BILATERAL EYE PATCHING MAY IMPROVE CLINICAL OUTCOMES FOR ACUTE PRIMARY RHEGMATOGENOUS RETINAL DETACHMENT

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Purpose: Evaluate preoperative bilateral eye patching (BEP) on subretinal fluid and vision in acute primary rhegmatogenous retinal detachments (RRDs).

Methods: Retrospective nonrandomized interventional study of 335 patients with RRD undergoing BEP until surgery (BEP cohort) and separated by the percentage of full-time compliance: high (≥90%), medium (>90% but ≥50%), and low (<50%). Those declining BEP were included (control). All underwent surgery and were followed for ≥3 months. Imaging was obtained immediately before surgery. Best-corrected visual acuity was measured at the longest follow-up and immediately before surgery. SRF and foveal status immediately before surgery were analyzed.

Results: Two hundred and forty and 95 patients were in BEP and control cohorts, respectively. Thirty patients presented immediately before surgery for analysis. High (64%) and medium (35%) compliance showed significantly greater ($P < 0.01$) SRF reduction compared with low (4%) and control (3%). Mac-off RRD showed significantly greater ($P < 0.01$) foveal reattachment with high (29%) and medium (8%) compliance compared with low (2%) and control (1%). Mac-on RRD demonstrated no significant differences ($P \geq 0.51$) in final best-corrected visual acuity among high (0 logarithm of the minimum angle of resolution [logMAR] [median], 20/20 Snellen), medium (0.10 logMAR, 20/25 Snellen), low (0.10 logMAR), and control cohorts (0.10 logMAR). Mac-off RRD demonstrated significantly better final best-corrected visual acuity with high compliance (0.30 logMAR, 20/40 Snellen) compared with low (0.40 logMAR, 20/50 Snellen; $P = 0.04$) and control (0.60 logMAR, 20/80 Snellen; $P = 0.02$).

Conclusion: Preoperative BEP can stabilize or improve subretinal fluid in acute primary RRD. Patients with BEP >50% of the time experienced the greatest benefits.

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The retina is the neurosensory component of the eye that is responsible for phototransduction and initiation of vision, and the macula is its central portion that mediates fine photopic visual acuity.[1] A full-thickness retinal tear (RT) can allow subretinal fluid (SRF) to accumulate, resulting in a primary rhegmatogenous retinal detachment (RRD).[2,3] If the macula is attached (mac-on), timely intervention is essential to prevent its detachment (mac-off) because worse clinical outcomes have been shown despite successful surgical repair.[4,5]

Numerous studies are underway to investigate preoperative measures that can be taken to enhance clinical outcomes or to minimize invasive surgery. Much of the focus involves using the innate SRF displacement capabilities of the retinal pigment epithelium (RPE) through membrane pumps and passive diffusion (referred to here as the "RPE pump").[6] With tamponade of RT(s) to prevent further fluid entry into the subretinal space, clinic-based techniques, such as pneumatic retinopexy (PR), rely on the RPE pump to resolve SRF. In some studies, PR has shown to result in improved visual

outcomes compared with pars plana vitrectomy, which uses active SRF drainage through RTs or iatrogenic retinotomy; however, discrepancies in outcomes could also be a result of less complex RRDs often being treated with PR.[7–9] Further validation of this observation is under investigation.

Another well-known but currently underused preoperative method that optimizes natural SRF absorption in RRDs is bilateral eye patching (BEP).[10,11] The exact mechanism by which this occurs is unclear; however, it is hypothesized that minimizing saccadic eye movements through visual sensory deprivation decreases turbulence of vitreous fluid and lessens flow through RT(s), thereby allowing for the RPE pump to remove remaining SRF.[11–13] This technique has been used to lower the risk of progression to foveal detachments in mac-on RRDs and to reduce the amount of SRF to mitigate surgical interventions. Lincoff et al previously reported complete resolution of RRDs using this technique.[14] Although surgeons in our practice have previously recommended BEP to patients as a preoperative measure, its utilization had been inconsistent. By standardizing the criteria for recommendation and patching technique across all surgeons in our group, we conducted a pilot study seeking to determine which types of patients with acute primary RRD would benefit the most from BEP.

Methods

Study Design

This retrospective comparative single-center nonrandomized interventional study was conducted according to the Declaration of Helsinki and the U.S. Health Insurance Portability and Accountability Act of 1996 with institutional review board approval by Allina Health Care (Reference #: 2038527). Informed consent was determined to not be necessary. It was HIPAA-compliant and conducted at a multiprovider, multilocation private institution (Retina Consultants of Minnesota) located within the State of Minnesota.

