Preserved scleral patch graft for unexpected extreme scleral thinning found at the scleral buckling procedure: A case report

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Pre-existing scleral pathology is an important risk factor for globe rupture during scleral buckling procedures. We report here, the surgical management of an unexpected scleral pathology found at the scleral buckling procedure in a retinal detachment patient. A 77-year-old white female with retinal detachment underwent a scleral buckling procedure. The surgery was converted into a scleral graft procedure, as extreme scleral thinning was found intraoperatively. An alcohol-preserved donor sclera graft was used. The second surgery for definitive retinal alignment was performed two weeks later. The presented case of an unexpected scleral pathology in a retinal detachment patient was managed with a combination of scleral grafting and pars plana vitrectomy, without any major complications. The anatomical outcome was excellent and the scleral rupture was prevented; the visual outcome was satisfactory. A conversion of the scleral buckling procedure into a scleral graft procedure has proved to be safe and effective for unexpected scleral pathology.

Key words: Donor sclera, globe rupture, scleral patch graft

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Pre-existing scleral pathology is a major risk factor for globe rupture during scleral buckling procedures.[1] Severe complications such as globe distortion, proliferative vitreoretinopathy, and subretinal hemorrhage can result from globe rupture during scleral buckling.[1] The anatomical and visual outcome after such an event is generally poor. Surgical reinforcement of the pathologically thinned sclera improves the tectonic stability of the globe and helps prevent globe rupture.[2,3]

Case Report

A 77-year-old female patient presented with a three-day history of flashes of light, floaters, and vision loss in the right eye. Apart from this, the patient's ocular history was unremarkable as was the medical history, except for the use of an antihypertensive medication. On examination, her uncorrected visual acuity (UCVA) in the right eye was hand motions (HM) and her best-corrected visual acuity (BCVA) in the left eye was 20/30 (- 1.0 sphere/ - 2.75 at 60° cylinder). Intraocular pressure was 13 mmHg in the right eye and 16 mmHg in the left eye. Slit-lamp examination revealed 1+ nuclear sclerotic cataract in both eyes. Fundus examination of the right eye revealed a macula involving rhegmatogenous retinal detachment extending from the six o'clock to the one o'clock position, with a horseshoe tear at the nine o'clock position. Fundus examination of the left eye was unremarkable.

A scleral buckling procedure under general anesthesia was planned for retinal detachment repair. Limbal conjunctival peritomy and blunt episcleral dissection were carried out. The lateral, superior, and medial rectus muscles were exposed and looped. When the rectus muscles were retracted, extreme scleral thinning with visualization of the underlying uvea was discovered. The defect extended from the nine o'clock to the three o'clock positions in the upper quadrants, from the muscle insertions to the equator of the globe [Fig. 1a and b]. Due to a high risk for globe rupture, with additional surgical manipulation, the scleral buckling procedure was stopped and converted into a scleral reinforcement procedure with a scleral patch graft. Donor scleral material preserved in alcohol was soaked in normal saline for 15 minutes, cut along its natural curvature, and tailored into a 40 mm long and 10 mm wide graft to fit the curvature and the size of the scleral defect. The graft was placed underneath the exposed rectus muscles to cover the entire defect. The graft was sutured to less thinned areas of the host with positional interrupted 8-0 nonabsorbable sutures and additional interrupted 7-0 absorbable sutures. The conjunctiva was then re-approximated at the limbus to entirely cover the graft, sclera and muscles. Pad and bandage, topical steroids, and antibiotics were prescribed postoperatively.

Post-operatively, total retinal detachment developed in the right eye. An ultrasound examination revealed a normal globe contour and normal scleral thickness at the posterior pole. The axial lengths were 24.16 mm on the right eye and 25.36 mm on the left eye.

A combined phacoemulsification with lens implantation and three-port pars plana vitrectomy for definitive retinal alignment was planned a week after the scleral patch graft procedure. However, due to the patient's systemic condition, the second operation had to be delayed for another week. The standard 20G three-port vitrectomy was carried out. The sclera and the scleral graft were exposed [Fig. 2a]. Three sclerotomies were completed 3.5 mm behind the limbus and anterior to the graft, where the sclera was less thin. Repair of the retinal detachment was performed using perfluorocarbon liquid, simultaneous subretinal fluid aspiration, endolaser around the tear, and 360° of the retinal periphery and silicone oil placement. Satisfactory retinal alignment was achieved. The sclerotomies were sutured and the conjunctiva re-approximated at the limbus.

