inflammation, which can lead to dry eye syndrome. [4]

Table 1. The dry eye test results and meiboscores of eyes treated with intravitreal injections (group 1) and healthy fellow eyes (group 2) of the same patients.			
	Group 1, mean $\pm$ SD (range)	Group 2, mean $\pm$ SD (range)	p value
Schirmer-1 (mm)	19.2 $\pm$ 4.8 (10-30)	20.3 $\pm$ 4.4 (12-30)	0.257
TBUT (s)	9.6 $\pm$ 3.8 (3-18)	11.3 $\pm$ 4.1 (3-19)	0.113
Oxford scale	0.6 $\pm$ 0.7 (0-2)	0.6 $\pm$ 0.7 (0-2)	0.594
OSDI score	28.9 $\pm$ 20.7 (2.1-71.5)	22.2 $\pm$ 18.5 (2.1-71.5)	0.212
Upper meiboscore	1.4 $\pm$ 0.9 (0-3)	1.3 $\pm$ 0.9 (0-3)	0.663
Lower meiboscore	0.9 $\pm$ 0.8 (0-3)	0.4 $\pm$ 0.7 (0-2)	0.048
Total meiboscore	1.1 $\pm$ 0.8 (0-3)	0.9 $\pm$ 0.7 (0-2.5)	0.211
SD: Standard deviation, TBUT: Tear film break-up time, OSDI: Ocular Surface Disease Index			

According to a recent study, intravitreal injections of povidone-iodine and topical anaesthetics caused ocular surface damage. It was also reported in the same article that TBUT was lower in the injected eye when compared to the healthy fellow eye of the same patients. The authors also stressed that this treatment procedure could result in iatrogenic and chronic dry eye, rather than just temporary damage. [5] Ocular inflammation caused by intravitreal anti-VEGF injections is a well-documented phenomenon with two clinical manifestations. The first is "acute-onset sterile inflammation," with clinical features ranging from subclinical anterior chamber inflammation to severe inflammation that can be misdiagnosed as endophthalmitis. Subclinical anterior chamber inflammation is a fairly common side effect of anti-VEGF injections, occurring in up to 20% of patients. The second manifestation, 'delayed-onset inflammatory vasculitis' associated with brolocizumab, is a new one.

Dry eye disease is common in the elderly. Age-related diseases or comorbid conditions, such as diabetes, can also cause nerve damage and increase the risk of dry eye. In most cases, determining whether dry eye is caused by treatment or by age-related changes is difficult. However, in the current study, the control group consisted of the study group's fellow eyes, implying that there is no difference in age or systemic or ocular comorbid diseases between the treated and control groups. As a result, the effectiveness of the treatment procedure can be effectively assessed. [6]

CONCLUSION:

To summarise, AMD requires intravitreal injections for treatment. Despite the fact that intravitreal anti-VEGF therapy is the gold standard, these patients may have dry eyes and/or meibomian gland dysfunction. We discovered statistically significant differences in meibomian gland dropout ratios in this study, despite the fact that treated eyes showed no significant differences in dry eye tests. Nonetheless, ophthalmologists should be on the lookout for dry eye and meibomian gland dysfunction in these patients. Because the treatment protocols are chronic, prolonged and repeated exposure to povidone-iodine, topical antibiotics, topical anaesthetics, and eye drop preservatives may predispose to ocular surface inflammation. OSDI scoring prior to multiple injections can aid in the early detection of dry eye.

REFERENCE:

1. Kıyat P, Palamar M, Nalçacı S, Akkın C. Dry Eye and Meibomian Gland Dysfunction in Neovascular Age-Related Macular Degeneration Patients Treated with Intravitreal Injections.

