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Laser Treatment after Minimized Eye Movement for Repair of Retinal Detachment

Repair of retinal detachment (RD) is usually performed with pneumatic retinopexy, scleral buckle procedure, and vitrectomy. Bilateral patching was previously used to decrease subretinal fluid.[1] The course of the index patient reported herein demonstrates that restricting eye movement can decrease subretinal fluid, allowing closure of the retinal breaks with laser photocoagulation without the use of a gas bubble or a scleral buckle.

Consecutive patients providing consent and seeking treatment at Retina Consultants of Hawaii were reviewed retrospectively for RD treated with laser treatment and minimized eye movement (LTMEM) from June 1989 through August 2019. This retrospective study was exempt from institutional review board approval by the Western Institutional Review Board (identifier, 1-1334939-1) and was performed in accordance with the Health Insurance Portability and Accountability Act and the tenets of the Declaration of Helsinki.

When a shallow peripheral detachment was found in young phakic patients or when bilateral detachment requiring a surgical procedure in one eye and a shallow peripheral RD in the fellow eye was found, indirect laser treatment around the peripheral retinal breaks usually with scleral depression allowed temporary retinal apposition and white laser burns. Unilateral eye patching was used to encourage compliance with minimized eye movement (MEM), which decreased subretinal fluid by avoiding reading, writing, computer use, and physical activity, but allowing television watching. The primary outcome was retinal reattachment using LTMEM alone, and the secondary outcome was retinal reattachment with LTMEM and subsequent surgery.

The index patient was a young woman with a bullous superior detachment with retinal holes and lattice degeneration (Fig 1A). She declined surgery, so unilateral patching and MEM was accomplished by avoiding reading, computer work, and physical activity. After 4 days, the RD resolved (Fig 1B). Laser treatment was recommended, but she declined and resumed activities. The RD recurred (Fig 1C), but after MEM, subretinal fluid resolved, allowing laser treatment around the breaks and lattice degeneration with successful repair of the RD for 30 years (Fig 1D).

The RD was treated with LTMEM in 39 of 35 patients. The average age was 39 years (range, 18–63 years), with the right eye involved in 31%, the left eye involved in 57%, and both eyes involved in 11%. No cases of multiple detachments in a single eye were present. Retinal breaks included holes in 62% (24/39 eyes), tears in 23% (9/39 eyes), retinal holes and tears in 13% (5/39 eyes), and a microdialysis in 2.6% (1/39 eyes). Refractive error ranged from plano to −6.00 diopters (D) in 56% (22/39 eyes) and more than −6.00 D in 44% (17/39 eyes). None of the patients had undergone prior refractive surgery. All patients were phakic. Sixty-nine percent of patients (27/39 eyes) were asymptomatic, 28% (11/39 eyes) were symptomatic with flashes or floaters, and 2.6% (1/39 eyes) were symptomatic with a curtain-like shadow.

Retinal break locations were superior in 31% (12/39 eyes), inferior in 46% (18/39 eyes), and both superior and inferior in 23% (9/39 eyes). When a more advanced RD requiring surgery under general anesthesia was present in 1 eye and the fellow eye showed a shallow peripheral detachment, indirect laser treatment with scleral depression was performed to accomplish visible laser burns around the breaks. For example, RD with proliferative vitreoretinopathy was repaired under general anesthesia in 1 eye, and the fellow eye with shallow peripheral RD was treated with indirect laser treatment and scleral depression with successful repair for 24 years (Fig 2, available at www.ophthalmologyretina.org).

Retinal reattachment was achieved by LTMEM in 79% (31/39 eyes) and after subsequent scleral buckle procedure in 100% (39/39 eyes). The average best-corrected visual acuity for the 31 eyes that underwent successful LTMEM treatment remained stable at 20/25 vision. The mean time to resolution of subretinal fluid was 44.5 days (range, 1 day–13 months). The follow-up period averaged 76.9 months (range, 3 months–30 years). Laser treatment was performed once in 28 eyes, twice in 2 eyes, and 3 times in 1 eye. All patients with successful LTMEM treatment showed resolution of subretinal fluid. If subretinal fluid

