AMBULATORY BINOCULAR OCCLUSION

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Purpose: To show the efficacy of ambulatory binocular occlusion in the management of vitreous hemorrhage and rhegmatogenous retinal detachment.

Methods: Nine eyes with a vitreous hemorrhage, rhegmatogenous retinal detachment, or both were managed initially by ambulatory binocular occlusion before the definitive treatment of the underlying cause was carried out.

Results: In four eyes with a vitreous hemorrhage of rhegmatogenous origin, binocular occlusion resulted in sufficient clearing of the media to allow visualization and treatment of the breaks. In another four eyes with a rhegmatogenous detachment, binocular occlusion reduced the extent of the detachment and made possible a less morbid solution than initially planned. In one eye with a vitreous hemorrhage of diabetic origin, binocular occlusion enabled panretinal photocoagulation.

Conclusion: The benefit of binocular occlusion can be obtained on an outpatient regimen that permits moderate ambulation.

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In previous years, it was routine for retinal specialists and other ophthalmologists to admit to the hospital patients with acute vitreous hemorrhage or with bullous retinal detachment for binocular occlusion and bedrest.[1–4] Fifty percent of acute hemorrhages will settle overnight, and 89% will settle enough by 4 days to make the retina visible and available for laser or cryopexy to close a tear or, in the case of diabetic retinopathy, for panretinal photocoagulation.[5] Most bullous detachments diminish in height with occlusion and rest, and a few become attached. In 1979 Algvere and Rosengren[6] described attaching the retina by immobilizing the eye with occlusion augmented by traction sutures.

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Since the advent of managed care, preoperative admission to the hospital for binocular occlusion and rest is not permitted unless the patient is prepared to pay for the additional inpatient days. After some anguish over having patients with hemorrhage or detachment refused permission for emergency admission by their insurance carriers, we have tried ambulatory preoperative binocular occlusion and allowed the patients to return home for rest.

Materials and Methods

A review of charts between 1993 and 2002 from the practice of the senior author showed nine patients with vitreous hemorrhage, retinal detachment, or both, who were treated initially with binocular occlusion on an ambulatory basis. The mechanism and potential benefit of occlusion was explained to the patient. Both eyes of the patient were covered in the office with a 2 ⅛ × 2 ⅝–inch gauze patch held in place with a single strip of 1-inch paper tape placed diagonally across them. In the presence of a relative or friend, patients with hemorrhages were instructed to sit up for the remainder of the day and to sleep with their head elevated at least 30°. Patients with detachment without hemorrhage were asked to lie with their head com-

fortably on a pillow. They were advised that they could lift the bottom of the patch over the unaffected eye momentarily to see when entering a car, ascending a staircase, and using the restroom. Patients were cautioned that more than a moment of peeking from the unaffected eye may negate settling in the affected eye. It was emphasized that if the peeking eye moved, the affected eye would also move. They were asked to eat finger foods and sandwiches and to return the next day with both patches still in place.

Results

Compliance was remarkably good, as shown by the results. Two patients removed the patch on the unaffected eye because they failed to appreciate the need to cover the unaffected eye. Both, however, succeeded on the subsequent day after additional explanation.

Patient 1

A 64-year-old man was referred for a dense vitreous hemorrhage of 2 days' duration. The hemorrhage obscured the disk and most of the retina. With dilation and depression, the anterior retina was made visible because the blood was still behind the hyaloid. The anterior edge of a detachment was defined inferotemporally from the 6-o'clock to the 9-o'clock position (Figure 1A). Both eyes were patched, and the patient returned home in the custody of a relative with instructions to sit up or recline at 30°. The next morning, the posterior pole was visible, and the visual acuity was 20/40. A long retinal tear, anterior to the equator and extending from the 6:00 to the 9:00 position, was apparent (Figure 1B). Laser coagulation could be applied to the posterior edge of the upper two thirds of the tear. After a second day of binocular occlusion, the inferior edge of the tear was still too obscured by blood to be treated with laser, but was sealed with transconjunctival cryopexy under ophthalmoscopic control. The patient maintained occlusion for another 5 days while the laser and cryopexy adhesions matured. Examination 1 month, 6 months, and 1 year later showed an attached retina. Visual acuity at 1 year was 20/20.