Five days after vitrectomy, the patient's UCVA in the right eye was finger counting and intraocular pressure was 13 mmHg. The vitreous cavity was filled with silicone oil and the retina was attached.

At the three-month follow-up, BCVA of the right eye was 20/100 (+ 4.50 spheres). Intraocular pressure was 12 mmHg. The globe was of normal shape and the scleral patch was visualized under the conjunctiva in the upper quadrants [Fig. 2b]. The retina remained fully attached [Fig. 3]. The patient was scheduled for silicone oil removal.

Discussion

Scleral pathology is one of two major risk factors for globe rupture during retinal detachment surgery; the second is reoperation after a failed retinal detachment surgery.[1] In this reported case, we started a scleral buckling procedure for rhegmatogenous retinal detachment, but surprisingly encountered extreme and extensive scleral thinning. We considered all possible causes of such thinning in our patient, retrospectively.[2] There was no history of previous eye surgeries, eye trauma or alkali burn, eye infection or inflammations or any rheumatic history. There are few diagnostic procedures that should be conducted if scleral thinning is suspected preoperatively, which however, is not routine in patients with simple retinal detachment and visible retinal tear. Ultrasound biomicroscopy is used to evaluate the anterior sclera. Ultrasound examination, ocular coherence tomography, and computed tomography are used for the evaluation of posterior scleral thinning. Irrespective to the scleral structure or possible pathology, two steps of the scleral buckling procedure carry a very high risk of globe perforation: episcleral dissection and tightening of the buckle.[1] Unaware of scleral pathology, we were fortunate not to encounter a complication during the episcleral dissection.

Different grafts have been proposed for managing scleral defects or tectonic instability of the eye. These include fascia lata, cartilage, cadaveric aortic tissue, tibial periosteum, synthetic Gore-Tex, skin, amniotic membrane, autologous sclera, and homologous sclera, which have been successfully used as scleral grafts.[2-5] Autologous preserved scleral patch graft has several advantages compared to the other proposed grafts, as scleral material is available from whole-eye donors, which can be preserved for months, is strong and flexible, has the natural curvature of the sclera allowing a better fit to

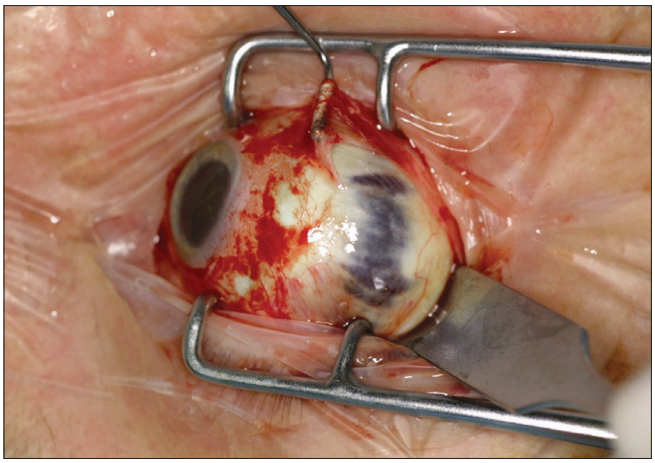

Figure 1a: Extreme scleral thinning from the equator to the line of the rectus muscle insertions in the upper quadrants of the globe; superior temporal aspect

