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To Report a case of Recurrence in post-traumatic Iris cyst with Traumatic cataract in 20 years old Young Male: A Multimodal Diagnostic and Surgical Approach

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Abstract:

Purpose: To report a case of recurrence in post-traumatic iris cyst with a related traumatic cataract in a young man, treated with a multimodal treatment regimen involving Deroofing of iris cyst, laser photocoagulation and adjunctive pharmacologic therapy.

Methods: A 20-year-old Male patient came with complaints of 6 months of redness, watering, foreign body sensation, and diminution of vision in the left eye. On examination, there was a translucent serous iris cyst along with traumatic cataract with blunt trauma to left eye 10 years ago. Imaging by ultrasound biomicroscopy (UBM) and anterior segment optical coherence tomography (AS-OCT) correlated the size and position of the cyst. Management involved are Deroofing of the anterior layer of iris cyst to maintain a round pupil and aspiration of the lens with foldable intraocular lens in the bag (IOL) implantation and for the recurrence of iris cyst with treatment of argon laser photocoagulation of the posterior pigmented layer of iris and intracystic injection of Mitomycin C.

Results: After 2-months follow-up patient with visual acuity improve from 6/60 to 6/9. But after 4 months there was a recurrence of the cyst clinically. The anterior segment was stable, free from any inflammation or complication.

Conclusion: Iris cysts after trauma should be treated by a stepwise, multimodal approach. Iris cysts after trauma should be treated with complete excision of the anterior and posterior layers of the iris cyst. But in this particular case we did Deroofing of anterior wall of iris cyst to save the pupil function as the patient was very young and with other stepwise treatment procedures but recurrence is seen maybe due to incomplete removal of cyst wall.

1.INTRODUCTION:

Iris cysts are epithelial-lined, fluid-filled structures that occur within or on the iris. They are either primary or secondary. Primary iris cysts are usually congenital or idiopathic, benign, and asymptomatic, not needing treatment (Philip et al., 2015).

On the other hand, Secondary iris cysts are acquired and caused by ocular trauma, surgery, inflammation, or implantation of epithelial cells into the anterior chamber. These cysts are more likely to be symptomatic, presenting with visual disturbances, and recurrent following treatment (Mahjoub et al., 2023).

Pathogenesis of secondary iris cysts also includes proliferation of epithelial cells within the anterior chamber after injury, which then results in formation of cysts. These could increase over the years and impair the visual axis, lead to secondary

glaucoma by mechanism of angle closure, or promote corneal decompensation by endothelial touch (Lomi et al., 2024). It is possible, in a few instances such as the one shown here, for cysts not to cause impairment or pain visually for many years.

Traumatic cataract happens when trauma to the eye damages the lens capsule and creates opacification of the lens. Opacification varies based on the amount and area of trauma (Köse et al., 2020). Treatment for a traumatic cataract as well as an iris cyst demands individualized treatment in both anterior segment diseases. This case presentation involves a young adult male presenting with a recurring iris cyst and traumatic cataract, treated with a multimodal strategy, underscoring the significance of precise diagnosis and concomitant medical and surgical intervention for favourable results.

2. CASE PRESENTATION:

2.1 Patient History:

A 20-year-old male reported to the outpatient department of ophthalmology on 15-05-2024 with a history of progressive, painless blurring of vision in his left eye over the last six months. Foreign body sensation, watering, and redness of the left eye, particularly when exposed to sunlight or dusty surroundings. These gradually increased over a period of time and caused considerable effect on his day-to-day activities.

Significantly, the patient provided a history of ocular trauma to the left eye that happened about ten years ago. The trauma was a result of an accident where he hit his eye against some unforeseen object. He received some local treatment from Quack Person but recovered and do not have any symptoms until development of present complaints.

There was no past history of previous ocular surgeries, wearing spectacles or contact lenses, systemic disease, or familial ocular diseases. The right eye was completely symptom-free. Otherwise, the patient was healthy and not on any chronic medications.

2.2 General and Systemic Examination:

On overall examination, the patient was found to be moderately built and well-nourished, with no clinical evidence of systemic disease. He was afebrile and completely alert, cooperative, and oriented to time, place, and person.