Patient 2

A 78-year-old woman was referred for acute loss of vision of 1 day's duration because of a vitreous hemorrhage. The visual acuity was 20/100. The outlines of an inferior detachment extending from the 4-o'clock to the 8:45 position were visible, and a horseshoe tear was discovered at the 8:30 position anterior to the equator

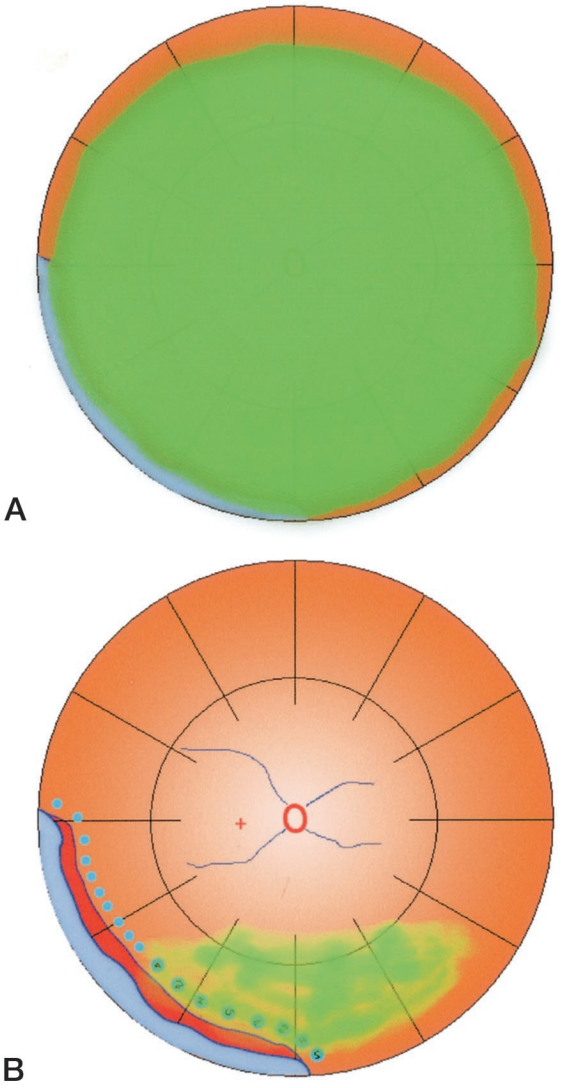

Fig. 1. Retinal drawings of an eye with a vitreous hemorrhage (green) obscuring a retinal detachment. Shown before (A) and after (B) ambulatory binocular occlusion.

(Figure 2A). With binocular occlusion, the vitreous cleared sufficiently overnight to show that the detachment had regressed and the break at the 8:30 position was attached and suitable for laser application (Figure 2B). The visual acuity was 20/40. One year later, the retina remained attached, and the visual acuity was 20/25.

Patient 3

A 54-year-old woman was referred for loss of vision in her right eye of 5 days' duration because of a dense vitreous hemorrhage. Examination showed an opaque vitreous that obscured all of the retina except for the extreme periphery, which appeared attached

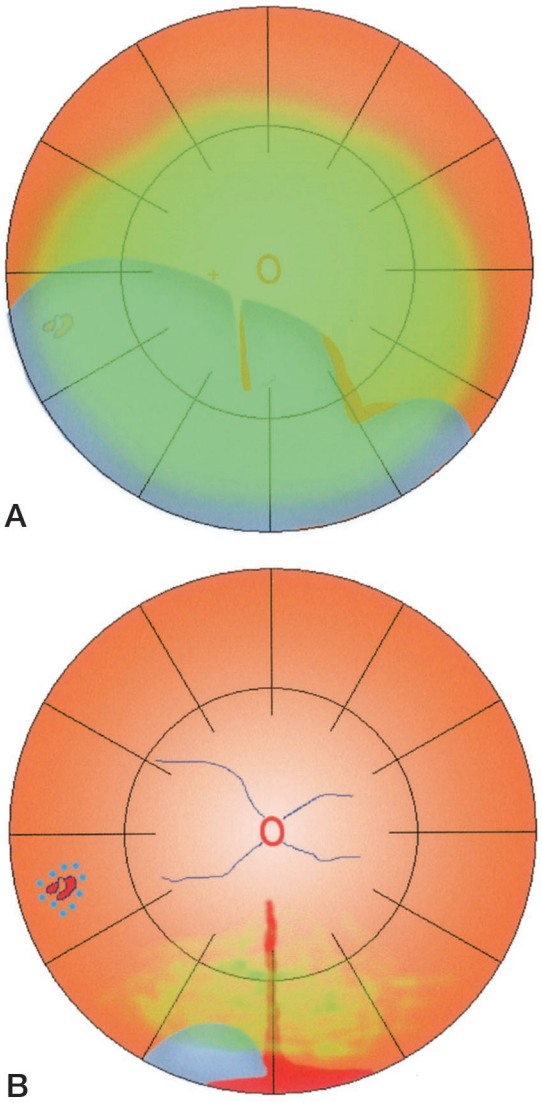

Fig. 2. Retinal drawings of an eye with a vitreous hemorrhage (green) obscuring a retinal detachment. Shown before (A) and after (B) ambulatory binocular occlusion.

