Scleral Perforation After Scleral Buckling Surgery for Retinopathy of Prematurity

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Scleral perforation occurred as a result of using a silicone band during scleral buckling surgery for subtotal retinal detachment in retinopathy of prematurity (ROP). The patient was initially treated by cryotherapy and scleral buckling surgery for ROP, and was later referred due to a dark bluish mass in the superotemporal quadrant of the eyeball. After removing the overlying whitish membrane, uveal tissue prolapsed through the melted scleral wound (5mm x 5mm). A silicone encircling band had passed through the wound and was exposed subconjunctivally around the temporal and the inferior limbus. The band was removed and a scleral allograft was performed. After three years, follow up revealed the eyeball was slightly microphthamic. Though scleral buckling surgery is helpful for the treatment of advanced ROP, a scleral perforation may develop as a disastrous complication.

Key words: retinopathy of prematurity, scleral buckling surgery, scleral perforation

INTRODUCTION

The treatment of retinopathy of prematurity (ROP) consists of cryotherapy\textsuperscript{1,2} or indirect laser photocoagulation\textsuperscript{3} for acute threshold cases, scleral buckling surgery\textsuperscript{4-6} for retinal detachment, and delamination surgery\textsuperscript{7} for funnel-shaped total retinal detachment. Cryotherapy or laser photocoagulation is used to ablate extensive areas of avascular retina, to induce the involution of widespread extraretinal fibrovascular proliferation. Retinal detachments found in ROP are mainly tractional type. For the purpose of relieving vitreous traction and minimizing the sequelae of cicatricial ROP, scleral buckling surgery, using a silicone band, can be performed, in some cases, this can be used in combination with cryotherapy.\textsuperscript{8,9} During buckling surgery, anterior chamber paracentesis or subretinal fluid drainage is usually performed in order to cause a high buckle effect and prevent a rise in intraocular pressure.\textsuperscript{4,6} We report a case which showed scleral perforation after scleral buckling surgery for ROP. To the best of our knowledge, this has not been previously reported in ROP eyes.

CASE REPORT

A premature female, born after a gestational period of 29 weeks and with a birth weight of 1370 gm underwent her first ophthalmologic examination when she was 4 weeks old. This showed that in both eyes, vascularized retina was within zone I only. Retinal vessels were dilated and tortuous, extraretinal fibrovascular proliferation and vitreous hemorrhage were also apparent. Due to progressive stage 3 plus ROP, bilateral cryotherapy was undertaken 5
weeks after birth. Both retinas were found to be progressing towards funnel-shaped detachment, and additional scleral buckling surgery, using a silicone band, was performed on her left eye 6 weeks after birth. After surgery, her eyes were unremarkable except for bilateral retinal detachment.

However, nine weeks after surgery, her parents noticed a dark bluish mass in her left eye, and 15 weeks after birth she was referred to us for further evaluation. Examination showed that she was completely unable to fix and follow a light; leukocoria due to retrolental fibrovascular membranes, was present in both eyes. In the superotemporal portion of the left eyeball, it was found that uveal tissues and the overlying fibrinous membrane were bulging out of the eyeball, and that a silicone band which have previously encircled the eye was seen beneath the conjunctiva (Fig. 1). Believing that scleral perforation had occurred, the fibrinous membrane was removed. It was disclosed that 5 mm x 5 mm of sclera melted out and the uveal tissues allowed to protrude through the scleral defect. The scleral edge of the defect was smooth but very thin compared to other portions of the sclera. The silicone band was covered with the membrane, and had migrated subconjunctivally to near the temporal and inferior limbus (Fig. 2). The left eye showed severe hypotony, a flat anterior chamber, and a totally detached retina. To save the eyeball, the band was removed and an allograft, using preserved human sclera from an eyebank, was performed on the defective scleral area. Tenon’s capsule and the conjunctiva were cautiously sutured.

One month after grafting, anterior chamber depth and ocular tension were normal and there was no sign of inflammation in the conjunctiva, cornea, or anterior chamber. When the patient was three years old, examination showed that the left eyeball was slightly microphthalmic.

**DISCUSSION**

Intraocular intrusion of sutures or the anterior migration of a silicone encircling band have been reported as unusual complications of retinal detachment surgery, but there has been no report of complications arising during the follow-up period after scleral buckling surgery for ROP eyes. Noorily et al. reported a case of a cataract with pupillary block glaucoma 6 months after scleral buckling surgery for stage 4B ROP, but this complication could be present at stage 4B or 5 ROP without surgery. Our case is the first report of scleral perforation after scleral buckling surgery for ROP.

The Multicenter Trial of Cryotherapy for ROP (CRYO-ROP) study indicated cryotherapy was beneficial to eyes with threshold ROP. This treatment may, however, involve complications, and in eye surgery, these include conjunctival laceration, pseudopterygial growth, and retinal and vitreous hemorrhage. Greven et al. reported three cases in which rhegmatogenous retinal detachment followed transscleral cryotherapy for stage 3+ ROP with a threshold disease level. Furthermore, the histopatho-
logic findings of avascular retina and retinal vascularization in eyes treated with cryotherapy are poorly documented, and transconjunctival or transscleral cryotherapy may also damage the sclera.

The sclera of a premature eye is thinner and more fragile than that of an adult, which means that during scleral suture fixation there is a risk of scleral puncture. Moreover, multiple cryotherapy makes the sclera thinner than normal. This can be clinically observed as the thin sclera is blue, and in such an eyeball there is a high risk of scleral perforation if the band is pulled too tightly.

As shown in our case, ROP eyes in which zone I disease was first observed progressed rapidly and resulted in severe tractional retinal detachment. The CRYO-ROP study showed that in zone I ROP, the beneficial effect of cryotherapy was limited to a reduction in the unfavorable anatomic outcome rate from 92% to 75%, as observed after a follow-up period of three months. To reduce the incidence of unfavorable outcomes, lowering the threshold criteria or early treatment of prethreshold posterior ROP has been suggested. Cryotherapy or laser photocoagulation combined with scleral buckling surgery may also be applicable to zone I ROP. In any case, prior to performing scleral buckling surgery in ROP eyes, the possible complications should be considered.

The anatomical and functional results of scleral buckling surgery for advanced ROP may be improved if the procedure is carried out without undue delay. In premature eyes, especially those which undergo multiple cryotherapy, great caution should be exercised during scleral suture fixation. And high intraocular pressure, after tightening the band, should be avoided during scleral buckling surgery. Otherwise, the tightened band may erode the thin sclera and perforate it, with resultant disastrous complications, including the loss of the eyeball.

REFERENCES


