

Femtosecond laser assisted cataract surgery with posterior iris adhesive small pupil descent: a case report

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The application of femtosecond laser technology in cataract surgery provides safer and more accurate surgical procedures for complex cataracts^[1]. However, femtosecond laser assisted cataract surgery (FLACS) has many relative contraindications, such as orbital diseases, eyelid stenosis, eyelid deformation, corneal diseases, the presence of other substances in the anterior chamber, and pupil size, which all affect normal operation. A patient with cataract combined with posterior iris adhesions was admitted to our hospital and underwent FLACS combined with intraocular lens implantation, with satisfactory results. The following report is presented.

Case presentation

1. General Information

Patient male, 68 years old. The main cause was unclear vision in both eyes for one year, which worsened for six months. On May 13, 2023, I came to the Cataract Department of Handan Aiyan Ophthalmology Hospital for treatment.

2. Examination Information

Right naked eye visual acuity 0.08, corrected visual acuity: $-2.00-2.50 \times 150^\circ = 0.4$. The intraocular pressure is 14.3mmHg. Slit lamp: The conjunctiva is not congested, the cornea is transparent, the central depth of the anterior chamber is 2CT, and the peripheral depth is 0.5CT. Polarized membrane can be seen near the edge of the iris at 3 o'clock, and light reflection is fixed at 3 o'clock. After dilation, the pupil appears as D, and the iris adheres to the anterior surface of the lens at 1-5 points (Figure 1). Crystal turbidity (N2C1P2). Direct fundus examination: Blurred right eye with clear optic disc boundary, light red color, good vascular orientation, and unclear visualization of the macular area. Master700: AL 22.69mm, ACD 2.54mm, LT 5.09mm, WTW 11.5mm, K1 42.91D@109°, K2 44.51D@19°. Corneal endothelial count: 2492 cells/mm². Eye ultrasound: Vitreous opacity with posterior detachment of the vitreous body. OCT: Local RPE layer elevation in the macular area of the retina. According to the examination report, the patient's right eye has astigmatism greater than 75°. According to the calculation of the artificial lens online calculator, Alcon SN6AT5 single focus intraocular lens was implanted in the patient's right eye with a 24.0D spherical lens, an incision of 140°, and a lens position of 18°. Left naked eye visual acuity 0.6, corrected visual acuity: $+1.5-1.00 \times 90^\circ = 1.0$. Intraocular pressure of 14.0mmHg, crystal opacity (N1C1P1), and no obvious abnormalities were found in the remaining eye examinations.

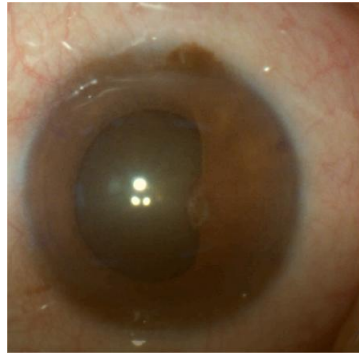


Figure 1: Patient's right anterior segment photo

3. Diagnosis

1. senile cataract (both eyes) 2. posterior synechia of iris (right eye) 3. ametropia (both eyes) 4. vitreous opacity (both eyes) 5. T2DM

4. Treatment

Right eye under surface anesthesia for posterior iris adhesion separation+femtosecond laser assisted cataract phacoemulsification+artificial lens Body implantation surgery. Routine disinfection during surgery, covering the mucous membrane of the eye, opening the eyelid with a eyelid opener, disinfecting the conjunctival sac with 0.2ml of 0.5% povidone iodine solution, and rinsing the conjunctival sac with physiological saline. Firstly, a transparent corneal auxiliary incision was made at 3 o'clock position using a 1.0mm emulsification specialized knife under a surgical microscope, followed by injection of viscoelastic agent. The iris adhesion at 9-10 o'clock position was bluntly separated using a lens alignment hook, causing the pupil to expand to over 5.0mm (Figure 2). Inject viscoelastic agent again to maintain anterior chamber depth and intraocular pressure, then transfer to the femtosecond laser surgery room, perform femtosecond laser PI connection, contact with the cornea, activate suction (Dock), input parameters and other routine operations, and give the patient a capsule opening diameter design of 5.0mm and a 6-point splitting method (Figure 3). After the femtosecond laser was completed, the patient entered the phacoemulsification surgery room again, followed by routine disinfection and laying of sheets, application of mucous membranes to the eyes, disinfection of the conjunctival sac, flushing of the conjunctival sac with physiological saline, and making a transparent corneal main incision at 140 ° of the cornea with a 2.2mm ultrasound special knife. Routine phacoemulsification surgery was performed, with SN6AT5 and 24.0D intraocular lens implanted, with an axial position of 18 °. IA was used to wash the anterior chamber viscoelastic agent, and the anterior chamber was formed. The anterior capsule opening was in the center, and the position of the lens was good (Figure 4). The intraocular pressure was TN.