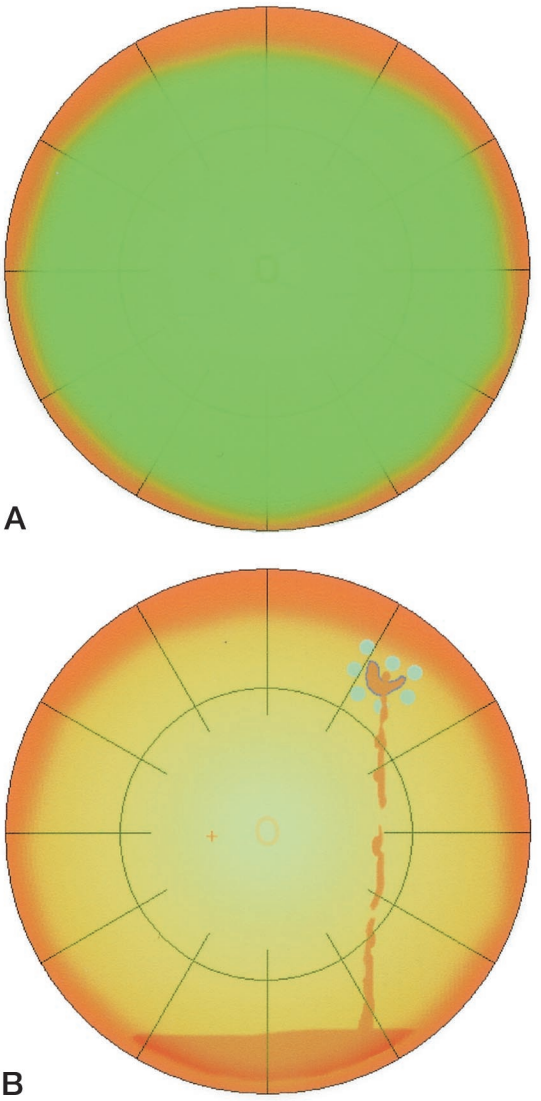

Fig. 3. Retinal drawings of an eye with a vitreous hemorrhage (green) obscuring a retinal detachment. Shown before and after ambulatory binocular occlusion.

(Figure 3A). Slit-lamp examination confirmed the presence of cells in the vitreous gel. The visual acuity was reduced to hand motions. Twenty-four hours after binocular occlusion, the disk was faintly visible, and a horseshoe tear became apparent superonasally, anterior to the equator. Cryopexy was applied to the edges of the tear under binocular ophthalmoscopic control, and the patient was asked to maintain occlusion for 5 additional days. The vitreous was slow to clear because of the cells in the gel (Figure 3B). One month later, the visual acuity was 20/400. One year later, the referring physician confirmed that the retina was attached. There were residual opacities in the center of the vitreous, and the visual acuity was 20/40.

Patient 4

An 80-year-old woman was referred for diminished vision in her right eye of 4 days' duration. Examination showed an inferotemporal detachment that invaded the macula and reduced vision to 20/200. There was spotty preretinal hemorrhage, and the vitreous was hazy. A retinal break could not be found (Figure 4A). Both eyes were patched, and the patient returned home in the company of her daughter and was asked to lie at 30°. Examination the next morning showed the retina to be attached except for a narrow residual elevation in a line of traction in the temporal periphery (Figure 4B). Biomicroscopy of the periphery through a three-mirror lens and with depression failed to show