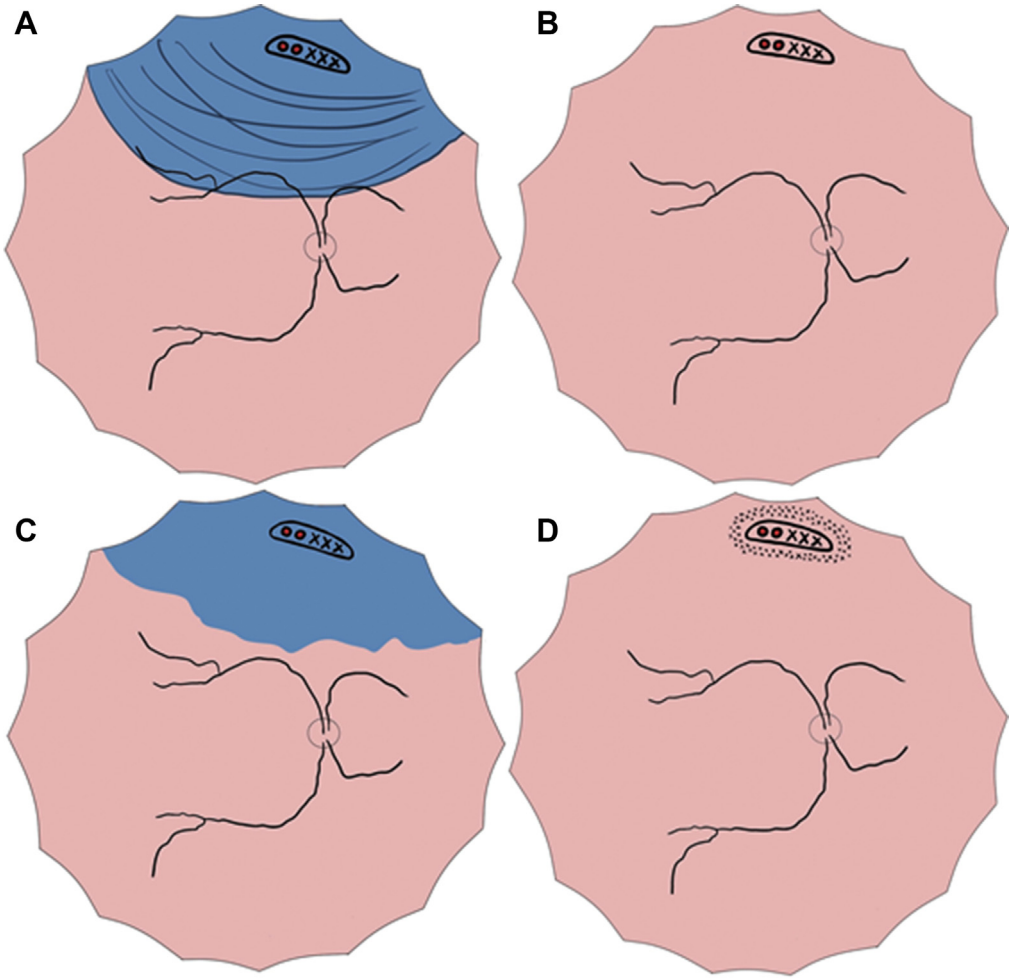

Figure 1. Index patient presenting with symptomatic bullous retinal detachment and initial refusal of surgical repair. **A**, Fundus drawing showing bullous superior retinal detachment extending posteriorly to superotemporal arcade associated with superior lattice degeneration and retinal holes. **B**, Fundus drawing showing complete resolution of retinal detachment after minimizing eye movement. **C**, Fundus drawing showing recurrent subretinal fluid after resuming activities. **D**, Fundus drawing showing successful laser scarring around retinal breaks and superior lattice degeneration with successful reattachment for 30 years.

persisted and did not resolve after LTMEM, a scleral buckle was performed. All 8 eyes in which LTMEM failed underwent successful reattachment with a scleral buckle procedure. None of the 39 eyes showed proliferative vitreoretinopathy or significant macular pucker.

Repair of RD involves closing the retinal breaks.[2] Schepens[3] used a Lincoff balloon with temporary buckling with cryotherapy or laser photocoagulation because it did not involve an intraocular procedure. Laser treatment and MEM is the least invasive procedure to repair select RDs in young phakic patients with peripheral shallow detachment and can be used if surgery is delayed. Minimized eye movement allowed reabsorption of subretinal fluid while planning for laser treatment with scleral depression around the retinal breaks. Laser treatment to treat retinal breaks with scleral depression was successful for Delaney et al[4] using the Eisner Cone contact lens.

An individualized approach is recommended for repair of RD.[5] Patients with shallow peripheral phakic detachment have a 79% success rate after LTMEM. Minimized eye movement involved avoiding reading, computer use, texting, social gatherings, and physical activities. Watching television was allowed. Unilateral eye patching enhanced compliance with MEM and also limited the quickness of rotational eye movements, which can cause fluid flow through retinal breaks.[1] Most patients showed shallow peripheral RDs, but as in our index patient, some patients showed bullous RDs. After spontaneous reabsorption of subretinal fluid, laser photocoagulation was administered around the retinal breaks, usually with scleral depression. If LTMEM was not successful, all detachments were repaired successfully with scleral buckle. Proliferative vitreoretinopathy and macular pucker were not noted. The detachments treated in this series mostly involved younger patients with phakic eyes, usually without complete posterior vitreous detachment.

Laser treatment and MEM is cost effective, requiring outpatient laser treatment after minimized eye movement.[6] The 79% success rate of LTMEM compares favorably with that of pneumatic retinopexy (80.8% success rate),[7] while also allowing the treatment of RD with inferior retinal breaks. Although LTMEM is usually performed for peripheral breaks with shallow subretinal fluid in younger phakic patients, this procedure can be successful in bullous RD if subretinal fluid resolves after MEM. A potential risk of extension of the RD into the macula exists, but this is

minimized by MEM. This may be especially useful when patients decline surgery or operating rooms are not available, as has occurred during the coronavirus disease 2019 pandemic.

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HUMAN SUBJECTS: Human subjects were included in this study. The human ethics committees at the Western Institutional Review Board deemed the study exempt. All research complied with the Health Insurance Portability and Accountability (HIPAA) Act of 1996 and adhered to the tenets of the Declaration of Helsinki. Participants provided informed consent.

No animal subjects were included in this study.

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Abbreviations and Acronyms:
D = diopter; **LTMEM** = laser treatment and minimized eye movement; **MEM** = minimized eye movement; **RD** = retinal detachment.

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