The vital signs were within physiological norms. The heart rate was 80 beats per minute, the blood pressure was 110/70 mmHg, and the respiratory rate was 19 breaths per minute. Pallor, icterus, cyanosis, clubbing, and lymphadenopathy were not present in the patient.

Systemic review was non-contributory. The patient had a clear respiratory system on auscultation with normal vesicular breath sounds. The cardiovascular review elicited a regular rhythm with auscultation of S1 and S2 heart sounds and no murmurs. Abdominal review noted a soft, non-tender abdomen with normal bowel sounds. Neurological assessment was consistent with the patient being neurologically intact, with normal higher mental function and no focal deficits. No underlying systemic conditions that might affect eye health or therapeutic response were detected.

2.3 Ocular Examination:

On external ocular inspection, showed normal head posture and symmetrical facial features. Ocular alignment was orthophoric in all positions of gaze. Extraocular movements were full, free, and painless in both eyes.

The right eye had an unaided distance visual acuity of 6/6p and improved to 6/6 with a +0.50 dioptre spherical correction. The left eye demonstrated a marked reduction in visual acuity with unaided vision of 6/60, improving to 6/24 with a pinhole, and achieving best corrected visual acuity of 6/18 with a prescription of +1.75 dioptres spherical and -4.00 dioptres cylindrical at 90 degrees. Near vision was N6 in both eyes. Colour vision assessed using Ishihara pseudoisochromatic plates was normal (21/21) bilaterally.

Slit lamp biomicroscopy of the Right eye showed healthy anterior segment structures. The eyelids, conjunctiva, cornea, anterior chamber, iris, pupil, and lens were all within normal limits.

The left eye demonstrated several significant anterior segment abnormalities. The conjunctiva was mildly congested. A leucomatous corneal opacity measuring approximately 4 mm by 2 mm was observed at the 3 o'clock limbus. The cornea

otherwise maintained its clarity and contour. The anterior chamber was of irregular depth and appeared shallow inferiorly. A translucent, loculated iris cyst measuring approximately 3 mm in diameter was seen extending from the 3 to 6 o'clock positions. The cyst was adherent to the corneal endothelium and partially obscured the pupillary aperture. The iris appeared distorted and irregular, with interrupted crypt patterns in the area surrounding the cyst. The pupil was small (2 mm), but slightly irregular in shape, and exhibited a sluggish response to direct and consensual light stimulation. The lens showed dense lenticular opacity consistent with a traumatic cataract.

Intraocular pressure measured by non-contact tonometry was 18 mmHg in the right eye and 20 mmHg in the left eye. Fundus examination of the right eye using direct ophthalmoscopy revealed a healthy pink optic disc with a cup-to-disc ratio of 0.3, well-defined margins, and a bright foveal reflex. The media was clear and the retinal background appeared normal. In the left eye, due to the presence of lenticular opacity and media haze, fundus details were difficult to appreciate. However, a dull foveal reflex was noted, and no gross abnormalities of the optic disc or vessels were visible.

Table: Visual Acuity and Refraction Summary:

	Uncorrected Vision	Pinhole Vision	Best Corrected Visual Acuity (BCVA)	Prescription
Right Eye	6/6p	6/6	6/6	+0.50 SPH, 6/6
Left Eye	6/60	6/24	6/18	+1.75 SPH -4.00 CYL @ 90°, 6/18
Near Vision	N6 (in both eyes)	–	–	–
Colour Vision	21/21(in both eyes)	–	–	–

2.4 Imaging and Investigations:

Slit lamp photography of the left eye provided high-resolution images confirming the clinical findings. The photographs showed a multiloculated, translucent iris cyst arising from the anterior iris surface and extending from 3 to 6 o'clock. The cyst was observed to be in contact with the corneal endothelium, displacing the pupil and partially obstructing the visual axis. No abnormal vascularity was observed on the cyst surface. The cyst appeared to contain clear fluid and exhibited surface pigmentation.