2. Grzybowski A, Kanclerz P, Myers WG. The use of povidone-iodine in ophthalmology. *Current opinion in ophthalmology*. 2018 Jan 1;29(1):19-32.
3. Periman LM, Perez VL, Saban DR, Lin MC, Neri P. The immunological basis of dry eye disease and current topical treatment options. *Journal of ocular pharmacology and therapeutics*. 2020 Apr 1;36(3):137-46.
4. Adiguzel S, Palamar M, Yargucu F, Oksel F, Yagci A. Evaluation of ocular surface and meibomian glands in patients with Scleroderma. *Cornea*. 2021 Aug 1;40(8):977-81.
5. Verrecchia S, Chiambaretta F, Kodjikian L, Nakouri Y, El Chehab H, Mathis T, Badri Y, Chudzinski R, Levron A, Chaperon M, Agard E. A prospective multicentre study of intravitreal injections and ocular surface in 219 patients: IVIS study. *Acta Ophthalmologica*. 2021 Dec;99(8):877-84.
6. Cox JT, Elliott D, Sobrin L. Inflammatory complications of intravitreal anti-VEGF injections. *Journal of Clinical Medicine*. 2021 Mar 2;10(5):981.

A Case Study of Hyperacute Iris Neovascularization After Cataract Surgery

INTRODUCTION:

Cataracts caused by ageing are a major cause of visual impairment and blindness worldwide, with cataract extraction being the most common eye surgery. The safety and efficacy of cataract surgery have steadily improved with continued development of surgical methods; however, complications may still occur. The most common causes of vision loss are central retinal vein occlusion (CRVO) and branch retinal vein occlusion (BRVO). Following diabetic retinopathy, retinal vein occlusion is the second most common cause of retinal vascular disease. Several studies on ocular neovascularization in CRVO and hemi-CRVO have been conducted. [1] NVI (neovascularization of the iris) is a rare complication of retinal ischemic diseases such as CRVO. NVI has the ability to progress to the trabecular meshwork and obstruct the aqueous humour outlet. As a result, neovascular glaucoma can result in blindness. [2]

Cataract surgery can exacerbate hemi-CRVO and cause iris neovascularization that responds to bevacizumab.

CASE REPORT:

A 78-year-old man came in for cataract surgery and glaucoma treatment. His medical history revealed that he had well-controlled hypertension as well as Parkinson disease. He had bilateral laser iridotomy for narrow angles four years ago, as well as cataract surgery in his right eye. After his symptoms were relieved by using a brinzolamide/timolol antiglaucoma eye drop, he was diagnosed with open-angle glaucoma in the left eye.

His best-corrected visual acuity (BCVA) on ocular examination was no light perception in the right eye and 20/100 (+6.00 Dsph;- 3.00 A90) in the left eye. The intraocular pressure was 48/13mm Hg using a noncontact tonometer. Slit-lamp examination revealed pseudophakic bullous keratopathy in the right eye and nonspecific findings except cataract in the left eye. The posterior pole was not seen on fundus examination due to dim vision in the right eye, but hemi-CRVO with a glaucomatous optic disc was seen in the left eye (Fig. 1). Macular edema in the left eye was not detected using optical coherence tomography. On ocular biometry, the anterior chamber depth was 2.66mm and the axial length was 23.15mm in the left eye.

After weighing the risks and benefits, the doctors decided to perform cataract surgery. The Centurion Vision System was used to perform phacoemulsification with intraocular lens implantation under topical anaesthesia through a 2.3-mm clear corneal incision. There were no complications observed.

His BCVA was 20/400 in the operated eye one day after surgery, and his intraocular pressure was 16 mmHg on a non-contact tonometer. Slit-lamp examination revealed corneal edema, 2+ cells in the anterior chamber, and 360° NVI (Fig. 2). A fundus examination of the left eye revealed aggravated hemi-CRVO and macular edema (Fig. 3), which required intravitreal administration of

0.05 cc bevacizumab (Avastin). On postoperative day 2, the left eye's BCVA and intraocular pressure had improved to 20/63 and 16mm Hg, respectively. The NVI was found to have regressed during a slit-lamp examination. His BCVA was 20/63 three months after surgery, and his intraocular pressure was 12mm Hg in the left eye, with no recurrence of NVI. A fundus examination revealed that the macular edema had not returned.

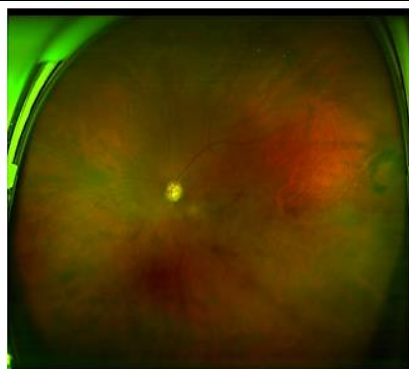


Figure 1. Fundus examination of the hemicentral retinal vein occlusion before the cataract surgery.