Inclusion/Exclusion Criteria

Between February 1 and April 30, 2023, we standardized criteria for recommending full-time BEP before surgery. Inclusion criteria included any adult patient (aged 18 years and older) diagnosed with acute primary RRD recommended for surgical repair. We excluded patients with nonrhegmatogenous etiologies (i.e., diabetic traction, exudative, etc), chronic RDs (defined as having demarcation line), proliferative vitreoretinopathy (PVR) at the time of initial diagnosis, and a history of posterior segment intraocular surgery of any kind in the study eye. Patients who have had previous cataract surgery or intravitreal injection therapies were not excluded. Patients were included in the control cohort and underwent routine RRD repair if BEP was deemed to pose a threat to overall health and safety such as those with mobility limitations requiring assistance devices (i.e., wheelchairs, walkers, canes, etc) who did not have an at-home caregiver to assist. Patients who refused BEP were also included in the control cohort. All other patients who met inclusion/exclusion criteria underwent BEP (BEP cohort).

Bilateral Eye Patching Protocol

Patients underwent patching of both eyes at the conclusion of their initial visit where the primary RRD was initially diagnosed. This was accomplished by asking the patient to close both eyes and then applying two gauze eye pads over each eye secured with adhesive paper tape from forehead to ipsilateral cheek. Additional gauze pads and tape were provided to replace patches at home as needed, and patients were instructed to sleep with patches remaining in place. Patients were encouraged to have an at-home caretaker for assistance while undergoing full-time BEP; to remove patches only when eating, bathing, or if there were acute safety concerns; and to continue BEP until they returned for surgery.

Variables of Interest

Demographic, preoperative, intraoperative, and follow-up data were collected. Race was self-identified as "White," "Black," "Asian," "Native American," "Hispanic," "Decline to Specify," or "Other". Patient home zip code was used as a surrogate for socioeconomic status tabulated from American Community Survey 2017 of median income.[15–17] Patients were considered

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"established" if previously seen within a 3-year period before diagnosis; otherwise, they were considered "new". Distance from home zip code of patient to clinic was used as a quantitative surrogate for health care access and was calculated based on the shortest route (miles) using Google Maps (Alphabet, Inc, Mountain View, CA).

We asked BEP cohort patients at the time of surgery to estimate what percentage of time while awake were they compliant with full-time BEP: 1) ≥90% (high), 2) 50% to 90% (medium), and 3) <50% (low). These cutoff values were arbitrarily selected. Preoperative imaging with optical coherence tomography (OCT) of the macula and ultrawide field fundus photographs (when possible) documented the presence and height of SRF, extent of clock-hours of RRD and RT(s), presence of a posterior vitreous detachment, and macula status (mac-off was defined as foveal detachment). If there was no preoperative fundus imaging obtained, clock-hours of RRD and macula status were assessed by fundus drawing. For the subset of patients who were able to present for clinical reassessment immediately prior to surgery (iPTS) (in addition to their previous clinic visit), we obtained repeat best-corrected visual acuity (BCVA), ultrawide field fundus photographs, and OCT imaging of the macula for comparison after conclusion of BEP.

Initial Snellen BCVA was obtained from the visit where patient was diagnosed. Final BCVA was determined at the latest postoperative visit; however, those with a follow-up course less than 3 months were excluded from final BCVA analysis. Time between initial diagnosis and surgery was recorded and the amount of time the patient was symptomatic before the initial presentation for evaluation.

Statistical Analysis

Statistical analysis was performed on JMP software (SAS Institute, Cary, NC). Snellen BCVA was converted to logarithm of the minimum angle of resolution (logMAR) units for quantitative analysis, with logMAR values for BCVA of "light perception," "hand motion," and "counting fingers" assigned 2.8, 2.3, and 1.8, respectively.[18] Comparison of categorical variables between two cohorts was completed using a two-tailed Fisher exact test. Continuous quantitative variables include age, median household income, travel distance, duration of symptoms, time to surgery, and logMAR BCVA were found to be nonnormal using the Shapiro–Wilk test. The median test, using median rank scores, was used for comparisons involving travel distance and logMAR BCVA. All other nonnormal distributions were compared using the Mann–Whitney U test. $P < 0.05$ was considered statistically significant.

Results

Baseline Characteristics

Querying the billing data for *CPT* codes during the 3 months of analysis generated 420 procedures. After excluding patients without acute primary rhegmatogenous etiology (i.e., diabetic traction, chronic RD, PVR, etc), a total of 335 patients were analyzed, divided into 240 patients who underwent BEP (BEP cohort) and 95 patients who did not (control cohort). There were no significant differences between the BEP and control cohorts for sex composition, age, or race. These data are summarized in Table 1.

Presurgical Best-Corrected Visual Acuity Testing and Fundus Imaging

After the initial clinic visit (ICV) where RRD was diagnosed, we were able to obtain formal BCVA testing and fundus imaging on 30 patients (9% of total) iPTS, of whom 28 underwent BEP and 2 were controls. Review of fundus photographs and OCT imaging revealed that 57% of BEP patients (16 of 28) showed improvement in SRF (examples shown in Figure 1, Patients 1–3), with 25% of mac-off BEP patients (5 of 20) demonstrating foveal reattachment before surgery (example shown in Figure 1, Patient 2).

Table 1. Baseline Demographics of Cohorts

Variable	BEP	Control	*P*
# of patients	240	95	
Male sex (%)	62	63	0.99
Age, years, mean ± SD	61.55 ± 12.32	59.99 ± 14.17	0.89
White race (%)	98	98	0.98
Type of surgery (%)	SB: 13 PPV: 27 SB/PPV: 60	SB: 10 PPV: 25 SB/PPV: 65	

PPV, pars plana vitrectomy; SB, scleral buckle.