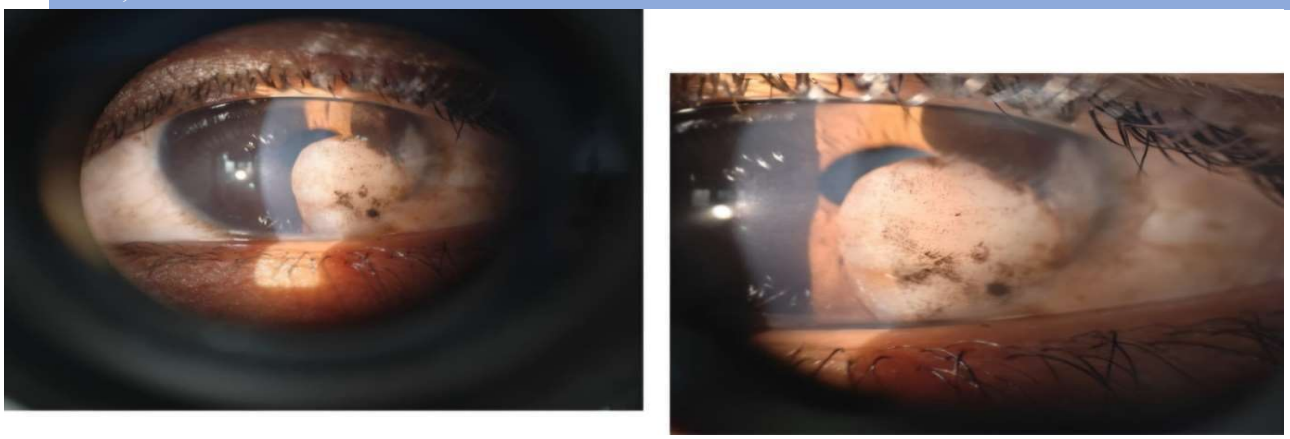

Figure 1: Left Eye Slit lamp image showing Traumatic Iris cyst touching corneal endothelium and blocking pupillary axis with traumatic cataract.

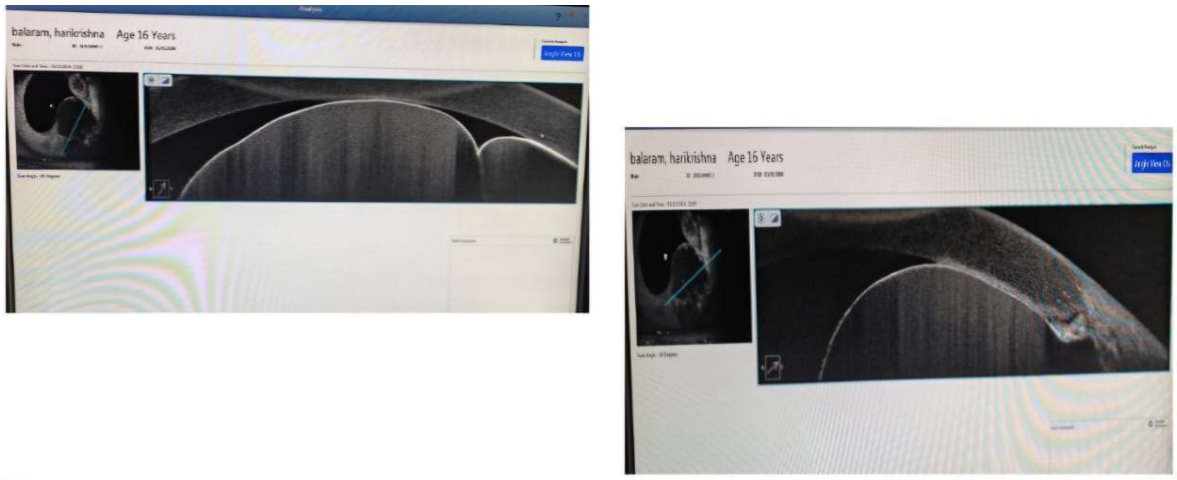

Figure 2: Anterior segment OCT of Left eye Traumatic Iris cyst touching corneal endothelial layer.

A transillumination test was performed by directing a beam of light from the temporal side of the eye while observing for transmitted light through the cyst. The test was positive, confirming the cystic nature of the lesion as light was observed passing through the cystic cavity, unlike a solid iris tumour which would block the light.

