# TREATMENT OF RETINAL DETACHMENT DUE TO CYTOMEGALOVIRUS RETINITIS IN PATIENTS WITH AIDS*

BY *Alexander R. Irvine,* MD

## INTRODUCTION

NEW MEDICATIONS ARE ALLOWING AIDS PATIENTS TO LIVE A LONGER life and are arresting or retarding the progress of cytomegalovirus (CMV) retinitis.[1-5] These advances have led to a new problem: a marked increase in rhegmatogenous retinal detachment due to breaks in areas of old, inactive CMV retinitis.[3,6,7] A number of factors make these detachments resistant to care by the standard techniques of scleral buckling, pneumatic retinopexy, or even vitrectomy and fluid gas exchange. These factors include the multiplicity and frequent posterior location of the breaks; the difficulty in recognizing all the breaks in areas of necrotic detached retina; the difficulty in obtaining a thermal adhesion to seal breaks surrounded by thin, necrotic retina; the ongoing nature of the retinitis; and the inflammatory changes involving the vitreous. The successful treatment of these detachments by vitrectomy and silicone oil injection was reported in 1987 by Freeman and associates[6] and more recently by Sidikaro and colleagues.[7]

The present paper reports on 20 patients with rhegmatogenous retinal detachment due to CMV retinitis. A possibility that myopia predisposes to such detachments is raised. Alternative methods of treatment and their results are discussed. The effect of silicone oil on the refraction is documented, and the data are examined regarding the life expectancy of the patients following surgery and the chance of fellow-eye involvement in an effort to determine the appropriateness of surgery in these sick patients.

## MATERIALS AND METHODS

Between October 1989 and February 1991, 20 patients with AIDS and rhegmatogenous retinal detachment following CMV retinitis underwent

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surgery by the author. All were men between the ages of 25 and 45. If the detachment spared the macular region and had a border of healthy tissue, an attempt was made to wall it off with laser and thus avoid major surgery (five cases). If the area of retinal breaks seemed to be localized and anterior enough that it could all be mounted on a buckle, a standard scleral buckling procedure was attempted (three cases). If either of these two procedures had already failed (in the author's hands or elsewhere) or the area of detached necrotic retina with its myriad holes was too widespread or too posterior to be buckled and the detachment spread across healthy retina in the macula, then vitrectomy and silicone injection was performed (polydimethylsiloxane fluid, 1000 centistokes, provided by Dow Corning Corp, service to medical research, Midland, MI). This was done in 15 cases, including 3 of the patients in whom laser or buckling had failed. Two patients who elected not to undergo any surgery because of their weak state of health and the good state of their fellow eye are not included in this series.

When attempting to wall off a peripheral detachment, a triple row of confluent 250- to 500-μ laser burns was placed in healthy retina surrounding the detachment and the whole area of necrotic healed retinitis. When healthy retina permitted it, treatment was carried out to the ora serrata by adding one or two cryopexy lesions to the end of the laser barrier.

Scleral buckling was done with either an encircling or a segmental silicone explant. Vitrectomy was done with a standard three-port pars plana approach. Retinotomy was performed with the endodiathermy probe in an area of necrotic retina with preexisting holes, if such was present in the superior half of the posterior pole. Otherwise, it was made in healthy, detached retina superior to the disc. Internal drainage and air-fluid exchange was done, draining repeatedly over a period of approximately 5 minutes in an attempt to drain the subretinal fluid as completely as possible. Endolaser was placed around the retinotomy site only if it was in healthy retina. The two superior sclerotomy sites were then sutured, and silicone oil was pumped into the eye via the infusion cannula, while air was allowed to escape via a 27-gauge needle introduced through the pars plana. The eye was rotated so that the needle was uppermost, and great care was taken in an effort to get all of the air out and thus achieve as complete a silicone fill as possible. Following surgery, patients were kept in a face-down position overnight, and they were usually discharged on the first postoperative day with instructions to sleep on either side but not on their back. Sometimes a moderately severe, stellate posterior subcapsular cataract was present on the first postoperative day. Those patients were kept in the hospital with strict face-down positioning for an addition-

al 24 hours, and the opacity usually decreased, so that at discharge the next day only a few scattered vacuoles remained.

## RESULTS

### REFRACTION

The author was struck by the high incidence of myopia in this series of patients, raising the question of whether the myopic eye might be predisposed to detachment following CMV retinitis. Table I lists the preoperative refraction (spherical equivalent) of the 20 patients (group 1). Thirteen of the 20 were 3 diopters (D) or more myopic, and 17 were at least 1 D myopic. A control group of 20 consecutive AIDS patients with CMV retinitis without retinal detachment seen at the San Francisco General Hospital AIDS Clinic is also shown (group 2). The difference between this control group and the patients with detachment is significant ($P$ = 0.0006).

TABLE I: REFRACTION IN PATIENTS WITH CMV RETINITIS*

| | MYOPIA ≥ 3 D | MYOPIA ≥ 1 to < 3 D | < 1 D MYOPIA |
|---|---|---|---|
| Group 1† | 13 | 4 | 3 |
| Group 2‡ | 2 | 7 | 11 |

*$P$ = 0.0006; McCullough's ordered logistic regression.
†Group 1 = previous refraction of patients with retinal detachment (spherical equivalent).
‡Group 2 = refraction of control series of 20 consecutive patients with CMV retinitis without retinal detachment seen at San Francisco General Hospital AIDS Clinic. J.J. O'Donnell, M.D., provided the control series.

Postoperatively the silicone-filled, phakic eye showed a rather uniform, 6- to 7-D hyperopic shift (Table II). This was usually decreased by 1 to 4 D if an encircling buckle was done at the time of silicone fill. Since most of the patients were more than 3 D myopic preoperatively, postoperative hyperopia was usually not severe.

### *Duration From Onset of Antiviral Therapy to Detachment of Fovea*

The duration from the time CMV retinitis was recognized and ganciclovir or foscarnet therapy was begun until detachment crossed the fovea and vitrectomy was done varied from less than 1 month to 9 months, with a mean of 4.5 months and a median of 4 months (Table III).