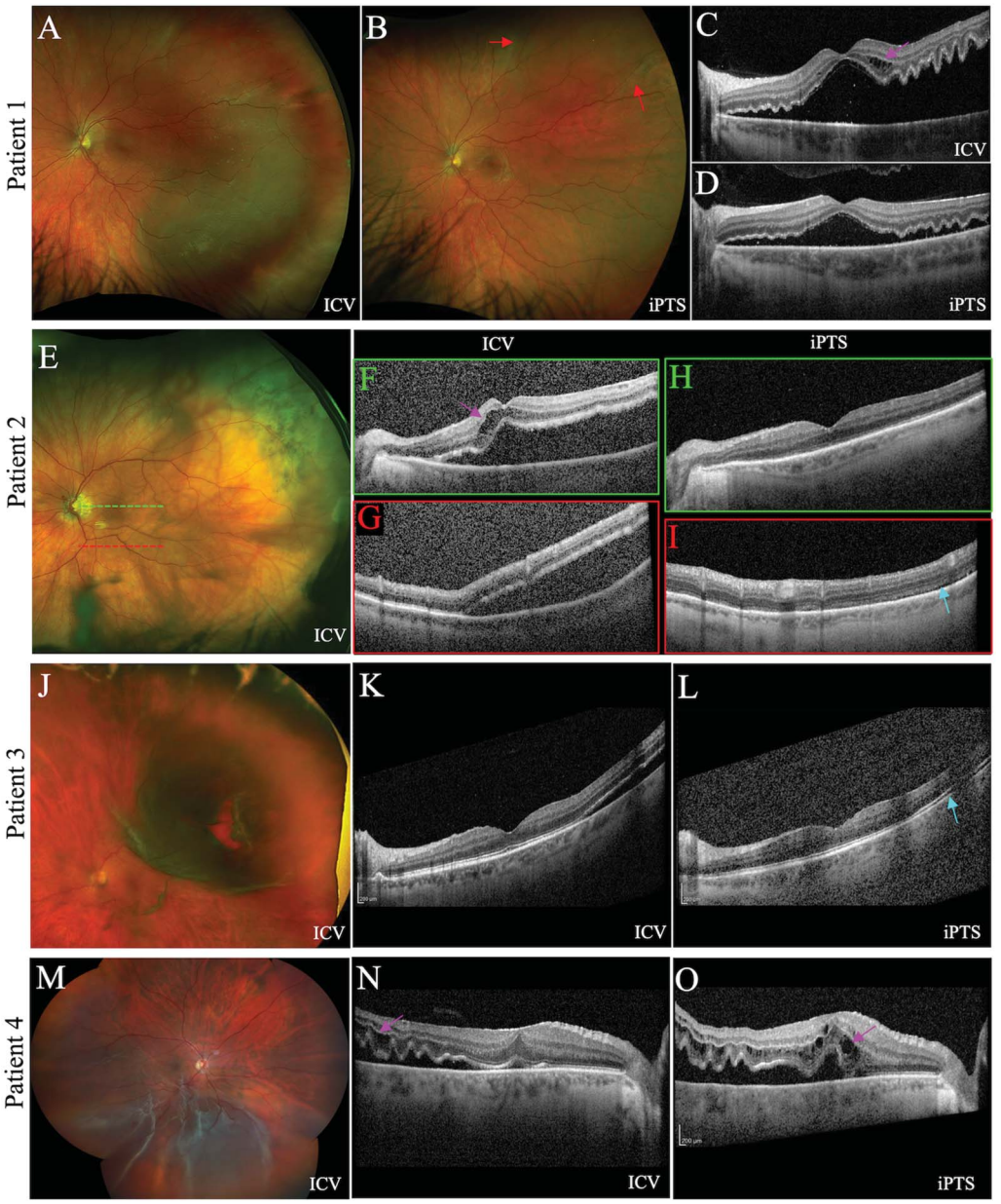

Fig. 1. Bilateral eye patching reduced subretinal fluid before surgery. Patient 1 was a 20-year-old man who presented with 4 days of vision loss in the left eye and was diagnosed with a primary rhegmatogenous retinal detachment with subretinal fluid extending 5 clock-hours temporally and retinal tears at the 1- and 2-o'clock position. His macula was detached (mac-off), and he underwent BEP before the next-day surgery with high compliance (>90% of awake time). Comparison of fundus photographs from the initial clinic visit (ICV; **A**) to those immediately prior to surgery (iPTS; **B**) showed significant SRF reduction, most prominently in the inferior–temporal quadrant, with SRF still remaining superior temporally (red arrows). Optical coherence tomography imaging of the macula demonstrated vitreomacular adhesion and reduction of subfoveal SRF; however, the fovea remained detached (**C** and **D**). He had trace parafoveal cystoid macular edema at the ICV that resolved at iPTS (purple arrow). Snellen BCVA improved from 20/200 ICV to 20/60 iPTS. Patient 2 was an 83-year-old woman who presented with 1 week of vision loss in the left eye demonstrating a mac-off RRD with SRF extending 6 clock-hours temporally and a single RT at the 2-o'clock position (**E**). Optical coherence tomography imaging of the fovea (green-dashed line, **F**) and along the inferior–temporal arcade vessel region (red-dashed line, **G**) at ICV showed posterior vitreous detachment with SRF and cystoid macular edema at the fovea (purple arrow). She underwent BEP for 2 days before surgery with high compliance. Immediately prior to surgery OCT imaging showed complete resolution of subfoveal SRF and cystoid macular edema (**H**) with trace SRF remaining along the inferior–temporal arcade (**I**, blue arrow). Her Snellen BCVA improved from 20/80 ICV to 20/25 iPTS. Patient 3 was a 77-year-old man who presented with 