Anterior Segment Optical Coherence Tomography (ASOCT) of the left eye was performed to evaluate the cyst morphology and anterior chamber configuration. ASOCT revealed a sharply demarcated, dome-shaped, anechoic cavity consistent with a fluid-filled cyst situated in the inferior iris. The lesion caused distortion and flattening of the adjacent iris contour and resulted in a localized shallowing of the anterior chamber inferiorly. The corneal endothelium remained intact but was in close proximity to the cyst, suggesting a risk of endothelial touch if the lesion enlarged further.

The imaging and investigative findings confirmed a diagnosis of a post-traumatic iris cyst with visual axis obstruction and concurrent traumatic cataract, necessitating a multimodal treatment strategy.

3. MANAGEMENT AND INTERVENTION:

3.1 Initial Surgical Procedure:

Given the patient's symptomatic presentation and the visual axis obstruction caused by the iris cyst along with a coexisting traumatic cataract, a combined surgical approach was deemed necessary. On 19-06-2024 patient underwent

Deroofing of iris cyst in left eye with Traumatic cataract lens extraction with in the bag foldable IOL implantation surgery under local peribulbar anaesthesia.

The procedure commenced by giving sideport incision at 3'o clock and 9'0 clock and Visco was injected under the cyst to gently separate the cyst from the adjacent iris stroma and corneal endothelium. But it was unsuccessful due to firm attachment of cyst but due to this step we have found there was some more posterior attachment behind the cyst with iris firmly which was not seen on slit lamp examination due to leucomatous opacity. The extension of actual iris cyst is from 2 to 6 0' clock extension with size of 4 mm in diameter which was seen on intraoperative period. Then we Deroof the anterior cyst wall which was successful with vitrectomy probe which was straight and useful in this procedure and care is taken not to damage the angle, the overhanging edges are cut with vannas scissors.

Excised cyst wall was sent for Cytological analysis.

The fluid that comes out of cavity was aspirated completely. The anterior chamber was then thoroughly irrigated to ensure no residual epithelial debris remained.

Subsequently, attention was turned to the lens. A manual SICS surgery was used to remove the traumatic cataract. Then scleral tunnel was done to enter the anterior chamber and anterior capsule was stained with Trypan blue. A continuous curvilinear capsulorhexis was performed and posterior synechiae was removed which was seen intraoperatively from 3 to 5'o clock followed by hydrodissection and nucleus removal. Cortical clean-up was carried out meticulously to ensure no residual lens material. A foldable posterior chamber intraocular lens (PCIOL) was implanted within the capsular bag under viscoelastic protection. The IOL was positioned centrally, and a final wash of the anterior chamber was done to clear any remaining viscoelastic. and Anterior chamber was filled with Air and finally one suture placed at main port section to prevent any wound leak and for the stability for the tunnel.

The operation was eventful, with stable anterior segment anatomy at the end of the surgery. Drops used postoperatively includes topical antibiotics, cycloplegics, and corticosteroids.

3.2 Postoperative Result:

On the first postoperative day, the patient's visual acuity in the left eye was 6/36 and with pinhole 6/24. The anterior chamber was well formed, and the PCIOL remained centred and stable. Inflammatory signs were negligible, and no fibrinous reaction or hypopyon was noted. The cornea was transparent, and no residual cystic material was seen.

CYTOLOGY REPORT:

Specimen-Excised iris cyst in 10 % Formalin

The smear was reported as poorly cellular with a predominance of occasional macrophages in a clear background. No atypical or malignant cells were identified. The findings supported the diagnosis of a benign, post-traumatic iris cyst with no evidence of neoplastic transformation.