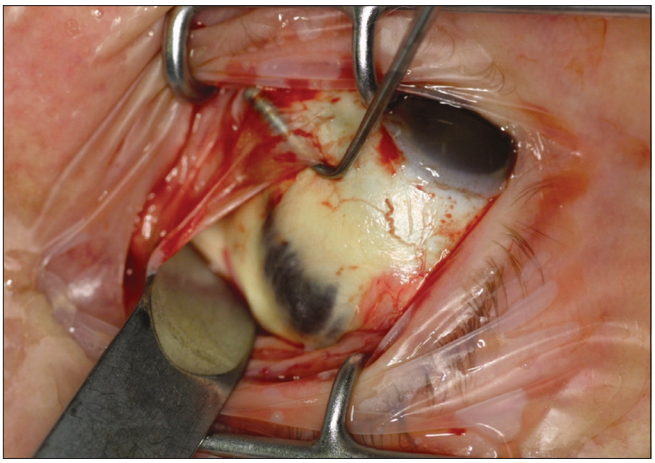

Figure 1b: Extreme scleral thinning, nasal aspect

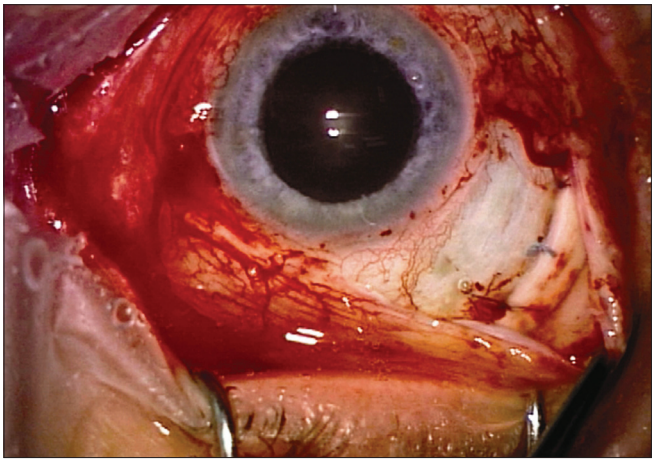

Figure 2a: Two weeks after the scleral patch graft procedure the scleral graft edge with sutures was exposed during the pars plana approach for vitrectomy (superior temporal quadrant of the globe). The scleral graft was in place with signs of epithelization

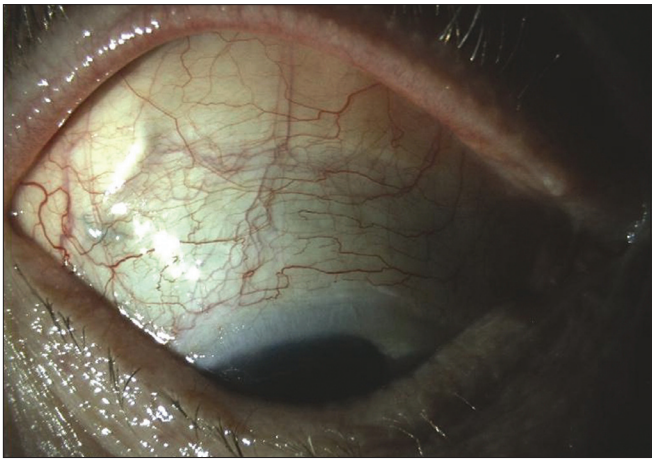

Figure 2b: At the three-month follow-up, the anterior part of the scleral graft and a suture were clearly seen under the conjunctiva, when the patient was looking down

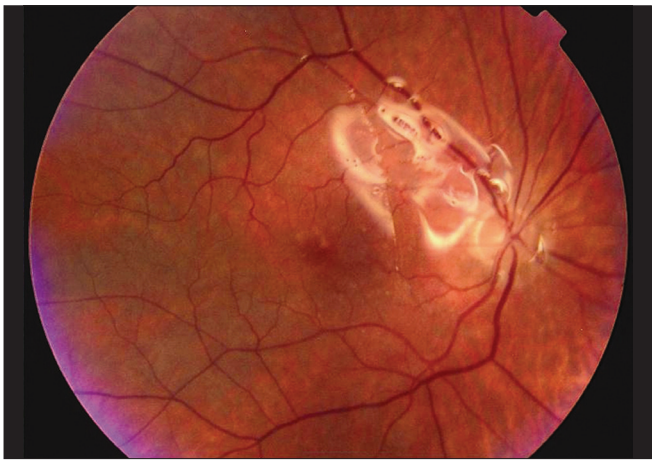

Figure 3: The fundus photography of the right eye at the three-month follow-up showing the silicon oil reflexes and fully attached retina at the posterior pole

the host defects, and is easy to handle. Donor sclera is well-tolerated by the host with little inflammatory reaction and rare rejections.[2] However, to avoid complications such as necrosis and melting of the graft, dehiscence, and postoperative endophthalmitis,[2,3] the avascular scleral patch graft must undergo epithelization and vascularization, which is stimulated with the conjunctiva covering, a free conjunctiva flap or an amniotic membrane graft.[2,4]

When significant scleral pathology is unexpectedly encountered intraoperatively, a conversion of the scleral buckling procedure into a scleral graft procedure, followed by delayed retinal detachment repair has proven to be safe and effective. For such and similar cases, a supply of donor sclera must be maintained.

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