4 days of vision loss in the left eye. He had a mac-on RRD with SRF extending 4 clock-hours superior temporally and a single RT at the 2-o'clock position (**J**). Optical coherence tomography imaging at ICV showed fovea-threatening SRF in the temporal macula (**K**) which improved (blue arrow) after approximately 6 hours of high compliance BEP before the same-day surgery (**L**). The fovea remained attached, and Snellen BCVA at iPTS remained unchanged from ICV at 20/20. Patient 4 was a 77-year-old man who presented with 5 days of vision loss in the right eye demonstrating an acute mac-off RRD with SRF extending 6 clock-hours inferiorly and single RT at the 10 o'clock position (**M**). He refused BEP and underwent surgery the following day. Optical coherence tomography imaging showed trace SRF detaching the fovea (**N**) at ICV that progressed on examination iPTS (**O**). Cystoid macular edema also worsened from the temporal macula to involve the fovea (purple arrows). His Snellen BCVA also declined from 20/40 ICV to 20/80 iPTS.

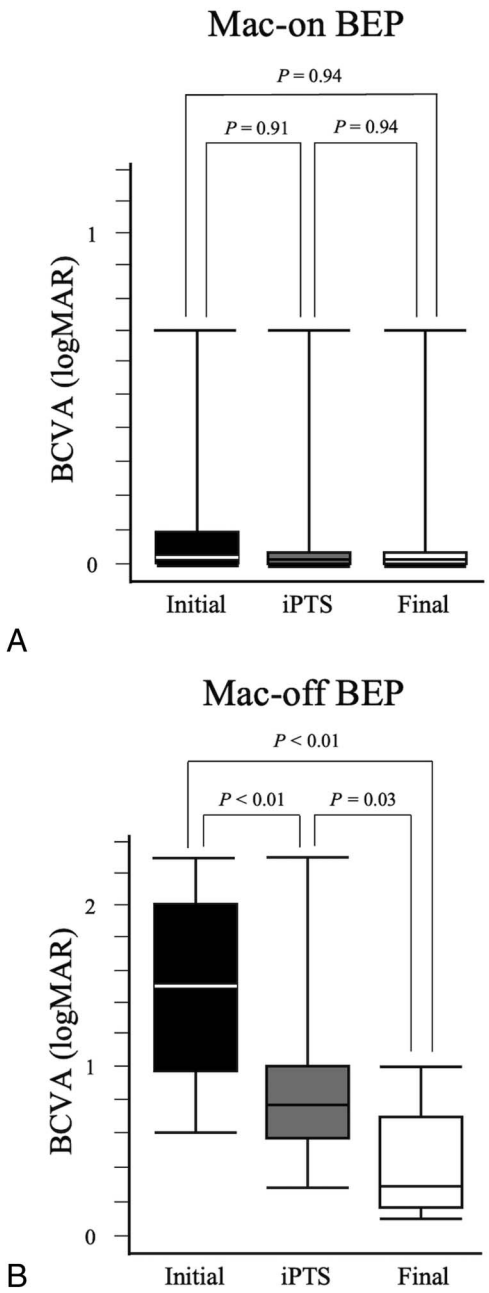

Fig. 2. Bilateral eye patching improved vision before surgery. Box and whisker plots illustrate distribution of logMAR BCVA in BEP patients who received formal BCVA testing iPTS. The box depicts the interquartile range, the line within the box depicts the median, and the bars above and below the box depict maximum and minimum range, respectively. When considering BEP patients presenting with macula-on (mac-on) RRDs (**A**), there was no significant difference ($P \geq 0.91$) in BCVA measured among initial (black), iPTS (gray), and final (white) clinic visits. BEP patients presenting with mac-off RRDs (**B**) demonstrated significantly improved BCVA at iPTS ($P < 0.01$) and final visits ($P = 0.03$) compared with the initial visit. These patients also showed significant improvement ($P < 0.01$) in BCVA at the iPTS visit compared with the initial visit.