TABLE II: EFFECT OF VITRECTOMY AND SILICONE OIL INJECTION ON REFRACTION (SPHERICAL EQUIVALENT)

| PATIENT | PREOPERATIVE REFRACTION | POSTOPERATIVE REFRACTION |
|---|---|---|
| Without buckle | | |
| 1 | Plano | +6.75 |
| 2 | −4.00 | +2.00 |
| 3 | −4.25 | +2.50 |
| 4 | −6.00 | +3.00* |
| 5 | −1.50 | Not obtained† |
| 7 | −7.00 | Plano |
| 12 | −2.50 | +4.50 |
| 13 | −3.00 | +4.50 |
| 14 | −1.00 | +5.00 |
| 15 | −2.00 | +4.25 |
| With buckle | | |
| 6 | −5.50 | −2.00 |
| 8 | −4.50 | +4.50 |
| 9 | −5.50 | −1.00 |
| 10 | −0.75 | +1.75 |
| 11 | −0.50 | +6.25 |

*Cataract made refraction difficult.
†Severe macular pucker.

TABLE III: DURATION FROM RECOGNITION OF CMV RETINITIS TO VITRECTOMY

| PATIENT | DURATION (mo)* |
|---|---|
| 1 | 3 |
| 2 | 6 |
| 3 | 2 |
| 4 | 1 |
| 5 | 4 |
| 6 | 3 |
| 7 | 7 |
| 8 | 9 |
| 9 | 8 |
| 10 | 6 |
| 11 | 3 |
| 12 | 5 |
| 13 | 1/2 |
| 14 | 4 |
| 15 | 6 |

*Mean, 4.5 months; median, 4 months.

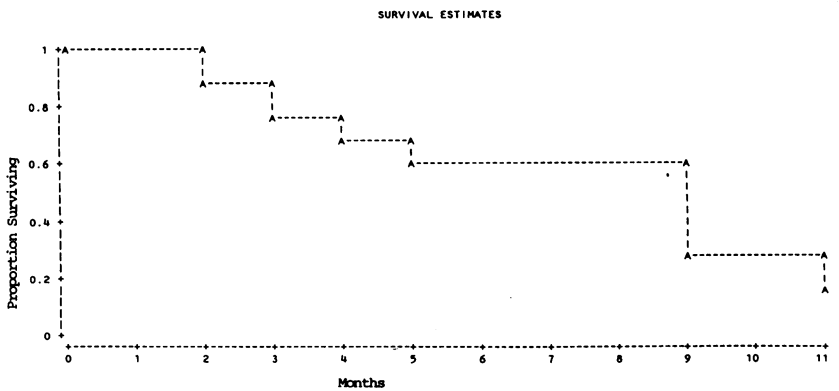


FIGURE 1
Survival analysis of 17 patients who underwent either vitrectomy and silicone injection (15) or only standard scleral buckling (2) for detachment across fovea. Survival is measured from time of surgery (Kaplan-Meier product-limit survival estimate).

### *Survival Following Vitrectomy*

Survival following vitrectomy or scleral buckling for a detachment that had reached the macula is shown in life table analysis in Fig 1. Although all patients had AIDS with detachment due to CMV retinitis, their condition varied from quite cachectic to outwardly robust. Survival varied from just under 2 months to 1 patient still alive at 11 months (Table IV). Approximately 50% survived 6 months.

### *Results of "Walling Off" a Peripheral Detachment with Laser*

Results of "walling off" a large extramacular detachment have been disappointing in this group of patients. Some cases do not lend themselves to laser therapy, because the areas of retinitis come so far posteriorly that there is not a sufficient border of healthy retina in which to place a laser barrier. In the five cases that did lend themselves to laser treatment and were so treated, three of the five failed, with detachment crossing the barrier and extending into the macula. Detachment crossed the laser barrier 2 to 4 weeks after treatment, at a time when a relatively strong adhesion might have been expected. The detachment spread across the barrier without spread of active retinitis.

### *Results of Scleral Buckling*

Only one of the three patients who underwent simple scleral buckling had a successful operation. In one patient with tears at the margin of lattice, outside the areas of old CMV retinitis, it was mistakenly believed that

TABLE IV: SURVIVAL FOLLOWING VITRECTOMY OR BUCKLE FOR CMV DETACHMENT

| PATIENT | DIED AT (MO) | STILL ALIVE AT (MO POSTOPERATIVELY) |
|---|---|---|
| 1 | 9 | |
| 2 | 4 | |
| 3 | 11 | |
| 4 | | 11 |
| 5 | | 8 |
| 6 | 5 | |
| 7 | 2 | |
| 8 | | 6 |
| 9 | | 5 |
| 10 | 3 | |
| 11 | 2 | |
| 12 | | 3 |
| 13 | | 3 |
| 14 | | 3 |
| 15 | | 3 |
| 16* | 3 | |
| 17* | 3 | |

*Buckled only.

closing those tears would lead to cure, since no obvious breaks were detected in the CMV retinitis and the area of retinitis appeared flat (Fig 2A). This proved incorrect and illustrated how difficult it can be to recognize detachment and breaks at the margin of an area of old healed retinitis. Although all the visualized tears in the lattice were closed on a buckle, there were additional unrecognized breaks at the edge of the old retinitis scar and the detachment persisted. The only patient who was successfully repaired by scleral buckling alone had just a single, small area of retinitis, which could be placed in its entirety on a broad 5.5 × 7.5-mm radial sponge (Fig 2B). It seems that when detachment spreads to the edge of an area of old apparently healed retinitis, it must be assumed that there are breaks within that area, especially near its edge, and the whole area must be placed on a buckle to guarantee success by buckling alone.

