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BRIEF COMMUNICATION

High Resolution Ultrasonography in Eyes with Angle-Closure Glaucoma Associated with the Cicatricial Stage of Retinopathy of Prematurity

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Abstract

Background: Angle-closure glaucoma in children at the cicatricial stage of retinopathy of prematurity (ROP) has been thought to be caused by the anterior displacement of the lens–iris diaphragm resulting from contraction of a retrolental fibrous membrane. Other possible mechanisms include pupillary block and ciliary block.

Cases: Three patients (three eyes) at the cicatricial stage of ROP with angle-closure glaucoma were examined by high-resolution ultrasonography before and after peripheral iridectomy.

Observations: High-resolution ultrasonography preoperatively showed that the angle was closed. A retrolental fibrous membrane was attached behind the lens. After the iridectomy, ultrasonography showed an open angle, and the intraocular pressure was normal.

Conclusions: The angle closure in our three patients was caused mainly by a pupillary block and could be treated by peripheral iridectomy. **Jpn J Ophthalmol** 2005;49:312–314 © Japanese Ophthalmological Society 2005

Key Words: angle-closure glaucoma, cicatricial stage of retinopathy of prematurity, high-resolution ultrasonography, retrolental fibrous membrane

Introduction

Angle closure is rare in children; however, it is a well-recognized complication in eyes of patients with retinopathy of prematurity (ROP) at the cicatricial stage.[1] It has been postulated that the pathogenesis of this condition is the anterior displacement of the lens–iris diaphragm by the contraction of a retrolental fibrous membrane (RLF).[1–3] These eyes have been reported not to respond to peripheral iridectomy, which is effective for pupillary block, but to require treatment by lensectomy.[3,4] In addition, a ciliary block mechanism has also been proposed for angle closure because of the effectiveness of cycloplegic therapy.[5]

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The morphological appearance of the anterior and posterior segments of ROP eyes at the cicatricial stage has not been determined, although ultrasound biomicroscopy has been used in one patient with angle closure.[1] We report the findings of high-resolution ultrasonography in three patients (three eyes) with ROP at the cicatricial stage who had secondary angle-closure glaucoma and were successfully treated with peripheral iridectomy.

Case Reports

High-resolution ultrasonography (RION, Tokyo, Japan) was performed on three ROP patients (three eyes) with angle-closure glaucoma. The procedure was carried out with a 15- and a 30-MHz probe under general anesthesia before peripheral iridectomy and while the patient was asleep after surgery. The clinical characteristics of the patients are shown in Table 1.

Table 1. Patient characteristics

Case	Birth weight (g)	Gestational age (weeks)	Stage of ROP	Therapy for ROP	Age at iridectomy (months)	IOP preop (mmHg)	IOP postop (mmHg)
1	760	24	Threshold ROP with plus disease	Photocoagulation, cryopexy	9	22	14
2	1162	28	Stage 4	Photocoagulation, encircling, buckling	24	31	13
3	756	26	Stage 4	Photocoagulation, cryopexy	72	43	5

ROP, retinopathy of prematurity; IOP, intraocular pressure; preop, preoperation; postop, postoperation.