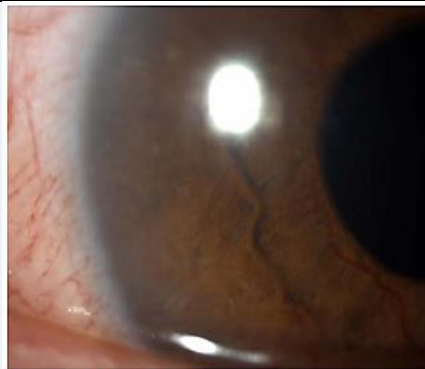


Figure 2. Slit-lamp examination of the neovascularization of the iris after the cataract surgery.

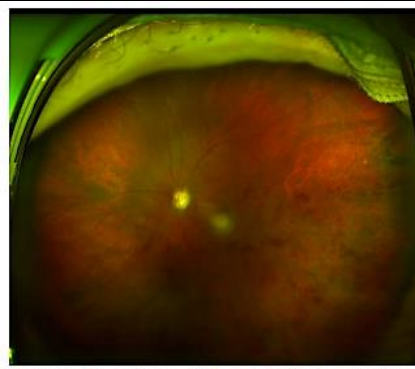


Figure 3. Fundus examination of the aggravated hemicentral retinal vein occlusion after the cataract surgery.

DISCUSSION:

Retinal vein occlusion is associated with a number of risk factors, including systemic hypertension, dyslipidemia, and ocular conditions. The risk of retinal vein occlusion is increased by high intraocular pressure and glaucoma. Systemic hypertension and glaucoma were among the risk factors for this patient. A number of risk factors, including systemic hypertension, dyslipidemia, and ocular conditions, are linked to retinal vein occlusion. High intraocular pressure and glaucoma increase the risk of retinal vein occlusion. This patient had systemic hypertension and glaucoma as risk factors. [3]

A study described rare cases of ischemic CRVO without neovascularization in the angle and without the pupil. Because the doctors did not perform gonioscopy, they may have missed preexisting angle neovascularization. [4]

CONCLUSION:

Cataract surgery may have caused the acute-onset iris neovascularization and aggravated hemi-CRVO in this case. In patients with pre-existing retinal vein occlusion, careful examination of the iris and gonioscopy is required prior to pupil dilation.

REFERENCE:

1. Sim HE, Hwang JH. Hyperacute iris neovascularization following cataract surgery. *Medicine*. 2022 Jul 7;101(27).
2. Jung YH, Ahn SJ, Hong JH, Park KH, Han MK, Jung C, Woo SJ. Incidence and clinical features of neovascularization of the iris following acute central retinal artery occlusion. *Korean Journal of Ophthalmology*. 2016 Oct 1;30(5):352-9.
3. Yin X, Li J, Zhang B, Lu P. Association of glaucoma with risk of retinal vein occlusion: a meta-analysis. *Acta Ophthalmologica*. 2019 Nov;97(7):652-9.
4. Rodrigues GB, Abe RY, Zangalli C, Sodre SL, Donini FA, Costa DC, Leite A, Felix JP, Torigoe M, Diniz-Filho A, de Almeida HG. Neovascular glaucoma: a review. *International Journal of Retina and Vitreous*. 2016 Dec;2(1):1-0.



This scientific input is prepared from the Department of Medical Services, an initiative of M/s Micro Labs Limited under the aegis of Micro Knowledge Academy. The information contained herein is for education purpose only. The content is developed by compiling information from various authentic and published literatures. Although great care has been taken to assure the accuracy of the publication, M/s Micro Labs Limited shall not be responsible or in any way liable for any inaccuracy, errors, or omissions resulting from negligence or otherwise howsoever or any consequences arising there from. In spite of best efforts, the information in this publication may become outdated over time. M/s Micro Labs Limited shall not be responsible in any manner whatsoever, for any action taken, opinions expressed, advice rendered or accepted, any direct, incidental, special or consequential loss and damage caused on the basis of any material or information presented in this publication / update