

CO₂ laser-assisted sclerectomy surgery and trabeculectomy combination therapy in Peters' anomaly-related glaucoma: a case report

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Dear Editor,

We present the first patient with Peters' anomaly-related glaucoma undergoing CO₂ laser-assisted sclerectomy surgery (CLASS) and trabeculectomy combination therapy. Peters' anomaly is a complex congenital eye disease, which is categorized as dysplasia of anterior segment. It often presents as diffuse corneal edema and a central corneal opacity^[1]. It's thought to be caused by genetic factors, environmental factors, or both^[2]. According to the studies about embryology of Peters' anomaly, it is characterized by mesenchymal dysgenesis of the ocular anterior segment, including congenital glaucoma^[3]. However, glaucoma is not an unusual finding in Peters' anomaly, and there are only few reports in the literature regarding the treatment of Peters' anomaly-related glaucoma and most researchers agree that Peters' anomaly-related glaucoma is treated with difficulty. The purpose of the letter was to evaluate the surgical outcomes of CLASS and trabeculectomy combination therapy in treating Peters'

anomaly-related glaucoma at our hospital. We obtained the written informed consent from the patient, and this case study is in accordance with the tenets of the Declaration of Helsinki.

A detailed case report was conducted of one patient who was diagnosed as Peters' anomaly-related glaucoma with failed trabeculectomy. The patient was born on March 3, 2018 after a 40-week pregnancy. The congenital anomalies of cornea were observed by the doctors on the first day of life. Examination under anesthesia revealed high pressure in her both eyes. The details of ultrasound biomicroscopy and B-scan ultrasonography were shown in Figures 1 and 2. The child was diagnosed as having congenital glaucoma with anterior segment abnormalities and binocular congenital leukoplakia. At the same session, a trabeculectomy, peripheral iridotomy and anterior chamber angioplasty were performed in both eyes to reduce intraocular pressure (IOP). In addition to this, a penetrating keratoplasty was performed in the right eye. The postoperative IOP was well controlled. However, after 3d, binocular IOP gradually rose again (20-25 mm Hg). The child was treated with brinzolamide and latanoprost, but the IOP was still poorly controlled. For further diagnosis and treatment, they came to our hospital.

On presentation, she had binocular nystagmus and couldn't cooperate with vision checking. Applanation pressure measured was 29 mm Hg in the right eye and 28 mm Hg in the left eye. For the right eye, the corneal graft was transparent with iris deficiency. The lens was not fully developed with a cup disk ratio of 0.6. Her left eye showed a central corneal opacity, which made it impossible to observe the anterior chamber and fundus (Figure 3). Axial lengths measured were 21.92 mm in the right eye and 21.69 mm in the left eye. No systemic anomalies were detected during the pediatric examination. There are several issues worth discussing for the next treatment of this patient.

WHICH EYE SHOULD WE OPERATE ON FIRST?

There are some reasons for choosing the right eye first. First, a clear optical axis was established after penetrating keratoplasty on right eye, which made it possible to observe the changes of fundus examination. Additionally, long-term high IOP could

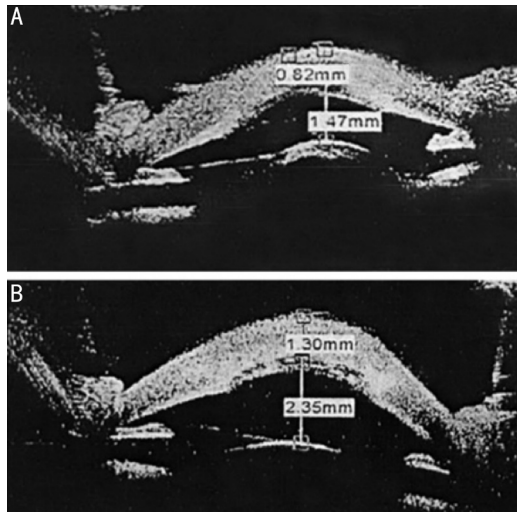


Figure 1 Ultrasound biomicroscopy for both eyes A: Right eye; B: Left eye. It showed binocular corneal opacity, closed all-round anterior chamber angle, and poorly observed all-round lens suspensory ligament. The depth of the anterior chamber was 1.47 mm in the right eye and 2.35 mm in the left eye.

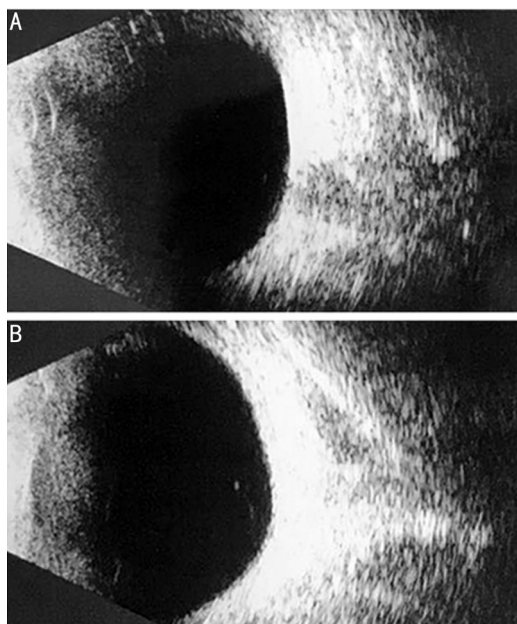


Figure 2 B-scan ultrasonography for both eyes A: Right eye; B: Left eye. It revealed binocular mild vitreous opacity.

cause damage to the function of corneal endothelia, which would affect the corneal transplantation on the right eye. Therefore, it's better to perform surgery on the right eye first. On the other hand, others suggested doing an operation on the left eye first for the following reasons. First, it was not long after the operation on her right eye, so it's better to wait for the right eye to recover before surgery. Most importantly, surgical interventions are always associated with a high risk of severe complications, so we can get more surgical experience from left eye operation, which would improve the success rate of right eye surgery. Because of the above, we decided to perform operation on the left eye first.