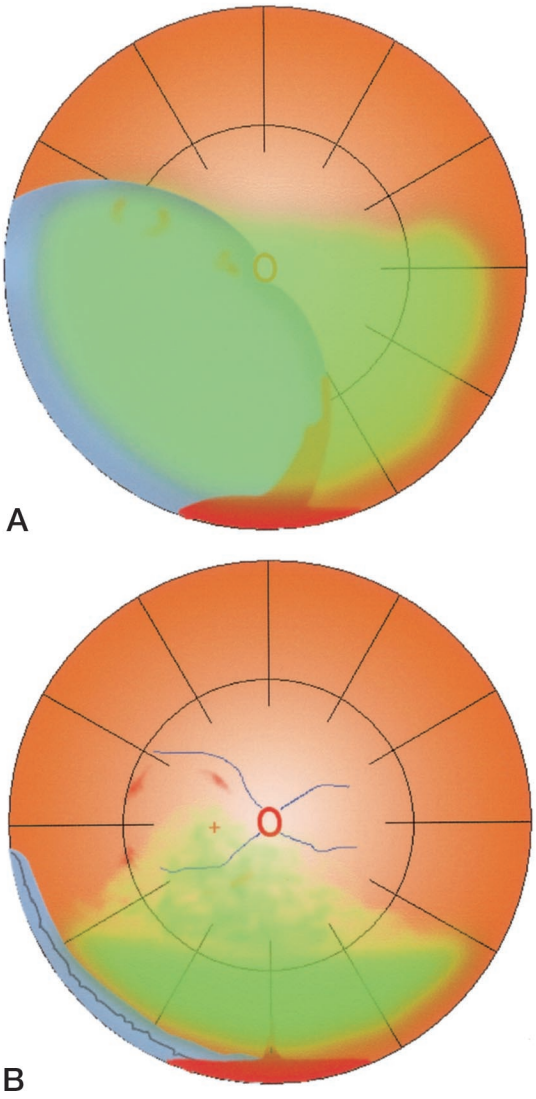

Fig. 4. Retinal drawings of an eye with a vitreous hemorrhage (green) obscuring a retinal detachment. Shown before and after ambulatory binocular occlusion.

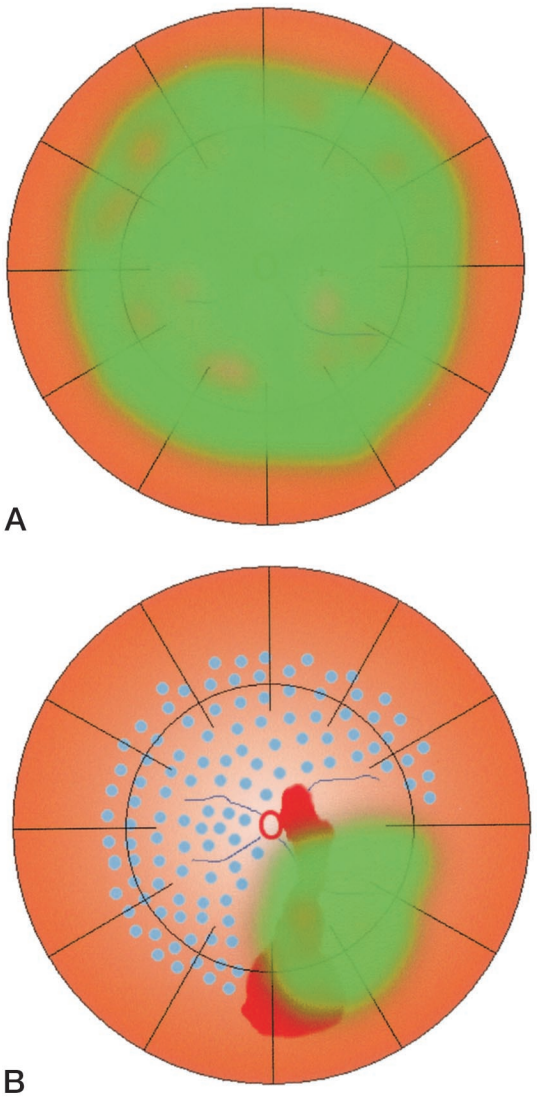

Fig. 5. Retinal drawings of an eye with a vitreous hemorrhage (green) obscuring diabetic retinopathy. Shown before and after ambulatory binocular occlusion.

a retinal break. It was decided to buckle the line of traction from the 6-o'clock to the 8:45 position with a 3 × 5–mm silicone sponge. The retina became attached, and the retina over the buckle was treated with interrupted laser coagulation. Four months later, the retina was still attached. The visual acuity was still 20/200 because of central vitreous opacities. Correspondence with the referring physician 1 year later confirmed that the retina was attached. The visual acuity was 20/40.