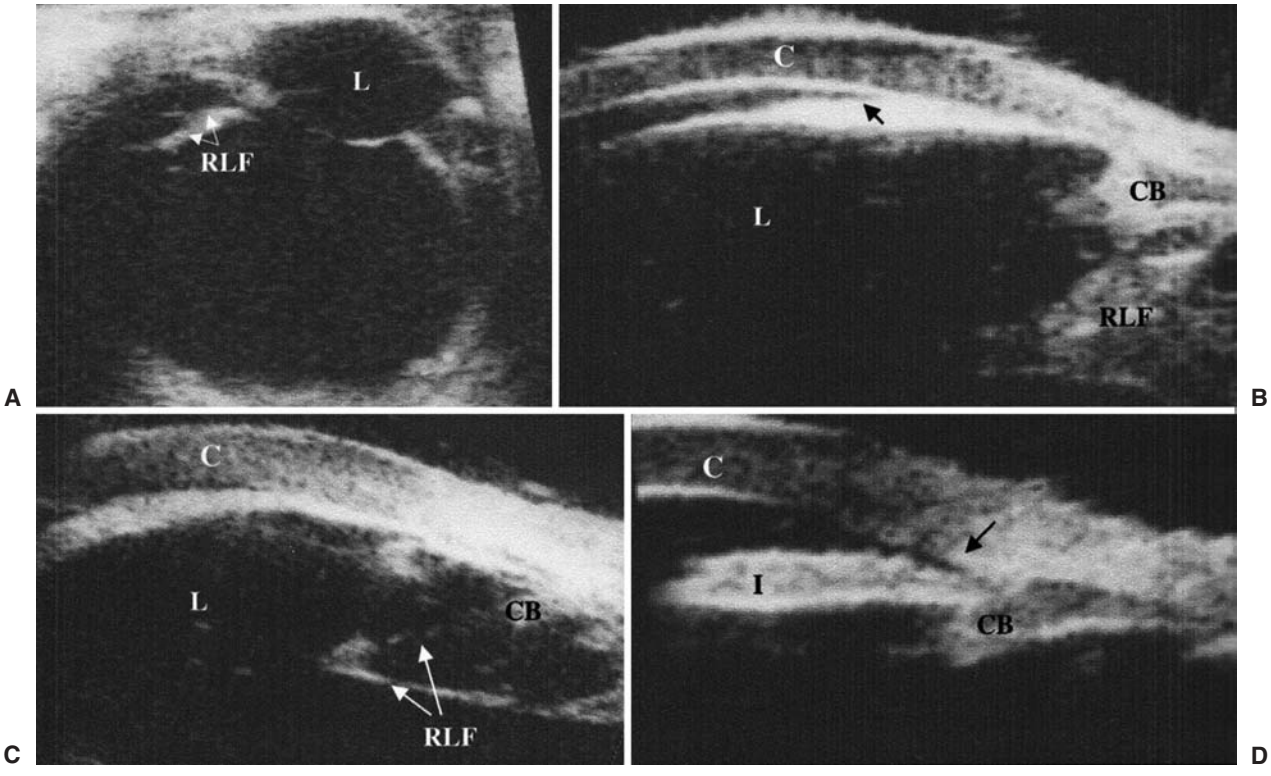

Figure 1. **A** High-resolution ultrasonogram using the 15-MHz probe. A forward shift of the lens–iris diaphragm can be seen (case 1). **B** Ultrasonogram using the 30-MHz probe demonstrating the angle closure (*arrow*) (case 2). **C** A retrolental fibrous membrane appears to push the lens forward (case 3). **D** The angle is open after iridectomy (*arrow*) (case 3). *L*, lens; *RLF*, retrolental fibrous membrane; *C*, cornea; *CB*, ciliary body; *I*, iris.

The preoperative ultrasonographic images demonstrated an extremely shallow anterior chamber with a retrolental fibrous membrane (RLF) attached to the lens (Fig. 1A). The angle closure was even more clearly visible in the images obtained with the higher resolution 30-MHz probe (Fig. 1B, C). The angle closure appeared to be caused by the anterior displacement of the lens–iris diaphragm, which was pushed forward by the RLF.

The parents were informed that the angle closure and resulting increased intraocular pressure (IOP) would require treatment, and informed consent was obtained for the pre- and postoperative examinations and for the peripheral iridectomy as the first choice for surgery. The three eyes were treated with peripheral iridectomy, and it was noted that the angle was open immediately after the iridectomy.

Ultrasonography performed 2 weeks after surgery confirmed that the angle was open (Fig. 1D), and the IOP had decreased. The reduced IOP was maintained during the follow-up of between 15 to 27 months (Table 1).

Comments

High-resolution ultrasonographic observations demonstrated angle closure in the three eyes at the cicatricial stage of ROP. The RLF was attached behind the lens, and the

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lens–iris diaphragm seemed to be pushed forward. Peripheral iridectomy was effective in lowering the intraocular pressure during the follow-up period of between 15 to 27 months (Table 1).

Peripheral iridectomy has been reported to be effective in young adults with angle-closure glaucoma at the cicatricial stage of ROP.[6,7] However, its effectiveness in infants and children has been reported to be very limited, because the main cause of the angle closure is a mechanical pushing forward of the iris–lens diaphragm by a contraction of the RLF.[3] A ciliary block was also considered in our three patients; however, 0.5% atropine sulfate, 0.5% tropicamide, and 0.5% phenylephrine hydrochloride were not effective.

In conclusion, our three patients had angle-closure glaucoma caused mainly by pupillary block. They were successfully treated with peripheral iridectomy, although anterior displacement of the lens–iris diaphragm by the RLF was confirmed by high-resolution ultrasonography.

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