Neither control patients showed SRF improvement, with one demonstrating worsening of foveal detachment (Figure 1, Patient 4). For the 8 BEP patients with mac-on RRD, there was no significant change ($P \geq 0.91$) in BCVA among initial (median = 0 logMAR, 20/20 Snellen), iPTS (median = 0 logMAR), or final visits (median = 0 logMAR, Figure 2A). For the 20 BEP patients who initially presented with mac-off RRD, they demonstrated significantly ($P < 0.01$) improved BCVA at iPTS (median = 0.88 logMAR, 20/150 Snellen) and final visits (median = 0.30 logMAR, 20/40 Snellen) compared with the initial visit (median = 1.48 logMAR, 20/600 Snellen; Figure 2B). These patients also showed significant improvement ($P = 0.03$) in BCVA at the final visit compared with the iPTS visit.

Factors Associated With Bilateral Eye Patching Compliance

Self-reported compliance with preoperative BEP varied greatly; thus, we investigated factors that may have had an influence. All BEP cohort patients were instructed to patch full-time immediately after ICV and to temporarily remove patches (if needed) when eating, showering, or if they felt their safety was acutely threatened. Patients reported compliance with full-time BEP for a self-estimated percentage of time patched while awake, and we stratified them into subcohorts according to "high" (≥90%), "medium" (50% to 90%), or "low" (<50%) compliance.

Summary of these data are provided in Table 2. Of the 240 BEP patients, 129 (54%), 34 (14%), and 77 (32%) reported high, medium, and low compliance, respectively. There were no significant differences in composition of patients new to the practice (high = 81%, medium = 82%, low = 81%, and control = 83%; $P \geq 0.91$) or in distance traveled to clinic for treatment (high = 29.30 miles [median], medium = 27.29 miles, low = 29.63 miles, and control = 35.49 miles; $P \geq 0.80$) among the three BEP compliance cohorts compared with controls. High and medium compliance cohorts had a significantly ($P = 0.03$) greater percentage of patients living with a spouse/partner compared with controls (76% vs. 63%), whereas the low compliance cohort did not show a significant difference (63% vs. 63%; $P = 0.97$). The low compliance cohort experienced significantly ($P = 0.01$) longer time from diagnosis to surgery (median = 3 days) compared with controls (median = 1 day), whereas there was no significant ($P = 0.91$) difference between high (median = 1 day) and medium compliance (median = 1 day) cohorts compared with controls. This observation was not a result of disproportionate amounts of mac-off RRD disease in any cohort because there were no significant differences found (high = 45%, medium = 47%, low = 47%, and control = 46%; $P \geq 0.89$).

Table 2. Factors Associated With Preoperative BEP Compliance

Variable	Pre-Operative BEP Compliance			Control	*P*
	High	Medium	Low		
# Of patients	129	34	77	95	
New patients (%)	81	82	81	83	≥0.91
Zip code–derived median household income (USD), mean ± SD	$82,076 ± 24,373	$84,527 ± 28,861	$80,324 ± 23,604	$79,236 ± 22,657	≥0.73
Lives with spouse/partner (%)	76*	76*	63	63	*0.03
Time to surgical repair (days), median (interquartile range)	1 (0–1)	1 (1–2)	3* (1–4)	1 (0–2)	*0.01
Distance to clinic (miles), median (interquartile range)	29.30 (10.61–67.52)	27.29 (15.11–47.90)	29.63 (15.17–62.94)	35.49 (17.95–73.20)	≥0.80
Mac-off disease (%)	45	47	47	46	≥0.89

*Indicates statistical significance.
Mac-off, subretinal fluid involving the macula.

Anatomic Outcomes of Preoperative Bilateral Eye Patching

Surgeons performed a fundus examination of the operative eye iPTS to note any changes in the amount of SRF (i.e., reduction in how bullous or extent of clock-hours of RRD), with a focus on the status of SRF at the fovea. This was performed in comparison to fundus imaging or drawings obtained at ICV. By these measures, SRF had significantly ($P < 0.01$) decreased in patients reporting high (64%) and medium compliance (35%) compared with controls (3%; Figure 3A). There was no significant difference ($P = 0.13$) between low compliance (4%) and control subcohorts.

When considering the status of SRF at the fovea iPTS in patients with mac-off disease, both high (29%) and medium compliance (8%) cohorts exhibited significantly ($P < 0.01$) greater rates of foveal reattachment compared with controls (1%, Figure 3B). The proportion of mac-off high compliance cohorts demonstrating foveal reattachment iPTS was also significantly ($P < 0.01$) greater compared with the medium compliance cohort. There was no significant difference ($P = 0.34$) in foveal reattachment rates iPTS between low compliance (2%) and control cohorts.

Analyzing rates of patients with mac-on RRD progressing to foveal detachment iPTS showed no incidents in high or medium compliance cohorts. Low compliance and control patients experienced similarly low rates (4%) that did not statistically differ from each other ($P = 0.67$); however, they were significantly greater ($P < 0.01$) than that experienced by the high and medium compliance cohorts. There were no significant differences ($P = 0.77$) in rates of retinal redetachments during the postoperative period that required repeat surgical intervention across all cohorts analyzed (~2%).