Patient 5

A 73-year-old man with diabetes and a history from the referring ophthalmologist of background retinopathy had acute loss of vision of 3 days' duration. The visual acuity was reduced to 5/400. Examination showed a dense vitreous hemorrhage that obscured all but the peripheral retina, which appeared intact (Figure 5A). After 24 hours of binocular occlusion, the vitreous hemorrhage had cleared except for a cloud over the posterior pole and the inferior temporal quadrant. The remainder of the retina accepted a loose pattern of laser applications (Figure 5B). One month later, the inferotemporal quadrant was still obscured, but acuity had improved to 20/100. After 10 months, a vitrectomy was performed at another facility to clear the central vitreous opacity. The final visual acuity was 20/400.

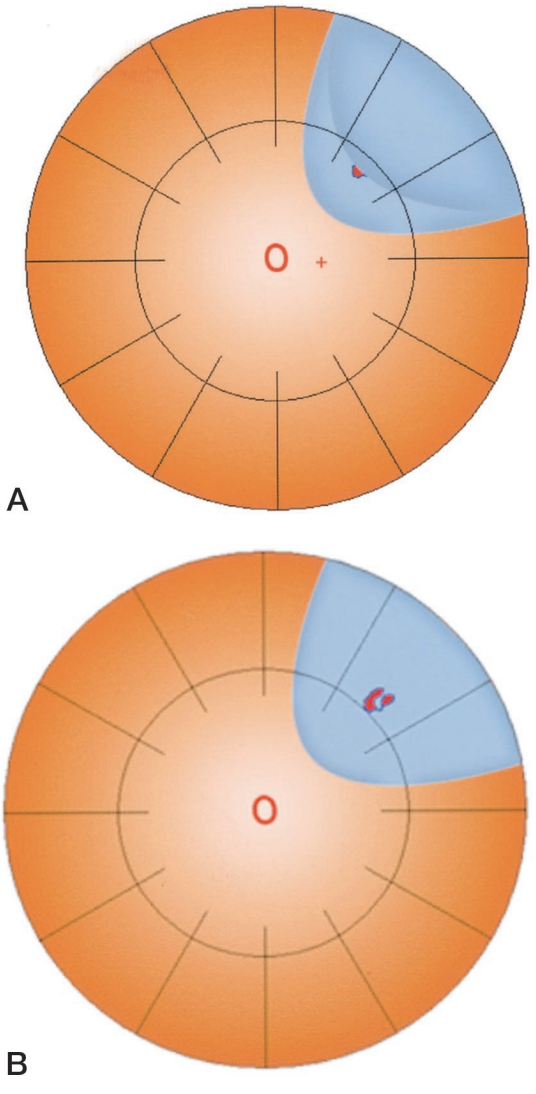

Fig. 6. Retinal drawings of an eye having a retinal detachment with clear media. Shown before and after ambulatory binocular occlusion.

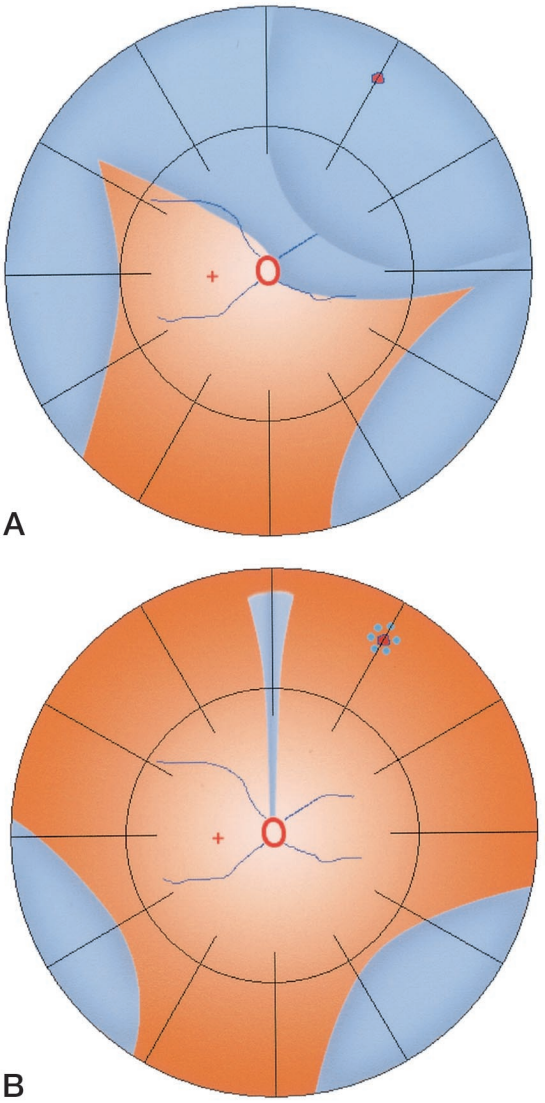

Fig. 7. Retinal drawings of an eye having a retinal detachment with clear media. Shown before and after ambulatory binocular occlusion.

