

Posterior Scleral Buckle for Posterior Perforating Eye Injuries

Use of radial elements for these injuries reduced rates of retinal detachment.

BY KRISTINE K. PIERCE, MD; AND R. GARY LANE, MD

Ocular trauma is a leading cause of monocular blindness worldwide, with estimates of 500,000 blinding ocular injuries occurring annually.¹ Posterior penetrating injuries beyond the rectus muscle insertion planes are a known risk factor for poor visual prognosis.² A recent meta-analysis of published reports revealed a final visual acuity of worse than 5/200 in 44% of cases.³

A common cause for severe vision loss is thought to arise from proliferative retinopathy. Studies of the efficacy of prophylactic encircling scleral buckles have revealed lower rates of retinal detachments with use of these devices.⁴⁻⁶ To the best of our knowledge, however, there have been no human studies assessing the efficacy of very posterior radial scleral buckling procedures. In this article, we present three cases of a large radial sponge extending posteriorly to support the rupture site and exit wounds for prophylaxis of retinal detachment.

CASE STUDY 1

A 17-year-old man presented to Wilford Hall Medical Center, San Antonio, TX, having sustained a shotgun blast to the face. Two pellets were found perforating the globe near the optic nerve. There was a 6-mm radial scleral rupture beginning posterior to the medial rectus insertion and a shotgun pellet embedded in the scleral wall. A second pellet perforated the posterior eye wall just superonasal to the optic nerve and came to rest at the left orbital apex just lateral to the optic nerve. Vision was light perception with projection.

Primary management consisted of closure with removal of the shotgun pellet that was lodged within the scleral wall (Figure 1). This was followed 2 weeks later by secondary retinal repair. A Type 506 radial sponge was placed from the ora serrata to the optic nerve and secured with posterior mattress sutures to

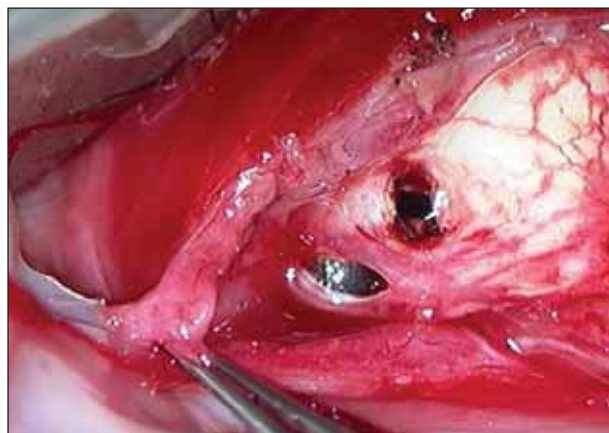


Figure 1. Case 1: Primary closure was performed, and the shotgun pellet was removed from the scleral wall.



Figure 2. Case 1: 1-year follow-up. The retina is attached despite significant chorioretinal scarring from the injury.

support the entrance and exit wound sites. Orbital fat also provided buckle height posteriorly. A pars plana vitrectomy (PPV) with lensectomy was performed to repair the retinal detachment. The exit wound and rupture sites were heavily cauterized, and a limited retinec-

tomy was performed with silicone oil injection.

Postoperatively, the patient developed severe superior and medial fibrosis surrounding the wound sites without retinal detachment due to the high posterior buckle. A large pucker developed temporally with macular traction. The patient underwent a final surgery to remove the radial element and repair the macular pucker. The silicone oil was removed, and an IOL was placed in the sulcus. Final visual acuity 12 months after the initial injury was 20/30 (Figure 2).

CASE REPORT 2

A 28-year-old man presented to Wilford Hall Medical Center after having sustained an open globe injury from a beer bottle fight. He was found to have a scleral laceration 13 mm posterior to the temporal limbus, extending approximately 20 mm posterior, just under the lateral rectus. The patient was able to count fingers at 3 feet.

Management consisted of primary closure followed by secondary repair 5 days later. A Type 506 radial sponge spanning the extent of the 20-mm laceration posteriorly was placed, followed by a PPV. Extensive endolaser was applied around the rupture sites and 360° in the far periphery with 14% C₃F₈. Figure 3 shows the reattached retina at 6 months after sponge placement, PPV, and endolaser. At 12 months after the initial injury, the patient's retina has remained attached with a visual acuity of 20/20-2.