Visual Outcomes

Initial BCVA measured at ICV showed no significant differences ($P \geq 0.77$) among BEP compliance and control cohorts with mac-on (high = 0.10 logMAR [median], 20/25 Snellen; medium = 0.10 logMAR; low = 0.10 logMAR; and control = 0.10 logMAR; $P \geq 0.81$) or mac-off disease (high = 1.30 logMAR, 20/400 Snellen; medium = 1.14 logMAR, 20/275 Snellen; low = 1.30 logMAR; and control = 1.14 logMAR; Figure 4A). Final BCVA measured at ≥3 months postoperative visit showed no significant difference ($P \geq 0.51$) in patients with mac-on disease among BEP compliance and control cohorts (high = 0 logMAR, 20/20 Snellen; medium = 0.10 logMAR, 20/25 Snellen; low = 0.10 logMAR; and control = 0.10 logMAR;

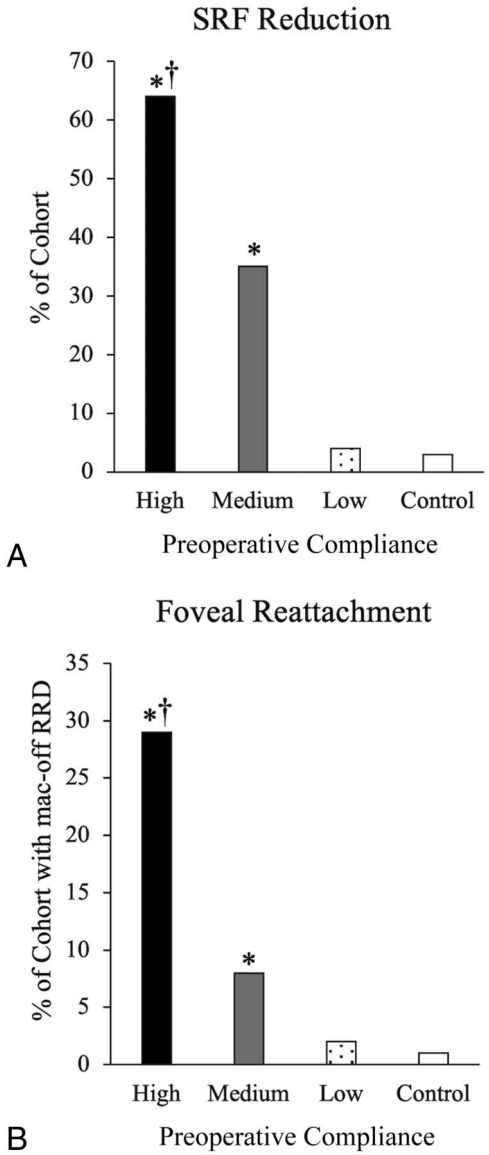

Fig. 3. Anatomic effects of BEP on RRDs. Reduction in the amount of SRF before surgery was observed to have occurred in significantly greater ($P < 0.01$, indicated by *) proportions of the high (black column) and medium compliance (gray column) BEP subcohorts compared with controls (white column; **A**). The proportion of high compliance subcohort was significantly greater ($P < 0.01$, indicated by †) compared with that observed in the medium compliance subcohort. There was no significant difference ($P = 0.13$) in proportions between low compliance (striped column) and control subcohorts. In mac-off BEP patients, reattachment of the fovea before surgery was observed in significantly greater ($P < 0.01$, indicated by *) proportions of high and medium compliance subcohorts compared with controls (**B**). The proportion of high compliance subcohort was significantly greater ($P < 0.01$, indicated by †) than that observed in the medium compliance subcohort. There was no significant difference ($P = 0.34$) observed between low compliance and control subcohorts.

Figure 4B). For patients with mac-off disease, the high compliance cohort demonstrated significantly better final BCVA (0.30 logMAR, 20/40 Snellen) compared with low compliance (0.40 logMAR, 20/50 Snellen; $P = 0.04$) and control cohorts (0.60 logMAR, 20/80 Snellen; $P = 0.02$). Although the final BCVA of the high compliance cohort was trending toward better than the medium compliance cohort (0.44 logMAR, 20/55 Snellen), it did not achieve statistical significance ($P = 0.06$). There were no significant differences ($P \geq 0.08$) in final BCVA among the medium compliance, low compliance, and control cohorts.

Discussion

For over the last half century, BEP has been known to preoperatively lower the progression of acute primary RRD[10,13,14] and improve the view of the fundus for possible in-office laser retinopexy of associated RTs.[19,20] Despite these benefits, to the best of our knowledge, BEP is underused as a part of current routine retina care. The goal of this pilot study was to examine the impact that BEP would have on care for acute primary RRD in the modern "real world" and to examine which patients would benefit the most from its implementation. Our results showed that preoperative BEP resolved SRF across all types of acute primary RRDs. For mac-on disease, BEP decreased the risk of SRF progression into the fovea before surgery. For mac-off disease, the extent of SRF was reduced so that approximately a third of these patients demonstrated foveal reattachment. Visual outcomes after surgical repair for the high compliance group may have improved as a result.