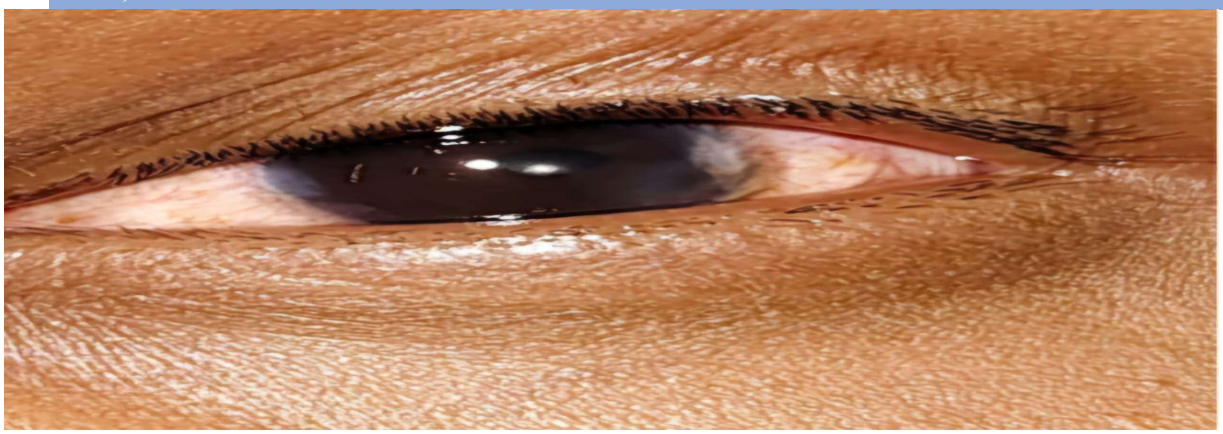

Figure 3: Left eye Day 1 post operative iris cyst deroofing with MSICS Surgery

During the course of the next week on 26-06-2024, the best corrected visual acuity of the patient improved to 6/12. The anterior segment was quiet and anatomically stable. Intraocular pressure in Right eye-14 mmhg,Left eye-17 mmhg

Follow-up anterior segment optical coherence tomography (ASOCT) performed postoperatively confirmed the complete absence of the previously visualized iris cyst. The anterior chamber depth had normalized, and the corneal endothelium showed no signs of damage. No abnormal masses or fluid-filled cavities were detected. The patient was instructed to continue anti-inflammatory corticosteroid drops on a tapering schedule.

3.3 Recurrence and Argon Laser Photocoagulation:

Despite successful removal of the cyst and stabilization of the anterior segment, the patient returned at the four-month follow-up on 3-10-2024 with complaints of watering and mild discomfort in the left eye. Slit lamp examination revealed recurrence of the iris cyst in the same temporal quadrant with size of 2 mm in diameter. The cyst was slightly smaller than before not impinging on the pupillary axis.

Considering the recurrence and the cyst's accessible location, a decision was made to proceed with argon laser photocoagulation as a less invasive treatment option. The procedure was performed under topical anaesthesia. Laser settings included a spot size of 200 microns, pulse duration of 0.2 seconds, and power settings titrated between 250 mw to achieve visible blanching of the cyst wall.

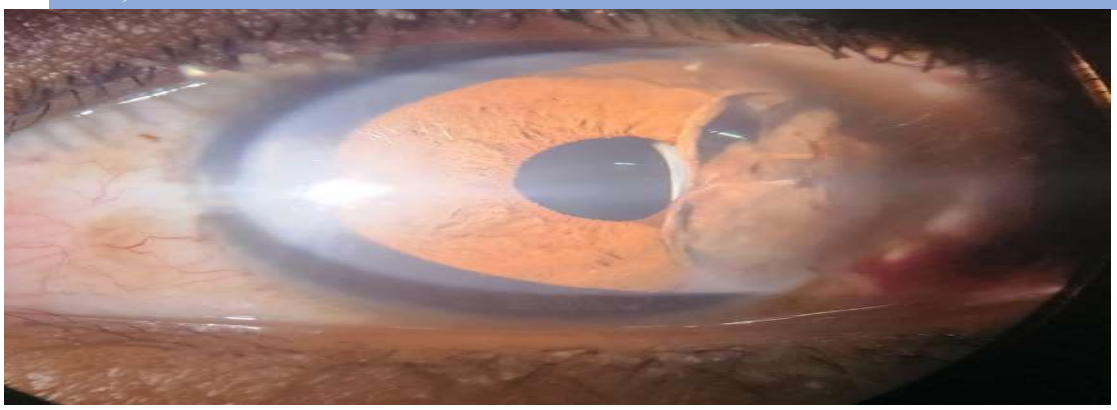

Figure 4: Left eye with Recurrent Iris cyst after Laser photocoagulation and post Deroofing of Traumatic Iris cyst

The laser was applied in a circumferential fashion around the base and dome of the cyst to induce collapse and prevent further expansion. The patient tolerated the procedure well. Follow-up over the next week revealed no regression of the cyst and residual cystic structures were still visible, and symptoms persisted, indicating that a more definitive treatment was required to achieve long-term resolution.