CASE REPORT 3

A 20-year-old man presented to Wilford Hall Medical Center after sustaining an open globe injury due to a gunshot wound. Vision was light perception without projection, and a 2+ relative afferent pupillary defect was present. An anterior 5-mm laceration was identified with dense hyphema and vitreous hemorrhage. The posterior extent of the wound could not be identified on initial examination.

Management consisted of primary closure followed by secondary retinal repair 1 week later. A Type 506 radial sponge and Type 42 encircling element were placed, with the radial sponge extending over the wound site in the superotemporal quadrant. Mattress sutures were placed over the radial sponge as far back as possible. The remaining support came from the orbital fat supporting the exit wound through the macula. This was followed by PPV with lensectomy for retinal detachment repair. Extensive laser to the entrance and exit wound sites were performed followed by 5000 centistoke silicone oil placement.

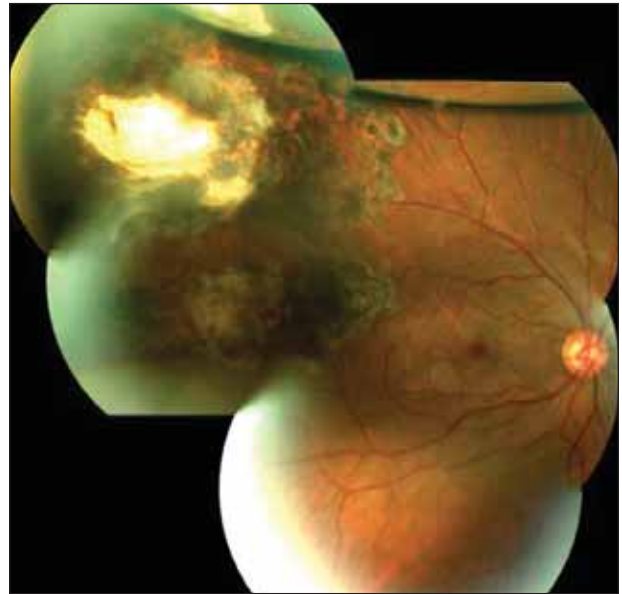


Figure 3. Case 2: Montage 6 months after surgery.



Figure 4. Case 3: 6-month follow-up after the initial surgery.

At 1-month follow-up, the radial sponge extruded. This was followed by an additional surgery for removal of the Type 42 band and anterior trimming of the radial sponge. Four months after the initial injury, the patient underwent a final surgery of radial sponge and silicone oil removal. The montage at 6-month follow-up shows the reattached retina (Figure 4). At the 2-year follow-up, the patient's retina remained attached. Given the extensive nature of the patient's injury, with fibrosis and scarring within the macula and periphery, his vision remains light perception.

DISCUSSION

Open globe injuries involving the posterior segment are known to have a poor visual prognosis. Many retinal surgeons advocate prophylactic encircling scleral buckles for prevention of retinal detachments. Detachment rates of 3.19% have been reported for those with encircling scleral

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buckles, with failure resulting from optic nerve injury and macular damage.⁷ Stone et al⁸ advocated the role of primary scleral buckling in open globe injuries involving the posterior segment, particularly in situations with opaque media following injury.

The placement of a large radial sponge to support the rupture site and exit wound from posterior perforating eye injuries in these three cases resulted in successful anatomic reattachment and prevention of subsequent retinal detachment from extensive fibrosis. We have found that the sheer bulk of the radial sponge combined with the orbital fat provides adequate support in most cases.

A similar technique has been reviewed by Men et al⁹ in experimental models using a segmental episcleral buckle in white rabbits. Microscopy demonstrated limited fibrocellular proliferation at the wound containing the buckle site, compared with the nonbuckled site, which contained much larger fibrocellular proliferations.

Traction usually develops at the wound site in perforating eye injuries; therefore, segmental radial elements are more effective in reducing the traction at the wound site when compared with encircling buckles that support the vitreous base. We conclude that radial elements may be considered as a useful adjunct when approaching posterior perforating eye injuries. Further research and experience with prospective large case studies will assist in elucidating the role of this approach in the future. ■

Kristine K. Pierce, MD, is a retinal fellow in the Department of Ophthalmology, Casey Eye Institute, Portland, OR. Dr. Pierce states that she has no financial interest in the material presented. She can be reached via e-mail at pierce@ohsu.edu.



R. Gary Lane, MD, is a vitreoretinal surgeon in the Department of Ophthalmology, Wilford Hall Medical Center, San Antonio, TX. Dr. Lane states that he has no financial interest in the material presented. He can be reached via e-mail at: richard.lane@lackland.af.mil.

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