5. Treatment outcomes, follow-up, and outcomes

On the first day after right eye surgery, the far vision was 0.8. The intraocular pressure is 14.0mmHg. Slit lamp examination: There is no edema in the cornea, the incision is well sealed, the central anterior chamber is 3CT, the peripheral area is 1.0CT, KP (-), the anterior chamber is sparkling (-), the pupils are large and round, sensitive to light reflection, the position of the artificial lens is in the center, and the

axis is good. On the 7th day and 1 month after surgery, the right eye had a distant vision of 0.8, normal intraocular pressure, anterior chamber KP and flicker (-), dilated and round pupils, sensitive to light reflection, and an artificial lens in the center.

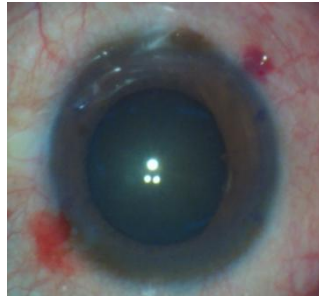


Figure 2. After blunt separation of posterior iris adhesion during surgery

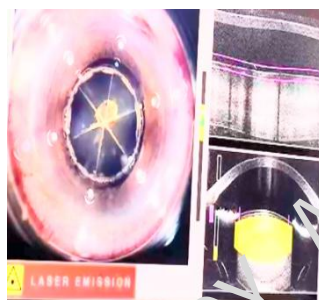


Figure 3. After femtosecond laser 6-minute splitting

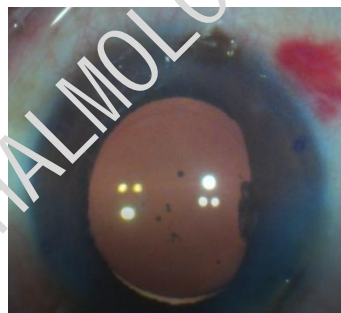


Figure 4. After FLACS combined with intraocular lens implantation surgery

Discussion

Cataract is the first blinding eye disease worldwide. According to statistics from the World Health Organization, cataracts accounted for 51% of blinding eye diseases in 2010, and the global number of cataract patients reached 20 million^[2]. Surgery is the preferred treatment option for cataracts. FLACS not only demonstrates advantages in conventional cataract surgery, but also provides a safer surgical approach for complex cataracts. However, FLACS has many relative contraindications, such as orbital diseases, eyelid stenosis, eyelid deformation, corneal diseases, presence of other substances in the anterior chamber, pupil size, and other factors that affect normal operation^[3].

In this case report, a polarized membrane was observed at 3 o'clock on the patient's iris before surgery, with posterior adhesion at 1-5 o'clock on the iris and fixed reflection of light. The pupil was not round, and after dilation, the pupil appeared in a

D-shaped shape with a diameter of about 4mm, less than 5.0mm, which was still lower than the tear diameter. Tearing the capsule was difficult, and there was an increased risk of anterior capsule rupture, residual crystalline cortex, and vitreous loss after surgery. To address this issue, we have changed the routine FLACS surgical sequence from femtosecond laser phacoemulsification to first performing a lateral incision - injecting viscoelastic agents - bluntly separating the iris and then adhering - minute second laser phacoemulsification combined with intraocular lens implantation. Not only does it solve the problem of small and irregular pupils, making it impossible to perform femtosecond laser assisted surgery, but it also perfectly solves the problem of posterior iris adhesion. The use of a side incision and a posterior iris adhesion separation incision as the same incision during surgery avoids damage to the cornea when making corneal incisions with iris hooks, reduces the number of corneal incisions, and reduces corneal surgery induced astigmatism caused by corneal incisions [4-6]. During the FLACS process, it was also found that the anterior chamber was filled with viscoelastic agents, and PI docking and negative pressure suction had no significant effect on the sealing of the contralateral incision, and had no effect on laser energy attenuation. The depth of the anterior chamber and intraocular pressure did not show significant changes [7]. After surgery, the observation showed that the anterior capsule opening was in the center, the crystal position was in the center, the astigmatism axis of the artificial lens was good, and the anterior chamber flicker and KP were (-). There were no obvious complications after surgery. This surgical method has been clinically observed to be safe and feasible, and it is hoped that there will be more cases in clinical work to further verify its safety and practicality. Expanding more methods for FLACS in complex cataracts, providing suitable surgical plans for patients, and improving postoperative visual quality.

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