3.4 Secondary Surgical Procedure with Alkylating agent-Mitomycin-C:

In light of the recurrent nature and incomplete response to laser treatment, a secondary surgical procedure was performed on 15-10-2024. The goal was complete eradication of the cyst using cyst aspiration followed by intraocular Intracystic injection of Mitomycin-C 0.2 mg/ml (0.02%) into the cyst. The procedure was conducted under aseptic conditions in the operating theatre.

A temporal clear corneal incision was made, and a 27-gauge needle was carefully introduced into the cyst cavity under direct visualization. The cyst contents, composed of clear fluid, were gently aspirated to collapse the structure entirely. Once decompressed, without removing the needle we injected the 0.2 ml (0.02%) of Mitomycin-C through 1 ml syringe and letting it stay in the cyst for 2 minutes. Then Mitomycin-C was then evacuated quite extensively to prevent endothelial/ anterior chamber angle toxicity.

After that an irrigation of cyst cavity richly with balanced salt solution and irrigate anterior chamber with balanced salt solution.

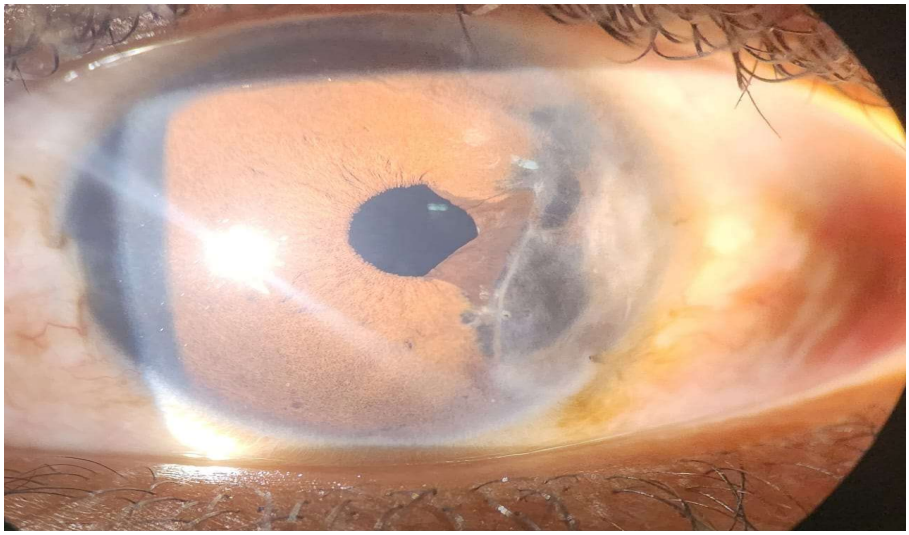

Figure 5: Left eye Post operative picture after secondary surgery with Mitomycin C (0.02%)

Post operatively the iris cyst regresses with Intra ocular pressure was 17 mmhg in operated left eye and topical cycloplegics and corticosteroids were prescribed to the patient. The anterior chamber was maintained deep and silent with no evidence of inflammation but after 1 month patient came for follow-up on 20-11-2024 again present with foreign body sensation and redness with recurrent Iris Cyst touching corneal endothelium temporarily with 2mm in diameter but vision is 6/6 P with Intra ocular pressure of 18 mm hg in left eye

4. DISCUSSION:

The recurrent post-traumatic iris cyst treatment is quite complicated due to the high rates of recurrence and complications with which they occur.

This case shows a use of a multimodal therapeutic approach primarily with deroofing of anterior cyst wall to save the pupil function as patient was 20 years old.