Patient 6

A 56-year-old woman had an acute symptomatic bullous detachment. A retinal break was partly obscured by the overhanging edge of an anterior bullous detachment (Figure 6A). The break appeared to be posterior to the equator, and a vitrectomy procedure was planned for the next day. Both eyes were occluded, and the patient returned home and was asked to lie in bed and to return in the morning. Overnight the anterior bullous detachment settled to reveal the anterior part of a horseshoe tear. With the settling, it became apparent that the tear was located anterior to the equator and would respond to a 5-mm radial sponge buckle without drainage of subretinal fluid, which it did (Figure 6B).

Patient 7

A 39-year-old man was referred for a bullous retinal detachment. He had perceived an inferior shadow for 2 days. The macula was attached, and the visual acuity was 20/20. The contour of the detachment, which crossed the 12-o'clock radian, was inconsistent with the only apparent retinal break, a round hole at the 1-o'clock position, anterior to the equator in the superonasal quadrant (Figure 7A). Intensive indirect ophthalmoscopy and three-mirror biomicroscopy failed to show another break. It was decided to defer surgery and test the contour of the detachment with binocular occlusion. The next day, the superior retina appeared attached except for a vertical traction detach-

ment in the 12-o'clock radian; traction had carried subretinal fluid across the 12-o'clock radian and into the temporal quadrant. The retinal hole in the nasal quadrant, which had become attached, was surrounded with laser applications (Figure 7B). Occlusion was maintained for an additional 5 days, during which time the traction elevation receded and the inferior detachments regressed. One year later, the retina continued to be attached, and the visual acuity was 20/20.

Patient 8

A 31-year-old man sought examination because of a 2-day history of flashes in his right eye. A retinal examination showed a peripheral detachment superonasally with two horseshoe tears (Figure 8A). The tears were suitable for buckling, but the location of the detachment, superonasal, did not qualify him for an emergency evening admission to the hospital. To impede progress of the detachment, the patient returned home with both eyes occluded and was asked to return the next morning for a scleral buckle. In the morning, examination showed that the detachment had receded enough to make the posterior edge of the tear suitable for laser coagulation. Laser treatment was applied, and patching was maintained for a second day, at which time the anterior detachment had receded enough for the anterior edges of the tears to be coagulated (Figure 8B). Occlusion was maintained for 5 more days. One year later, the retina continued to be attached, and the visual acuity was 20/20.

Patient 9

An 18-year-old theological student was referred for a symptomatic detachment secondary to a break at the edge of lattice (Figure 9A). The detachment invaded the edge of the macula and reduced the visual acuity to 20/70. Both eyes were patched, and the patient returned home and was asked to lie in bed, except for toilet, eating, and prayer, and to return in the morning. Examination the next morning showed that the detachment regressed to the equator, and the visual acuity improved to 20/30 (Figure 9B). The patient was advised that if he maintained binocular occlusion for another day, he may avoid a surgical procedure. The patient was enthusiastic about his overnight improvement and chose to maintain occlusion. It took 4 days for the break to become attached and suitable for laser. After the laser treatment, occlusion was maintained for an additional 5 days. One year later, the retina continued to be attached. Three years later, however, the patient returned with a recurrent detachment. A line of traction at the superior edge of the original