*Results of Vitrectomy and Silicone Injection*

All 15 of the patients who underwent vitrectomy and silicone injection had successful initial reattachment. Preoperative and postoperative vision in the patients who underwent vitrectomy with silicone injection is shown in Table V. Preoperatively, five patients had only light perception or hand motion vision, seven had finger counting vision, two had 20/200 acuity, and one had 20/40 acuity. Initially the patients did well. Postoperatively

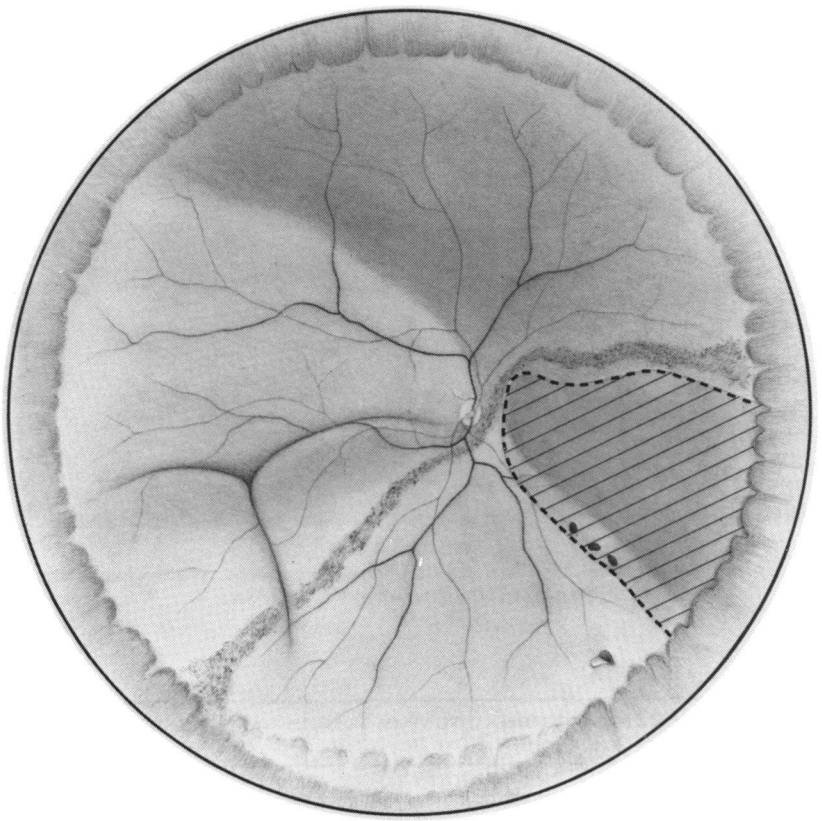

FIGURE 2
Spread of detachment across laser barrier 3 weeks following photocoagulation. A: Detachment spread clockwise from area of old inactive retinitis (*striped lines*) across laser barrier (*crosses*) and then across macula. Note horseshoe tear at 10:30-o'clock position and spread of detachment across ora serrata from 11- to 12:30-o'clock positions.

only one patient did not improve; severe macular pucker developed and the patient maintained just counting fingers vision. Within the first 2 months, postoperative vision improved to a best level of 20/40 to 20/80 in eight patients, 20/100 to 20/200 in five patients, and 20/400 and count fingers in the remaining two patients. Unfortunately, this relatively good vision did not persist, because of postoperative complications including recurrent inferior detachment that crossed the fovea, involvement of the fovea by CMV retinitis, and cataract. At 3 months follow-up, two patients

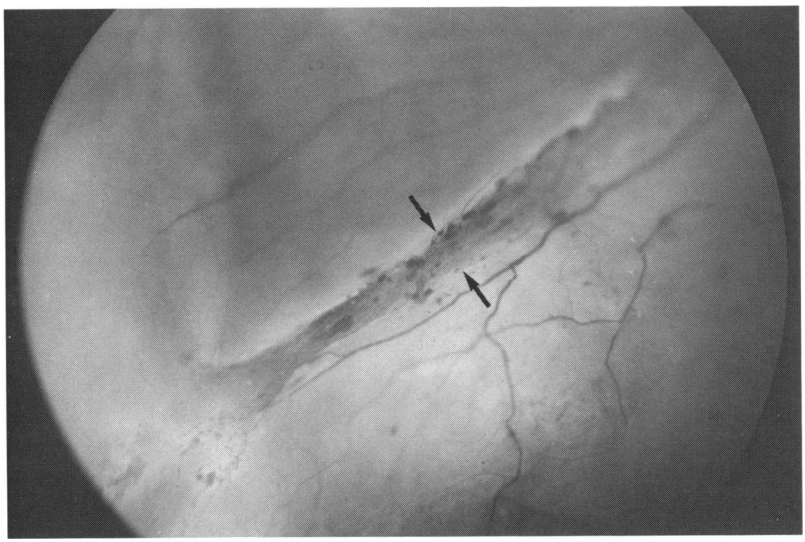

FIGURE 2B
Previous laser barrier (*arrow*) is elevated with bullous detachment. At vitrectomy surgery, vitreous was still adherent to this laser scar.

TABLE V: PREOPERATIVE AND POSTOPERATIVE VISION IN PATIENTS WHO HAD VITRECTOMY WITH SILICONE INJECTION*

| PATIENT | PREOPERATIVE VISION | POSTOPERATIVE VISION | | | COMMENT‡ |
|---|---|---|---|---|---|
| | | BEST IN FIRST 2 MO | AT 3 MO | AT DEATH OR LAST VISIT† | |
| 1 | CF | 20/30 | 20/50 | 20/50 | |
| 2 | CF | 20/40 | 20/40 | 20/50 | |
| 3 | LP | 20/80 | LP | LP | RD |
| 4 | LP | 20/400 | 20/400 | 20/400 | Cataract |
| 5 | CF | CF | CF | CF | Macular pucker |
| 6 | 20/40 | 20/40 | 20/40 | CF | RD |
| 7 | CF | 20/200 | Died | CF | RD |
| 8 | HM | 20/200 | 20/400 | 20/400 | CMV in macula |
| 9 | CF | 20/100 | 20/100 | 20/200 | Cataract and RD |
| 10 | HM | 20/200 | CF | CF | Cataract and RD |
| 11 | 20/200 | 20/80 | Died | CF | RD |
| 12 | 20/200 | 20/80 | 20/200 | 20/200 | CMV in macula |
| 13 | HM | 20/70 | 20/80 | 20/80 | |
| 14 | CF | 20/200 | 20/200 | 20/200 | |
| 15 | CF | 20/70 | 20/60 | 20/60 | |

*CF, counting fingers; LP, light perception; HM, hand motions.
†Sometimes bedside estimate or even telephone description.
‡RD, recurrent detachment spreading across foveola from below.

had died; acuity was 20/40 to 20/80 in five patients, 20/100 in one patient, 20/200 in two patients, 20/400 in two patients, counting fingers in two patients, and light perception in one patient. In the last months of life, patients were often unable to return, and follow-up sometimes was limited to bedside examination or even telephone conversation, so that visual acuities were often approximate. As best as could be ascertained, however, at the time of death or at the last recording for those surviving, vision remained 20/40 to 20/80 in four patients and 20/200 to 20/400 in five patients and had fallen to count fingers or light perception in six patients.

