· Original article ·

Surgical staging as a therapy for retinopathy of prematurity

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治疗早产儿视网膜病变的一种新思路:分期手术

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Dear Sir,

We are Dr. Yu J, and Dr. Zhang Q, from Department of Ophthalmology, Xinhua Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai, China. We write to present a case report of a novel therapy concept: staged surgery as a therapy for retinopathy of prematurity (ROP).

ROP is a neovascular retinal disorder. It can affect the vision of infants of low birth weight and young gestational age. Serious ROP can progress to childhood loss of vision, even blindness. Consequently, early screening and therapy are curial for infants with a low birth weight.

However, when the retinas of these infants begin to detach and/or progress to stage 4 or 5, surgical interventions are the only effective choice for retinal reattachment and foveal formation.

ROP can be categorized according to the international classification of retinopathy of prematurity revisited. In brief, this ROP classification includes the following stages: stage 1, demarcation line; stage 2, ridge; stage 3, extraretinal fibrovascular proliferation; stage 4, partial retinal detachment; and stage 5, total retinal detachment[1].

Thecurrent surgical operation for stage 4 or 5 ROP includes vitrectomy with or without lensectomy[2-4]. There are several potential complications during these stages, such as corneal opacity, the disappearance of anterior chamber, occlusion of the pupil and secondary glaucoma, all of which could increase the difficulty of the operations or even cause them to fail. Based on our previous clinical experience, we have attempted to apply a novel therapy concept, staged surgery, to improve the chance of success. Following out clinical observations, we believe that this type of surgical method could be used to help treat stage 4 or 5 ROP.

The patient was a female infant who was born at 28wk gestation and at a birth weight of 1800 g[2]. The baby was 2 months old and weighed 5000 g when she was first taken to see the doctor on this condition. She was screened for stage 5 ROP following a clinical evaluation. Her symptoms included corneal opacity, anterior chamber disappearance and retinal detachment. The baby was submitted to surgery after obtaining informed consent from her parents. The ophthalmologist implemented the surgical therapy in two steps. Stage 1 surgery included closed lensectomy and was associated with anterior vitrectomy. Stage 2 surgery included closed vitrectomy

During stage 1 surgery, three limbal paracentesis procedures were applied at the 8:00, 10:00 and 2:00 positions. Viscoelastic substance was injected to achieve separation of the pupil adhesion, and remove then. The lens and anterior vitreous were then removed by vitreous cutter (Figure 1).

Medication was administered to maintain the retina following the stage 1 surgery. A local application of glucocorticoid ophthalmic ointment or eye drops, such as TobraDex® or Pred Forte®, or intravitreal injection, such as ranibizumab (Lucentis®) or triamcinolone acetonide, was applied to maintain the retina[5,6]. Nearly 1mo later, the cornea of the infant became transparent, and the intraocular vascular activity subsided. These events signaled the time for stage 2

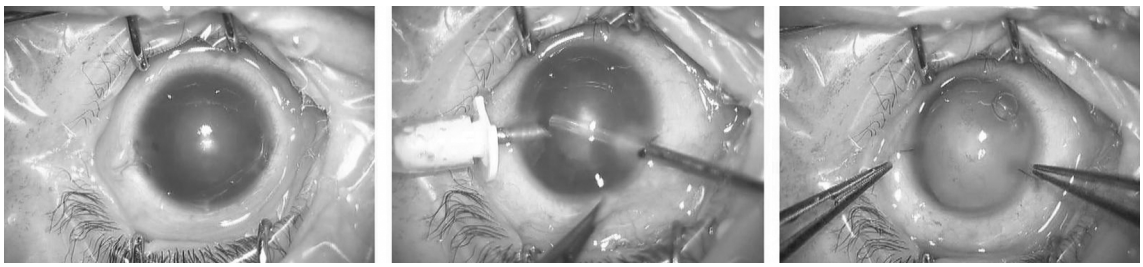

Figure 1 Procedures of stage 1 surgery.

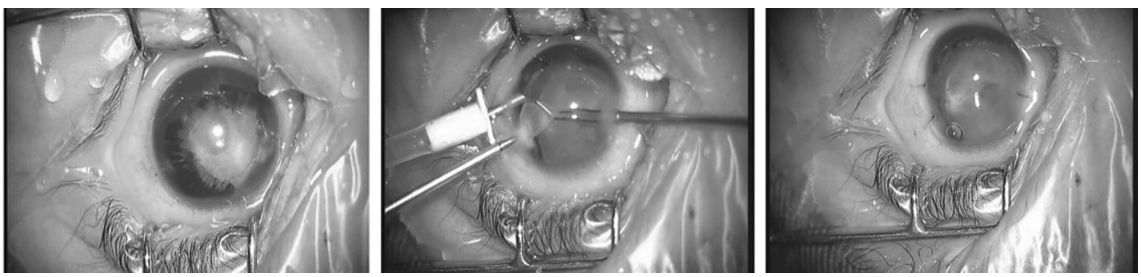

Figure 2 Procedures of stage 2 surgery.

surgery: closed vitrectomy. The proliferative membranes and the residual vitreous were removed. Viscoelastics were also injected to achieve retinal reattachment (Figure 2).

In premature infants, the neural retina and retinal vasculature are immature. After the birth of these infants, retinal development becomes overactive. Furthermore, the intake of high-concentration oxygen could accelerate this symptom[7,8]. More severe manifestations of these diseases include neovascularization and subretinal/intraretinal hemorrhage exudate. The vascularized preretinal membranes that can give rise to a series of diseases, such as retinal folds, macular ectopia, retinal detachment, secondary glaucoma and the anterior chamber missing. Surgery is the only method available to treat these serious symptoms. Based on our pre-clinical research, we found that vitrectomy was hard to perform successfully because of these complications. As a result, we attempted to implement the operation in two steps. The first step involves "saving" the cornea. During stage 1 surgery, we only cut the lens and anterior vitreous to reconstruct the anterior chamber. After this operation, pharmacotherapy was applied. We frequently use a local application of glucocorticoid ophthalmic ointment or eye drops, such as TobraDex® or Pred Forte® , or an intravitreal injection, such as ranibizumab (Lucentis®) or triamcinolone acetonide, to maintain the retina after stage 1 surgery[7,8]. The ophthalmologist must check the infant regularly during this time. The medications help treat retinal anti-angiogenesis. This process usually continues for one or two months. When the retina transitions from "active" to "inactive," it is time for stage 2 surgery.

Currently, many ophthalmologists agree thatlens-sparing vitrectomy fails to prevent the progression of retinal detachment in cases of aggressive posterior ROP due to insufficient removal of the vitreous gel at the vitreous base, compared with lensectomy with vitrectomy in which the gel is completely removed[9,10].

Furthermore, advanced ROP can involve seriouscomplications, such as corneal opacity, anterior chamber disappearance, occlusion of the pupil, secondary glaucoma, or intraocular vascular activity that has not yet subsided. All these complications increase the difficulty of surgery. Vitrectomy with lensectomy is less prone to failure due to surgical damage and complications. Consequently, the choice of surgical timing and method are critical.

Compared with the formerly applied methods, we believe that staged surgery is an appropriate choice for the treatment of advanced ROP.

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