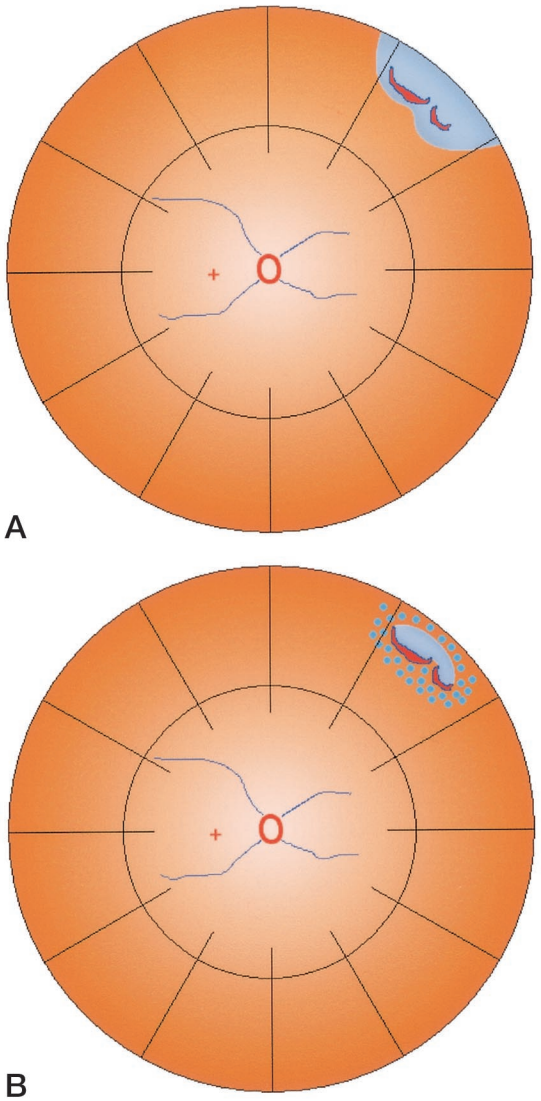

Fig. 8. Retinal drawings of an eye having a retinal detachment with clear media. Shown before and after ambulatory binocular occlusion.

break had reopened the break and caused a redetachment that extended two clock hours above the break and beyond the equator (Figure 9C). Because of the apparent traction, the patient was advised that he would require a scleral buckle. The patient elected, however, to try occlusion again. With occlusion, the detachment regressed, and his shadow diminished and encouraged him to continue occlusion. After 15 days, the break under traction was still detached, and he agreed to surgery (Figure 9D). A short circumferential sponge buckle beneath the break and the line of traction attached the retina. When last examined 3 years later, the retina was still attached, and visual acuity was 20/20.