The major postoperative complication following vitrectomy and silicone injection was recurrent detachment that began inferiorly and slowly spread upward until it crossed the fovea. This complication developed in 6 of the 15 patients. In one of these (patient 9), subsequent surgery with drainage of subretinal fluid and heightening of the preexisting buckle to effectively increase the silicone fill was done successfully.

Drainage of subretinal fluid in the presence of silicone oil can be difficult, as the drainage site must be kept dependent to avoid silicone pressing the retina against it. Techniques allowing drainage in a dependent position under observation with the indirect ophthalmoscope, such as described by Charles,[8] or with the use of the modified lacrimal probes of Wilder (Karl ILG Instruments, Inc, St Charles, IL) designed to bluntly dissect into the subretinal space through a bevelled partial thickness scleral incision have proven useful in these cases.

The development of visually significant cataract following silicone surgery was relatively unusual in these patients. Some posterior subcapsular vacuoles were often present in the early postoperative period, and there were sometimes inflammatory precipitates on the back surface of the lens, apparently sequestered there by the silicone. The lens opacity seemed to progress very slowly, so that in only 3 of the 15 patients did cataracts develop that were believed to be sufficient to limit vision in the 20/200 to 20/400 range.

### *Risk of Loss of Fellow Eye*

Of the 15 eyes that underwent vitrectomy and silicone injection, 2 had lost vision in the fellow eye preoperatively. Four of the remaining 13 lost vision in the fellow eye during follow-up so that the operated eye became the better eye. Four patients had no evidence of CMV infection in the fellow eye at the time of surgery, and none of these lost the vision in that fellow eye. Thus, if we study the nine patients with good vision but some evidence of CMV infection in the fellow eye at the time of surgery, we find that in four of the nine, the operated eye eventually became the better eye.

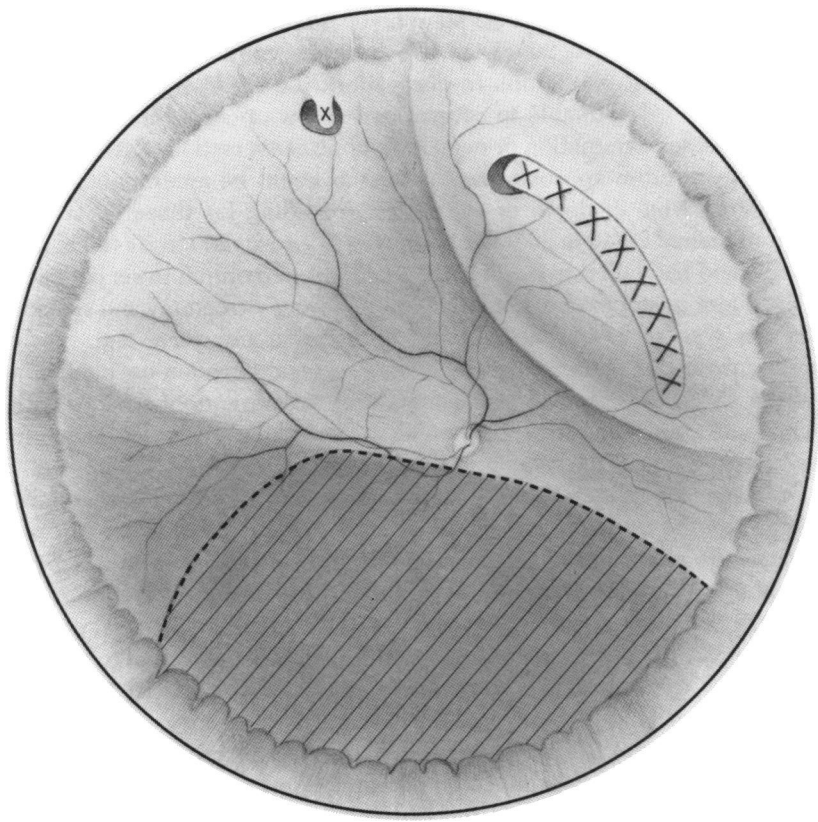

FIGURE 3
Cases treated with scleral buckling alone. A: Retinal tears related to lattice vitreoretinal degeneration and lying outside area of old healed retinitis (*striped area*) seemed responsible for this detachment. Closing these tears with superior, segmental buckle failed to cure detachment, presumably because of small, unrecognized breaks in area of old retinitis. B: Multiple small retinal breaks were present in area of healed retinitis in inferotemporal quadrant. Because this area of old retinitis was relatively small, it could all be placed on radial buckle (7.5 × 5.5-mm sponge). This led to cure of detachment.