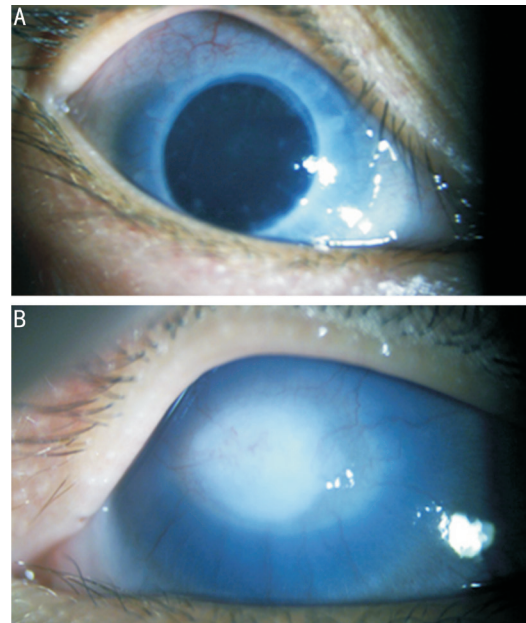


Figure 3 Anterior segment image for both eyes A: Right eye; B: Left eye. It showed that the corneal graft was transparent with iris deficiency in the right eye. The lens was not fully developed with a cup disk ratio of 0.6. Her left eye showed a central corneal opacity, which made it impossible to observe the anterior chamber and fundus.

WHICH KIND OF SURGERY SHOULD WE CHOOSE?

The patient has received a trabeculectomy, peripheral iridotomy and anterior chamber angioplasty on both eyes, but it failed. There are a great many possible reasons for the surgical failure. On one hand, it's difficult to operate on the eye with abnormal anatomy due to anatomical characteristics of Peters' anomaly-related glaucoma. On the other hand, it's prone to scarring for newborns, which could reduce the effectiveness of surgeries^[4]. However, it can be more difficult to decide on a next step and control IOP after the surgical failure. Recently, owing to many serious potential complications from trabeculectomy, some researchers suggest that nonpenetrating deep sclerectomy surgery (NPDS) may be the most appropriate and effective procedure in mild to moderate cases of primary congenital glaucoma^[5]. However, few reports have focused on NPDS in Peters' anomaly-related glaucoma. CLASS is an alternative method for the most difficult portions of the manual NPDS. CO₂ laser energy has been found useful in sclerectomy as it provides accurate ablation of dry tissues and is absorbed by fluid^[6]. Moreover, during the manual dissection, when the aqueous humor exudes, its effect stops, thus avoiding perforation. Therefore, many researchers believe that CLASS is a recent modification of NPDS and has been widely regarded as a new way to overcome the technical difficulty of the manual technique^[5-7]. However, there is no literature reporting CLASS in Peters' anomaly-related glaucoma. In this report, we performed CLASS and trabeculectomy combination therapy on the left eye.

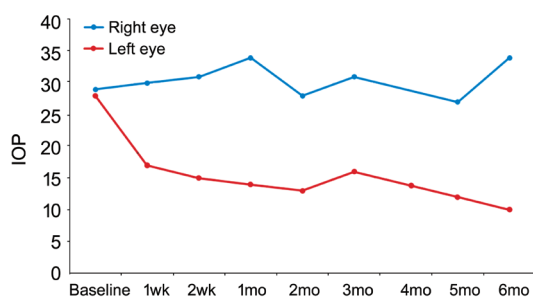


Figure 4 During the full follow-up period of 6mo, IOP remained stable in left eye, however, the IOP in right eye was still under poor control.

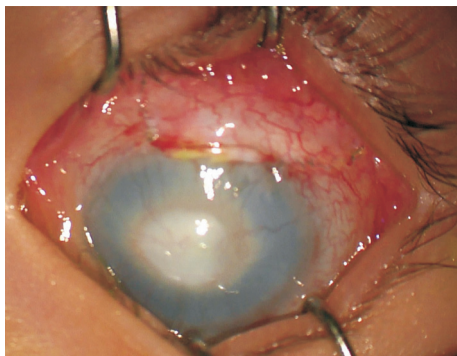


Figure 5 Anterior segment image for the left eye. It showed the upper temporal filtering bleb bulged well and the IOP of the left eye was controlled satisfactorily.

WHAT SHOULD WE PAY ATTENTION TO AFTER SURGERY?

For postoperative medications, we gave Tobradex eye drops to the patient every 1h tapered at the first 4wk and atropine 0.5% twice daily for 2wk, as well as adjusted the dosage according to the condition. We checked the patient on the first postoperative day with a portable slit lamp to evaluate corneal haze, anterior chamber depth and any potential complication. However, the central corneal opacity made it impossible to observe the fundus. IOP was estimated by Goldman's applanation tonometry. Routine postoperative visits were performed at the 1st week, the 2nd week, the 1st month, the 2nd month, the 3rd month, the 4th month, the 5th month and the 6th month. During the full follow-up period of 6mo, IOP remained stable in left eye (IOP \leq 21 mm Hg without glaucoma medications). The details were shown in Figure 4. No any other complications

were observed (Figure 5).

All in all, this case suggests that CLASS and trabeculectomy combination therapy may be a feasible surgical therapy for Peters' anomaly-related glaucoma after failed trabeculectomy, being to the best of our knowledge, the first report on this topic. We need further analysis in larger case series to assess long-term treatment modalities and outcomes.

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