Open-globe trauma involving the posterior segment is a significant cause of visual loss, despite advances in our knowledge of the pathophysiology, our ability to identify prognostic factors, and the improvements in surgical techniques and instrumentation introduced over the past few decades.1-3

The standard of practice includes repairing the open ocular wound at the earliest opportunity, followed by vitreoretinal surgery in eyes with concurrent intraocular damage. A near complete pars plana vitrectomy (PPV) with removal of the posterior hyaloid within 14 days of an open globe injury, to relieve vitreoretinal traction and to remove the scaffold for future traction and prevent stimulus of the wound healing response, has become the standard of care to reduce the risk of tractional retinal detachment.4-5

Early PPV reduces the risks of posttraumatic endophthalmitis, development of severe inflammatory changes and fibroblastic tissue within the vitreous, and secondary complications such as retinal detachment and ciliary membrane. On the other hand, induction of posterior vitreous detachment (PVD) results in a significantly higher incidence of intra- or postoperative retinal breaks, or both,6 due to the difficulty of detaching the posterior hyaloid. This is especially true because the population primarily at risk for eye injury is young people,7 who have strong adhesion between the posterior vitreous cortex and the internal limiting lamina (ILL).

Therefore, an early limited vitrectomy may be useful to stabilize the eye and prevent vitreoretinal traction in cases of open-globe trauma. This approach, avoiding complete hyaloidectomy and vitreous base shaving, could result in less potential iatrogenic damage.

**CASE REVIEW**

We reviewed all open-globe injuries involving the posterior segment treated at the University of Bari, Italy, in 2009 and 2010. We included 10 patients with penetrating or perforating trauma, with or without intraocular foreign body (IOFB) and/or retinal breaks (RB). We excluded patients with retinal detachment (RD), choroidal detachment, or endophthalmitis.

All patients underwent partial PPV under general anesthesia within 48 hours of trauma. The surgical management was the same for all cases. The corneal or scleral wound was sutured, and traumatic cataract was extracted in 8 patients: in 5 eyes by means of phacoemulsification and in 3 eyes using pars plana lensectomy. Among the 8 patients who underwent combined cataract extraction during partial PPV, 6 received a posterior chamber hydrophilic acrylic intraocular lens (IOL).
at the time of primary surgery. The 2 patients left aphakic at primary surgery underwent secondary implantation of an iris-enclavated anterior chamber IOL, 1 at 5 and 1 at 11 months after the first surgery.

In 3 cases a 23-gauge vitrectomy system was used, and in the other 7 standard 20-gauge PPV was carried out. In all cases, PPV was limited to the central vitreous, removing the hemorrhage and the area overlying the point of impact on the retina or the retinal tear. Neither posterior hyaloid removal nor vitreous base shaving was performed in any case.

Eight eyes out of 10 had at least 1 IOFB; 1 eye had multiple IOFBs. Of these eyes, 4 had the IOFB embedded in the retina partially or completely. In 3 eyes the IOFB was within the vitreous cavity, and in 1 eye it impacted the fovea, causing retinal hemorrhage. The IOFBs were visualized, freed of tissue incarceration or fibrin encapsulation, and removed using forceps. Intraoperative laser photocoagulation was carried out around the retinal breaks. No tamponading agent was used at the end of surgery.

Mean follow-up was 10.6 months (range, 4–18). Preoperative visual acuity ranged from light perception to 20/20 and improved significantly postoperatively in all patients, ranging from 20/200 to 20/20. Five eyes (50%) achieved a final visual acuity of 20/20. In 8 eyes final visual acuity was >20/40.

The retina was fully attached in all eyes. No new RBs, endophthalmitis, or PVR occurrence were observed until the end of follow-up. Two patients showed minimal macular wrinkling. B-scan ultrasonography demonstrated the presence of residual vitreous and showed that a spontaneous posterior vitreous detachment had occurred in all eyes a few days after surgery (mean, 10 days). At the last follow-up, the lens was still clear in the 2 patients left phakic.

**DISCUSSION**

We think that early partial PPV could be responsible for the satisfactory results observed in this series, combining the advantages of an early PPV with those of avoiding complete hyaloidectomy and vitreous base shaving, which may lead to less potential iatrogenic damage. Chung et al,6 in a retrospective comparative study, showed that induction of PVD causes a high incidence of intra- and postoperative RBs.

Open-globe trauma involving the posterior segment preferentially affects young patients with strong attachment of the vitreous, and forcing PVD in these eyes can lead to iatrogenic RBs. Avoiding PVD induction and vitreous base shaving with scleral depression could have other beneficial effects. Mei et al8 analyzed 5 traumatized eyes in which suprachoroidal hemorrhage had occurred intraoperatively and found that in 1 (20%) eye the suprachoroidal hemorrhage occurred during the creation of high pressure to induce PVD, and in 2 (40%) it occurred during scleral depression for vitreous base shaving.

In our series, all patients had vitreous hemorrhage of varying degrees. Hsu and Ryan9 showed in experimental models that scleral laceration with vitreous loss inducing full-thickness RB, but without intravitreal blood injection, did not result in RD. In eyes with blood injection, fibroblastic proliferation ensued, with the development of cyclitic, epiretinal, and intravitreal membranes, resulting in tractional RD. For this reason we carried out complete removal of all hemorrhage from the vitreous cavity, clearing vitreous

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and hemorrhage from the impacted retinal area if present. In cases with retinal pathology that required treatment, we performed endoscopic laser photocoagulation. This induces less breakdown of the blood-retinal barrier in comparison with cryotherapy, resulting in less intraocular inflammation and intravitreal dispersion of retinal pigment epithelial cells, and therefore less scar tissue formation, reducing the chance of RD.10

CONCLUSIONS

In this series, retinal attachment was maintained even though only limited core vitrectomies were performed and the posterior hyaloid was not removed. A limited vitrectomy alone, performed early, may be useful to stabilize the eye, remove vitreous hemorrhage and IOFB, and prevent vitreoretinal traction. Further study is warranted to assess long-term outcomes with this approach.

The encouraging results of our series should be regarded from the perspective that our cases represent relatively “good” trauma cases. In fact, none of the patients preoperatively demonstrated endophthalmitis, RD or choroidal detachment, or rupture injuries, and none had serious posterior segment insults. It should be recognized that when these complications occur, complete PPV may be the safer approach to the management of an open-globe injury involving the posterior segment.

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