## CASE EXAMPLES

### WALLING OFF WITH A LASER BARRIER

*Case 1*

A 41-year-old man with −2.00 D myopia had been taking foscarnet since the diagnosis of CMV retinitis 5 months previously. He was referred with a fresh

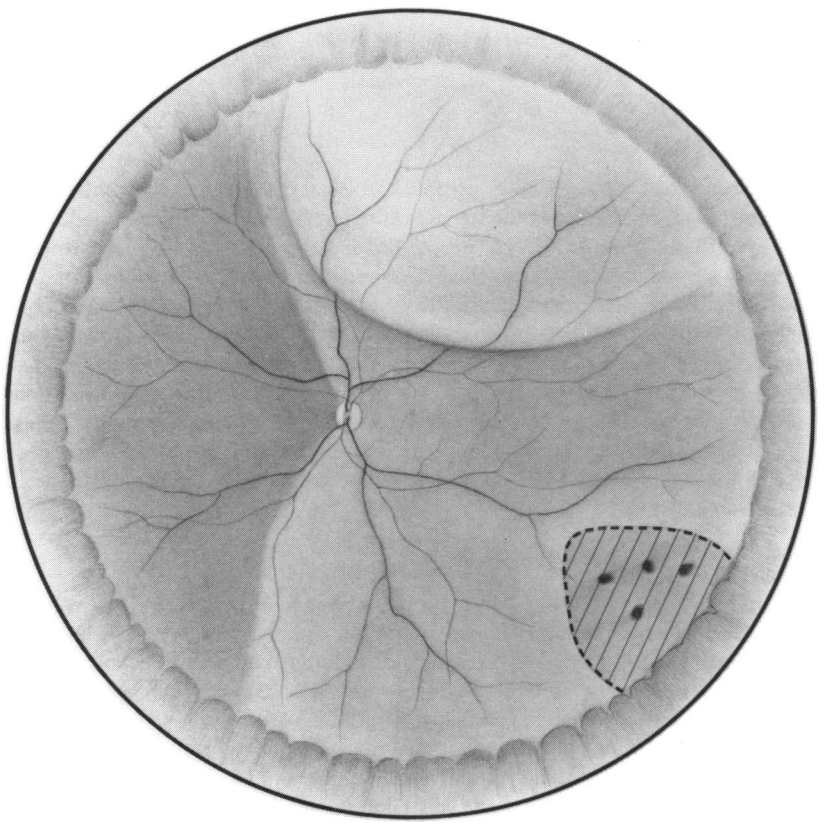

FIGURE 3B

bullous supranasal retinal detachment in his left eye. There was a large area of old, inactive retinitis nasally, extending from the ora to almost reach the optic nerve with several atrophic breaks at its superior margin. The detachment extended from that superior margin at the 10-o'clock position clockwise to the 1-o'clock position. Vision was 20/25 in the right eye and 20/30 in the affected left eye. A barrier consisting of a triple row of confluent laser burns was placed around the detachment and the area of old retinitis, connecting to the ora with cryopexy at the 1:30 and 8:30 positions. Three weeks later the detachment crossed the whole laser barrier and the vision fell to finger counting (Fig 2). At that time, there was spread of the detachment across the ora serrata superiorly and a small horseshoe tear at the 10:30 position. The previous laser barrier could be seen as a thinned linear area of retina bullously elevated in the detachment. The whole line of laser therapy had been pulled right up with the detachment. At the time of vitrectomy, the posterior hyaloid was found still attached to the elevated retina along this laser barrier. The development of the small horseshoe tear and the spread of the

detachment across the ora were considered further indication that vitreous traction was playing a role.

### SCLERAL BUCKLING

*Case 2*

A 27-year-old man with −3.50 D myopia had been taking ganciclovir therapy for CMV retinitis for 7 months when he was referred with a retinal detachment in his right eye. In addition to a large area of old inactive scarring from the retinitis inferiorly, he had lattice vitreoretinal degeneration superiorly with large horseshoe tears. The detachment appeared to end at the upper edge of the area of old, inactive retinitis, and it was felt that simply closing the tears in the lattice would cure the detachment (Fig 3A). A segmental buckle successfully closed these breaks, but the detachment persisted. It appeared that the detachment extended shallowly into the area of old, apparently healed retinitis, and atrophic breaks there caused failure of the buckling procedure. Because the patient had good vision in the other eye and was quite sick, no further surgery was done. He died 3 months later.

*Case 3*

A 42-year-old man with −3.50 D myopia had not been aware of CMV retinitis until a retinal detachment developed in the left eye. He had a bullous temporal detachment, including a small area of old retinitis with atrophic holes in the periphery between the 4- and 5-o'clock positions. Several patches of active retinitis were seen in attached retina just nasal to the optic nerve (Fig 3B). A radial 5 × 7.5-mm segmental sponge explant was placed, buckling the entire inferotemporal area of old retinitis. The retina remained flat, and vision improved to 20/70 for 5 months. Although the patient was taking ganciclovir, CMV retinitis in the posterior pole with papillitis recurred and vision fell to no light perception in that eye before he died 7 months postoperatively. Fortunately, vision remained good in the fellow eye until death.

### VITRECTOMY WITH INTRAVITREAL SILICONE INJECTION

*Case 4*

An emmetropic 27-year-old man had been taking gancyclovir for 3 months for CMV retinitis when a retinal detachment in the right eye developed as a result of breaks at the margin of a large area of inactive retinitis just above the superotemporal arcade. The left eye also had large areas of peripheral inactive scarring from retinitis. Vision was counting fingers right eye and 20/20 left eye. The patient underwent vitrectomy and silicone injection in the right eye, and vision improved to 20/50 with a +6.50 sphere with +0.75 cylinder axis 105. Four months after surgery, the fellow left eye developed retinal detachment and the right eye, maintaining 20/50, acuity became his only seeing eye. He died 9 months postoperatively. The patient was too sick to come for examinations during the last month of his life, but by telephone report he appeared to maintain 20/50 vision in his right eye until death.

*Case 5*

A 30-year-old man with 4.25 D myopia had had retinal detachment in his left eye 2 months previously, which had led to the initial diagnosis of CMV retinitis. That detachment was not treated, but he was referred when his right eye detached. At that time vision was recorded as light perception in the right eye and hand motions in the left. Five days after loss of vision in the right eye, he underwent vitrectomy and silicone injection. Vision improved to 20/200 with a +2.50 sphere in the right eye. He maintained that 20/200 vision until 3 months postoperatively, when shallow detachment crossed the fovea and his vision fell to finger counting. He died 11 months postoperatively with just light perception vision.