A key benefit of BEP is the reduction in size of an acute RRD before surgery, thus potentially lowering the degree of intervention required and reducing intraoperative complications. Not only could BEP be implemented after RRD is diagnosed with the retina specialist but also general eye care providers could even initiate BEP at the initial evaluation before referral. With the decreased extent of SRF, the usage of drainage retinotomies, perfluorocarbon (PFO), long-acting gas tamponades, and anesthesia exposure might be minimized. Previous studies have shown that BEP could even completely resolve an RRD[14]; therefore, theoretically some patients could avoid the operating room and be more confidently treated with pneumatic retinopexy or laser/cryo retinopexy in the clinic with benefits to patient safety and overall health care costs.[21,22]

Furthermore, implementation of BEP in the appropriate patient can expand the therapeutic window for emergent surgical intervention in foveal-threatening disease. The American Academy of Ophthalmology suggests that an acute primary mac-on RRD should be repaired as soon as possible, with some advocating

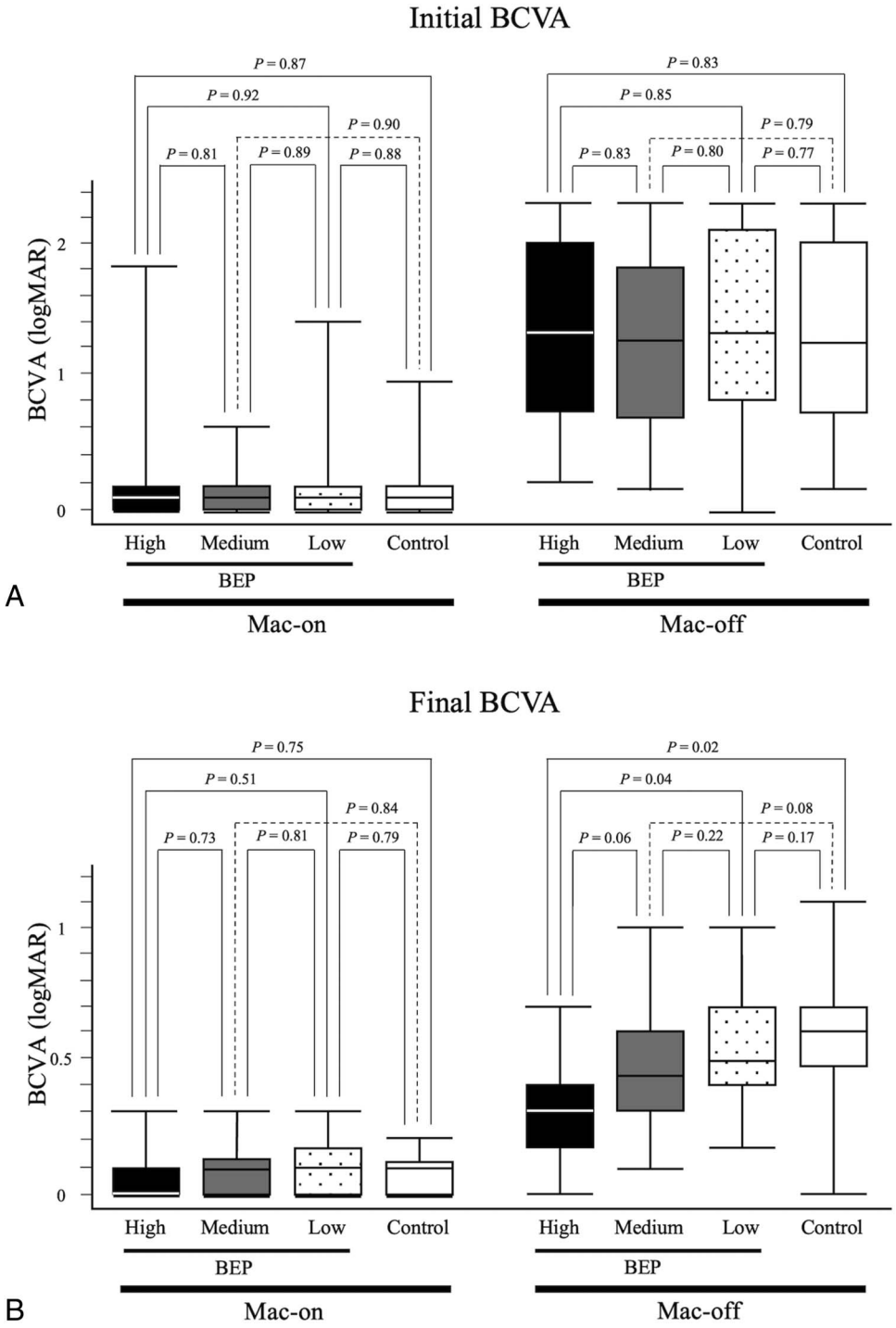

Fig. 4. Visual outcomes. Initial BCVA was measured at the time of RRD diagnosis (**A**) and was found to have no significant differences among patients with varying levels of BEP compliance (high [black], medium [gray], and low [dots]) and controls (white) in both mac-on (left) and mac-off disease (right). The final vision was measured at ≥3 months after surgical repair of RRD (**B**). There was no significant difference in final BCVA among patients with mac-on RRD with varying levels of BEP compliance and controls (left). For those with mac-off RRDs (right), high compliance subcohort showed significantly better final BCVA compared with low compliance subcohort ($P = 0.04$) and control cohort ($P = 0.02$). Although final BCVA of the high compliance subcohort was trending toward better than the medium compliance subcohort, it did not achieve significance ($P = 0.06$). There were no significant differences ($P \geq 0.08$) in final BCVA among the medium and low compliance subcohorts and the control cohort.