But even after this multimodal treatment approach the patient still had a recurrence of Iris cyst so further procedures that can be done are Cryotherapy and finally 180 degrees complete excision of the cyst with pupilloplasty in this particular patient.

The first operation in combination with traumatic cataract removal and Deroofing of cyst procedure promised the option of simultaneous treatment of both diseases. But the recurrence after four months is, however, a reflection of the recidivistic nature of implantation cysts as reported by Kim et al., (2024), with the recurrence rates varying from 30-50% after the primary excision.

This is a reminder that one should anticipate recurrence and prepare for it.

Staircase-like progression from surgical deroofing to argon laser photocoagulation and then to Intracystic injection of alkylating agent like Mitomycin-C is an appropriate therapeutic approach. While laser photocoagulation with an argon laser is relatively unaggressive, it was only partially successful in our patient, matching the report of Shields that laser therapy alone does not often suffice in the treatment of thick-walled traumatic cysts (Jin et al., 2016). Partial response led to the necessity to move on to more definite chemical therapy.

The effectiveness of the application of Mitomycin-C for 2 minutes in our patient was manifested to reduce epithelial proliferation in recurrent iris cyst. In this patient we used Mitomycin C as an antimetabolite to minimise epithelial proliferation and to prevent recurrence a tactic that was supported and demonstrated by Georgalas et al. (2018) in their review on 12 recalcitrant iris cysts.

Mitomycin-C can be toxic to ocular structures if prolonged exposure is there in the intraoperative period but no corneal toxicity or secondary glaucoma noted in this patient.

Visual outcome was favourable with vision improvement from 6/60 to 6/9, as in the series given by Dubey et al. (2021) in the combined cataract & iris cyst program. Absence of such complications as corneal decompensation, glaucoma or uveitis after four months provides evidence of the safety of our multimodal approach.

Anterior segment OCT was also helpful in following up on the anatomical outcomes to accurately determine the extent of the resolution of the cyst and configuration of the anterior chamber without the burden of the repeated testing of UBM that was implied by Budhwani and Potti (2022).

But still after 1 month of Mitomycin-c application there was a recurrent iris cyst again in this case speaks of the need for the necessary preoperative investigation, a rigorous operative procedure, a selective use of adjunctive modalities, and careful follow-up in treating these recurrence cases.

Despite this multi staged approach of treatment patient still had multiple recurrence of iris cyst, so patient may need further management with cryotherapy if there is any increase in Intra ocular pressure and 180 degrees of excision of recurrent cyst with pupilloplasty as a final management.

Long term follow up is therefore still essential to establish sustained resolution and early identification of any tendency of recurrence.

5. CONCLUSION:

The recurrent post-traumatic cataract accompanied by the iris cysts represents a great therapeutic challenge. This case shows the efficacy of a multimodal surgery that includes Deroofing of iris cyst, argon laser photocoagulation, and intracystic Mitomycin-C injection into cyst wall. The patient was a 20-year-old male in whom incomplete resolution of cysts and a stable visual acuity (6/9) in left eye was achieved with cyst recurrence at 4-month follow-up.

Firstly, even primary deroofing of iris cyst may turn out to be insufficient for traumatic iris cysts because of its high rate of recurrence. Secondly with Argon laser photocoagulation also didn't help to regress the recurrent iris cyst and after that with intracystic injection of Mitomycin-c period with the result of regression of recurrent iris cyst with no corneal toxicity or secondary glaucoma noted in this patient.

This case also supports the evidence that even after using Argon laser photocoagulation and intracystic injection of Mitomycin-c there is a refractory iris cyst. While presenting this unfavourable outcome, it calls for the standard protocol of treatment.

Final treatment would be cryotherapy and 180 degrees excision of iris with recurrent cyst and pupilloplasty would be helpful for this patient.

Future studies should look at long-term follow-up (> 5y), where larger groups are used for comparing the efficacy of different treatment protocols. The optimal management algorithm has not been identified yet; however, this report assures a stepwise approach with the treatment of the difficult cases where visual preservation is the focus, from the conservative option to combination therapies.

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