## DISCUSSSION

The increased incidence of myopia in those patients with CMV retinitis in whom detachment developed, as compared to those in whom it did not, implies that myopia may predispose to detachment in the presence of retinal necrosis and vitreous inflammation produced by CMV retinitis. It may be that in myopic patients with relative stabilization of the retinitis by ganciclovir or foscarnet therapy, prophylactic photocoagulation is indicated, as has been suggested for patients with the acute retinal necrosis syndrome.[9,10] The discouraging results of attempting to wall off larger extramacular detachments gives impetus to such prophylactic therapy. Such prophylactic therapy would have to include a very wide margin to take into account the usual creeping progression of the retinitis seen even in those patients who do respond to antiviral therapy. The reason for the frequent failure of the laser barriers in the present series may be that these detachments were simply too large and bullous to be walled off, with too great a volume of subretinal fluid pushing against the barrier. On the other hand, it was the author's impression that vitreous contraction in eyes without complete posterior vitreous detachment contributed to the failure.

As medical therapy improves, the life span of AIDS patients would be expected to continue to increase. The survival from time of surgery until death found in this study will probably be superseded by longer survivals. As this occurs, the incidence of involvement of the fellow eye can be expected to increase beyond that found in this study. Thus, it might be predicted that the indications for surgery will become progressively stronger with time.

The results of vitrectomy plus silicone oil injection in this series indicate a modest success. Cataracts have been a complication but were not often sufficient to decrease the acuity below the 20/200 level. The spread of CMV retinitis into the fovea was recognized in only 2 of the 15 patients.

The major postoperative complication has been the recurrence of inferior retinal detachment with gradual spread across the fovea. At one point the author thought that a broad inferior buckle would help prevent this complication, but that appears to have been counterproductive. It seems that the buckle always decreases somewhat in height postoperatively, and as it does so, the vitreous cavity enlarges and thus the silicone fill becomes less complete. Unless the whole area of inferior retinitis can be placed on the buckle, it seems best not to place a buckle. Because the surface tension of the silicone bubble causes the silicone to round up into a sphere, a meniscus of fluid is present extending up across the fovea when the patient is in the upright position, unless the silicone fill is nearly complete (Fig 4). In the most recent cases, we have seemed to achieve a more complete fill, and it is hoped that the incidence of recurrent macular detachment will decrease. Perhaps some cases that have sufficient healthy retina outside the inferior arcade could be treated with a prophylactic laser barrier placed at the time of silicone surgery in an attempt to avoid spread of such inferior detachments across the fovea.

The decision of whether or not to perform vitrectomy and silicone surgery on a patient with CMV detachment due to AIDS is a complex one. Each case must be judged according to the systemic status of the patient and the status of the fellow eye. It is hoped that the data from the present study will be of help in making these decisions.

### *REFERENCES*

1. Lemp GF, Payne SF, Neal D, et al: Survival trends for patients with AIDS. *JAMA* 1990; 263:402-406.
2. San Francisco Department of Health: Recent survival trends for persons with AIDS in San Francisco. *San Francisco Epidemiology Bull* 1990 (July); 6 (7).
3. Holland GN, Sidikaro Y, Krieger AE, et al: Treatment of cytomegalovirus retinopathy with ganciclovir. *Ophthalmology* 1987; 94:815-823.
4. Jabs DA, Newman C, De Bustros S, et al: Treatment of cytomegalovirus with ganciclovir. *Ophthalmology* 1987; 94:824-830.
5. Holland GN, Sison RF, Jatulis DE, et al: Survival of patients with the acquired immune deficiency syndrome after development of cytomegalovirus retinopathy. *Ophthalmology* 1990; 97:204-211.
6. Freeman WR, Henderly DE, Wan WL, et al: Prevalence, pathophysiology, and treatment of rhegmatogenous retinal detachment in treated cytomegalovirus retinitis. *Am J Ophthalmol* 1987; 103:527-536.
7. Sidikaro Y, Silver L, Holland GN, et al: Rhegmatogenous retinal detachments in patients with AIDS and necrotizing retinal infections. *Ophthalmology* 1991; 98:129-135.
8. Charles SR: Controlled drainage of subretinal fluid and choroidal fluid. *Retina* 1985; 5:233-234.
9. Han DP, Lewis H, Williams GA, et al: Laser photocoagulation in the acute retinal necrosis syndrome. *Arch Ophthalmol* 1987; 105:1051-1054.
10. Sternberg P, Han DP, Yeo JH, et al: Photocoagulation to prevent retinal detachment in acute retinal necrosis. *Ophthalmology* 1988; 95:1389-1393.

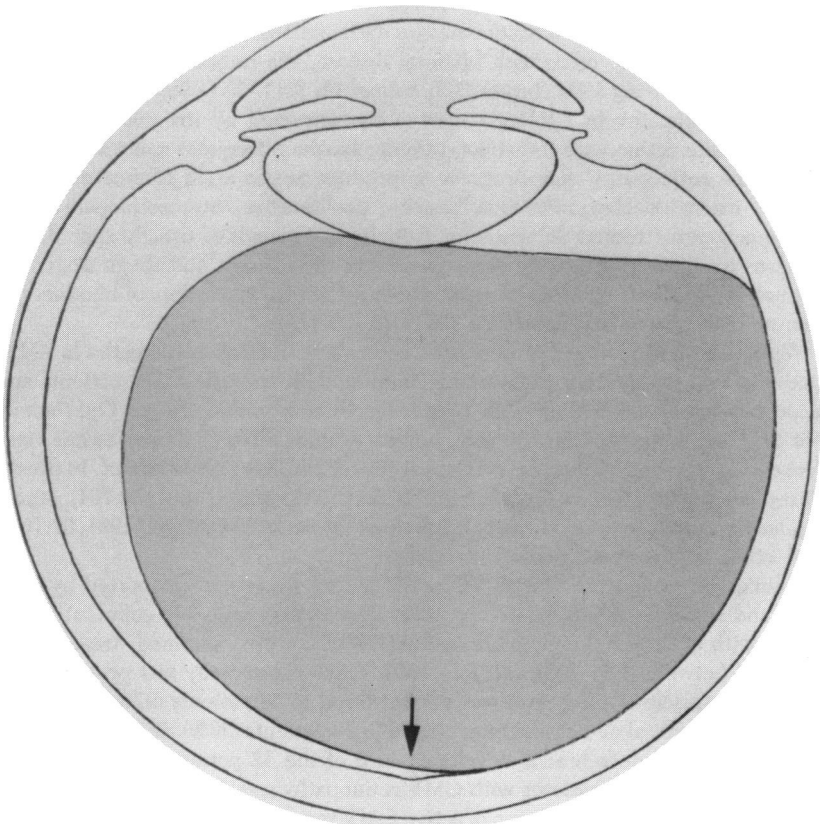

FIGURE 4
Even with over 75% of vitreous cavity filled with silicone, meniscus of fluid crosses fovea (*arrow*). To ensure against spread of inferior detachment across fovea, nearly complete silicone fill is necessary.