within 24 hours of presentation.[23] Although we strive to facilitate timely and emergent surgical intervention for all patients with mac-on RRD, there can be logistical challenges such as limited after-hours and weekend access to operating room facilities and staff, significant systemic comorbidities of the patient that may require medical clearance or stabilization, and availability of caretakers for immediate postoperative cares. By stabilizing SRF and protecting the fovea from detachment, BEP may potentially expand the therapeutic window to help coordinate care for patients who face these complex logistical challenges so as to maximize their visual outcomes and safety. Further studies are needed to explore this possibility.

Another benefit of BEP relates to the use of the intrinsic RPE pump to resolve subfoveal fluid in patients with acute primary mac-off RRD.[24] Previous studies have shown that patients treated with techniques that leverage the RPE pump to resolve SRF, such as pneumatic retinopexy or primary scleral buckle placement without a tamponade agent, have demonstrated improved visual and metamorphopsia outcomes compared with "active" SRF drainage during vitrectomy with complete fluid–gas exchange.[7,8] Indeed, our results offer further support by showing that patients with mac-off RRD who undergo BEP may have improved visual outcomes compared with controls. Although we did not evaluate metamorphopsia and aniseikonia outcomes in this current pilot study, they will be an important measure in future randomized studies.

Proper compliance with full-time BEP is critical to achieving its maximum benefits. We found that an important factor affecting the level of patient compliance is the presence of a caretaker at home because most of our high and medium BEP compliance patients initially presented alongside their spouse or partner. Further support comes from studies showing that the presence of caretakers can improve health care compliance, including decreased loss to follow-up with long-term intravitreal injection therapies,[25] improved follow-up with outpatient appointments after hospitalization,[26] and adherence to home medication regimens for chronic conditions, such as hypertension.[27] Our data suggest that we should encourage and assist patients who live alone but are BEP candidates to seek full-time caretakers to maximize their clinical outcomes.

A second consideration for the level of BEP compliance is the length of time a patient undergoes patching until surgery. For our pilot study, while we instructed all patients in the BEP cohort to full-time patch for the entire duration of time from diagnosis to surgery, a significant decline in compliance was observed when surgery was scheduled $\geq$3 days out. Although reasons for the delay are multifactorial, the proportion of mac-off disease was not a factor as all three BEP compliance cohorts demonstrated similar proportions. Full-time BEP can pose a significant burden to patients because they lose their sense of autonomy and are severely limited in daily tasks that they can perform while awaiting surgery. It is unclear at this time what duration of time for BEP will result in peak benefits because this was not directly addressed in our pilot study. One potential method to mitigate this compliance decline is to have patients who are scheduled $\geq$3 days to begin full-time patching 1 to 2 days before surgery. This will be an important question to analyze in a subsequent randomized trial.

It is important to note that full-time BEP is not without significant drawbacks. One of the key considerations is the potential for accidental injuries.[28] The possibility that complete visual deprivation can lead to patients experiencing falls or burns and psychological distress cannot be understated when providing initial counseling. Having a full-time caretaker at home may not just help with compliance but could also prevent significant injuries. Patient selection is another consideration because those with mobility challenges may not be proper candidates for BEP. One strategy may be to admit these patients to the hospital for full-time BEP until surgery; however, the significant increase in associated health care costs must be weighed against any potential benefits on a case-by-case basis.

There are significant limitations to our study. Because BEP compliance data were self-reported, and there was no reliable method for us to independently verify, these data are subject to bias and inaccuracies. A mitigating method for future studies may be to use a journal for patients to record patching at home. Furthermore, because this study was not randomized, the data are subject to observer and confirmation biases. We experienced a 2% rate of retinal redetachment after initial surgical repair that required repeat intervention; however, this was only measured with a 3-month follow-up period. Redetachment rates may increase if we extended our follow-up period. Owing to the logistical challenges posed by our practice functioning out of multiple clinics, ambulatory surgery centers, and hospitals throughout the state, we were only able to obtain objective measurements regarding the effects of BEP immediately before surgery on 9% of our patients in this study. Although this small data set provided valuable insight, it limits the translatability of our study to a broader population. Further work will be needed to overcome these logistical challenges.

In conclusion, full-time BEP may be an effective method to enhance visual outcomes for patients experiencing acute primary RRD. Although it poses an inconvenience to patients, its appropriate and targeted implementation with thoughtful incorporation into modern practice patterns can offer significant benefits. Larger randomized trials will be necessary to further examine its benefits to our patients through enhanced clinical outcomes and to our health care system through reduced costs and improved patient access.

Key words: rhegmatogenous, retinal detachment, retina, RD, RRD, bilateral patching, patch, eye patch, subretinal fluid, PVD, posterior vitreous detachment.

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