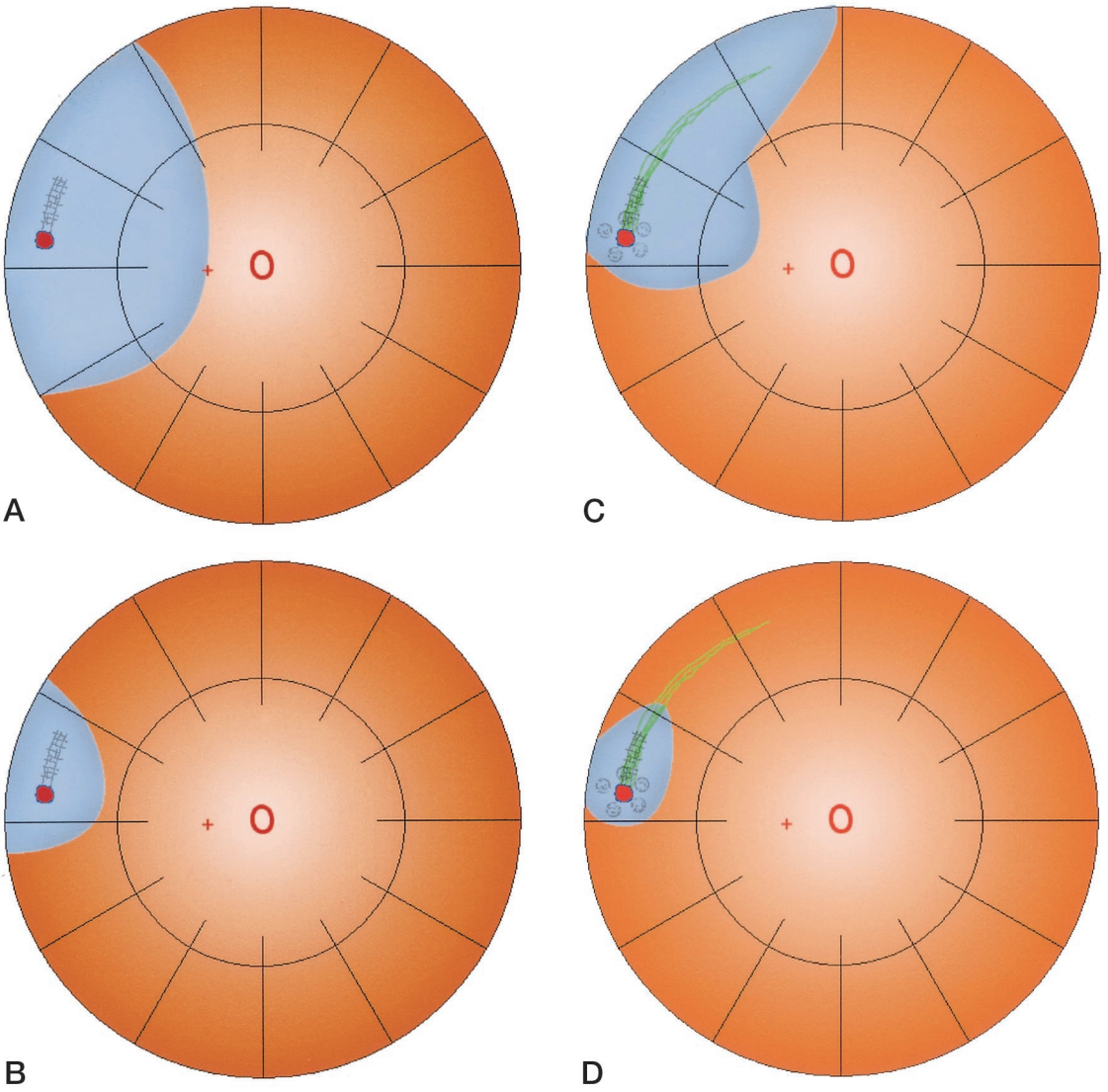

Fig. 9. Retinal drawings of an eye having a retinal detachment with clear media. Shown before and after ambulatory binocular occlusion.

Discussion

The nine examples of vitreous hemorrhage and retinal detachment that have been described indicate that binocular occlusion is the critical factor for the settling of blood or rhegmatogenous retinal detachment. Mobilization of the patient for travel to and from the office and for eating and toilet did not significantly interfere with the settling process. Clearing of vitreous hemorrhage with binocular occlusion can occur in the first days after a preretinal hemorrhage when erythrocytes are still in the retrohyaloid space. Later, the cells will enter the gel and will no longer settle. The decision to try binocular occlusion in a late case can be influenced by the presence or absence of cells in the anterior vitreous on slit-lamp biomicroscopy and by whether the peripheral retina is visible with binocular ophthalmoscopy. If the anterior vitreous is devoid of cells and the peripheral retina is visible, it is likely that most of the blood is still retrohyaloidal, which was the case with patients 1 through 5. In the case of patient 5, who had diabetes, only partial clearing occurred because some blood had already entered the central vitreous gel. It may be argued that this patient would have been more appropriately treated with a vitrectomy. Vitrectomy was also an option for the four patients with a vitreous hemorrhage and retinal detachment to rehabilitate them earlier. Patients after vitrectomy, however, usually have an intraocular gas bubble that inhibits their activity for 1 week or longer. Because of the signifi-

Table 1. Results of Binocular Ambulatory Occlusion

Patient	Initial VA	Vitreous Hemorrhage	Clearing of Hemorrhage (%)	Retinal Detachment (quadrants)	Settling of Retina (%)	Therapy	Final VA
1	20/200	++++	80	1	90	Laser, cryopexy	20/20
2	20/100	+++	90	2	90	Laser	20/25
3	HM	++++	70	0	N/A	Cryopexy	20/40
4	20/200	+++	60	2	90	Buckle	20/40
5	5/400	++++	50	0	N/A	Laser, vitrectomy	20/400
6	20/20	—	N/A	1	20	Buckle	20/20
7	20/20	—	N/A	3	80	Laser	20/20
8	20/25	—	N/A	1	80	Laser	20/20
9 (first episode)	20/70	—	N/A	2	90	Laser	20/20
9 (second episode)	20/200	—	N/A	2	60	Buckle	20/20

VA, visual acuity; HM, hand motions; N/A, not applicable.

cant reoperation rate of vitrectomy (15%–20%) and the acceleration of cataract changes that occurs after vitrectomy, preoperative and postoperative binocular occlusion may be less morbid for some patients.

Maintaining occlusion for 5 days after a break has been coagulated is an arbitrary decision based on our experimental observations on the development of retinal adhesion after cryocoagulation in a rabbit model.[7] Postcoagulation compliance was erratic in our patients, but none of their retinas detached except for patient 9, whose detachment occurred 3 years later because of preretinal proliferation.

Ultrasonography can make it possible to discover retinal detachment in patients with opaque media. Retinal tears may also be shown with ultrasonography.[8,9] Sarrafizadeh et al[10] described a series of 36 eyes with dense hemorrhage. They were followed up initially by ultrasonography, and 14 eyes developed retinal detachment; proliferative vitreoretinopathy was present in seven of them at surgery.

Ambulatory occlusion may be a useful alternative to urgent surgery for the patient with a vitreous hemorrhage that obscures the retina and for the patient with a detachment that is encroaching on the macula.

Key words: double patching, retinal detachment, vitreous hemorrhage.

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