## *DISCUSSION*

DR BRADLEY R. STRAATSMA. Doctor Irvine is to be congratulated for an excellent report on a major ophthalmic problem. Illustrating the dimension of the problem, it is estimated that 1 million people in the United States are infected with the human immunodeficiency virus, type 1 (HIV). Most of these people are not even aware of their infection, but an increasing number of individuals progress to the acquired immune deficiency syndrome (AIDS) each year.

In patients with AIDS, cytomegalovirus (CMV) retinopathy is by far the most common ocular infection (*Ophthalmology* 1991; 98:129-135). About 35,000 cases of CMV retinopathy, often with bilateral disease, are projected to occur in the United States during 1991 (*Invest Ophthalmol Vis Sci* [ARVO Suppl] 1991; 32:iv).

CMV retinopathy in AIDS patients is characterized by irregular patches of opaque white retina with indistinct granular borders, frequent ganciclovir treatment, the retinopathy may progress to produce larger areas of necrotic white retina, extensive chorioretinal adhesions, proliferative vitreoretinopathy, and rhegmatogenous retinal detachment. Initially the macula is usually spared, but progressive CMV retinopathy may extend into the macula, and rhegmatogenous retinal detachment may also be responsible for severe vision loss of blindness in one or both eyes (*Ophthalmology* 1991; 98:129-135).

Variations in the clinical presentation and course of CMV retinopathy in AIDS patients may result from the variable immunodeficiency in AIDS patients and concurrent retinal infection with *Cryptococcus neoformans* (*Invest Ophthalmol Vis Sci* [ARVO Suppl] 1991; 32:766), herpes simplex virus or herpes zoster virus (*Invest Ophthalmol Vis Sci* [ARVO Suppl] 1991; 32:iv. *Am J Ophthalmol.* In press), *Toxoplasma gondii* (*Invest Ophthalmol Vis Sci* [ARVO Suppl] 1991; 32:764), *Mycobacterium avium* complex (*Invest Ophthalmol Vis Sci* [ARVO Suppl] 1991; 32:764), and other opportunistic ocular infections.

Clinical variations are illustrated by the UCLA experience, reported by Sidikaro and associates (*Ophthalmology* 1991; 98:129-135), with 130 consecutive patients with ophthalmic complaints and AIDS who were examined, treated, and followed between July 1983 and July 1987. CMV retinopathy was present in 60 patients, ganciclovir treatment was administered to 58 patients (97%), and rhegmatogenous retinal detachment developed in 12 patients (20%). Bilateral rhegmatogenous retinal detachment developed in 8 of the 12 patients (67%).

In all 20 eyes of 12 patients with CMV retinopathy and rhegmatogenous retinal detachment, there was evidence of active CMV retinopathy when the detachment developed, and all 20 eyes presented proliferative vitreoretinopathy. In 1 eye, there was a single horseshoe-shaped retinal tear, but the other 19 eyes presented retinal detachment associated with extensive retinal necrosis and multiple atrophic holes.

Retinal reattachment surgery performed on seven eyes of six patients consisted of scleral buckle with intraocular gas in two eyes and vitrectomy with intraocular silicone oil in five eyes. Retinal reattachment was achieved in six of seven (86%) operated eyes. Vision after retinal reattachment ranged from light perception to 20/20, but vision generally deteriorated during the postoperative follow-up period. Median survival from retinal detachment surgery to death was approximately 17 weeks, and about half of the patients maintained ambulatory vision (5/200) up to the time of death.

The experience of Doctor Irvine at the University of California, San Francisco, is similar in all major respects to the findings noted at UCLA. Additionally, Doctor Irvine has identified myopia as a significant risk factor for development of rhegmatogenous retinal detachment in AIDS patients with CMV retinopathy. His obser-

vations, analysis, and surgical results are highly commendable.

In closing, I wish to address two questions to Doctor Irvine. First, recognizing the increasing prevalence of AIDS, CMV retinopathy, and associated retinal detachment, as well as the frequent bilaterality of the disease and the debilitated state of many afflicted patients, what are your current indications for retinal reattachment surgery in these individuals? Second, following, successful retinal reattachment surgery in patients with AIDS and CMV retinopathy, progressive loss of vision is usually ascribed to CMV retinopathy. However, AIDS patients may have diffuse retinal damage, optic neuropathy, and other causes for vision loss. In your experience, what causes progressive loss of vision in AIDS-CMV retinopathy patients who have had successful retinal reattachment surgery?

DR WILLIAM H. JARRETT. Thank you Doctor Blodi and Doctor Anderson. I want to congratulate Doctor Irvine on a very useful and worthwhile paper. The problem of retinal detachment complicating CMV retinitis in AIDS patients is becoming more and more prevalent in all parts of this country. In another context, I have heard Doctor Irvine predict that within 10 years this will be one of the most frequent diagnoses encountered by vitreoretinal surgeons.

Our experience in dealing with detached retinas complicating CMV retinitis in AIDS patients has been quite similar to Doctor Irvine's. We too have utilized "routine" methods of treatment, such as transconjunctival cryopexy, pneumatic retinopexy, walling off with laser, and scleral buckling, but have not been satisfied with our results using these methods. Consequently, when we now see a patient with CMV retinitis and retinal detachment, our procedure of choice as a primary procedure is pars plana vitrectomy with silicone oil injection, even in the phakic patients.

I have two points to make: one has to do with surgery, and the second with follow-up of the patients. Doctor Irvine mentioned the problem of recurrent retinal detachment due to inferior fluid creeping up beneath the silicone oil. We have had the same experience, but we have found that doing the procedure in two stages will prevent this. At the initial vitrectomy, after the subretinal fluid has been drained, an air/fluid exchange is carried out and an expandable gas, either C3F8 or SF6, is injected. Over the next several days the gas bubble expands inside the eye, and any residual subretinal fluid will be totally gone within 2 or 3 days. The patient is then returned to the operating room and a silicone/gas exchange is carried out, filling the cavity with silicone. When done in this two-stage procedure, the retina usually stays flat with the silicone in the eye.

The second one has to do with further visual loss following successful anatomic reattachment of the retina. We have had the unhappy experience of optic nerve involvement, as well as retinal infection, with the CMV virus, despite both ganciclovir and foscarnet. I wonder if Doctor Irvine would comment on his experience with optic nerve involvement in these patients.

DR J. DONALD GASS. Doctor Irvine, I enjoyed your paper very much.

I would like to ask a question that concerns your most frequent complication

that occurred in 6 of the 15 patients, that is the gradual creeping of the detachment superiorly into the macula. Doctor Jarrett has already suggested one way of managing this. Since you have silicone in the eye at the time of surgery, you might consider putting three rows of prophylactic treatment along the major inferior vascular arcade from the disc to beneath the macula to block the spread of the detachment.

DR ROBERT C. DREWS. One practical question. There are a couple of studies now which show that ophthalmic surgery teams have a much greater incidence of self-inflicted injury during surgery than other surgical teams in operating rooms. I just wondered if you take special precautions, education, whatever, to protect the surgeon and the team from blood borne HIV infection.

DR ALEXANDER IRVINE. I thank the discussants. Doctor Straatsma aptly points out that though averages and life table analysis are helpful, the decision as to whether or not to operate on a single patient is an all or none proposition, and he asks "what factors do we use in making that decision?" There are three major variables: The visual potential of the eye in question, the general health of the patient, and the state of the fellow eye. At the extremes, the decision is easy, and in between it becomes a real exercise in clinical judgment. Let us look at those variables. First, the visual potential of the eye in question. Most of these eyes have peripheral retinitis, and there is not involvement extremely close to the disc or the fovea. In that situation, with the retina mobile and healthy in the posterior pole, there is a good prognosis in the eye in question. The second question is the general health of the patient. Some of these patients appear quite robust and you think they have a long time to survive. That is quite different from other patients who may come in so emaciated that you know they do not have very long to go. That also has to be weighed in your decision, as to whether or not to operate. The final factor is the state of the fellow eye. This is where the data from our paper may be most helpful. With present use of DHPG and foscarnet, and with the internists' willingness to reinduce patients with DHPG when needed, I think we have much better control of CMV retinitis. So that if there is no evidence of retinitis in the fellow eye at all, then I think the risk of that fellow eye later developing retinitis and detaching is so low that we can advise against operating on the first eye. On the other hand, if there are areas of necrotic retina from old retinitis in the fellow eye, the chance of that eye later detaching is close to 50% and hence surgery on the first eye may be indicated.

I can illustrate this with this case where we have retinitis coming down and beginning to involve the disc in one eye. Now if that eye developed detachment, we would tend not to operate because of the poor prognosis for maintaining good vision even if reattached. In another eye, where we have retinitis ending just behind the equator, with relatively healthy tissue in the region of the disc and macula, you would be more tempted to operate, depending on the general health of the patient and the state of the fellow eye. These, then, are the three variables that we try to put together in making the clinical decision of whether or not to operate.

Doctor Straatsma's second question related to the postoperative visual loss after initially successful surgery. We have talked about the problem of recurring detachment. That has been the major problem. Other problems have been spread of CMV retinitis to either the fovea or the optic nerve. But that occurred relatively infrequently in the 15 patients on whom we did the silicone oil surgery. Only three of those developed such involvement of the disc or fovea.

Doctort Jarrett describes his technique of dividing the surgery into two stages in order to get the retina as dry as possible and hence the best silicone fill. I think what he is saying makes awfully good sense and I have preferred to treat some proliferative vitreoretinopathy cases that way. In the AIDS patients at internal drainage we will drain, wait a minute, drain again. It usually takes at least 5 minutes just to repeatedly drain and get as much as we can. But even having done that, the next day we say "my God what has happened, there wasn't any room there, we had it all flat and now there is more room." I always feel that maybe the choroid is engorged in eyes that have detachment, and it shrinks postoperatively to produce more space. I think Doctor Jarrett's technique makes sense. The problem is that one thing we want in these sick AIDS patients is to have as simple as procedure as possible. We would love to avoid taking them to the operating room twice.

Doctor Gass's suggestion, that once you get the retina flat at surgery, you ought to put a laser barrier down along the inferior temporal arcade to prevent recurrent inferior detachment from spreading across the fovea is a good one, and I think we are going to start to do that in those cases where posterior involvement doesn't come too close to the fovea to prevent it. I have heard of some others who said that they have done that.

Doctor Drews' raises the question of the risk to the operating team. I think, frankly, that has to go into our equation, too, when we are deciding whether or not to operate on this patient. We have to decide what is best for the patient, what is his predicted survival, is there chance for vision in that eye, is there enough chance of losing his fellow eye enough to warrant the decision to operate. But, also, we have to factor in to some degree the risk to our operating team. As Doctor Drews points out, we are putting them to some risk. What precautions do we take? We do double glove, for whatever that is worth. The main change that we've made is that we never use a needle twice. We use a needle once and we throw that one away and open another pack for the next needle. Also, we do not pass the sharp suture scissors back and forth. We use a blunt scissors for cutting all our sutures. People have talked about the technique of having an intermediate table where the surgeon takes an instrument and puts it on the table and the nurse picks it up from there, rather than handing it back and forth between the scrub nurse and the surgeon. We have not found that practical in our vitrectomy surgery, where we have our eyes inside the microscope most of the time. So we have not done that. We do double glove, never use a needle twice, and avoid sharp scissors.