VITRECTOMY FOR EPIRETINAL MEMBRANES WITH GOOD VISUAL ACUITY

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ABSTRACT

Purpose: To evaluate the visual results of vitrectomy for epiretinal membrane in eyes with a preoperative visual acuity of 20/50 or better.

Methods: The visual results and complications were analyzed following vitrectomy for idiopathic epiretinal membranes and epiretinal membranes secondary to retinal tears. This study was a retrospective, consecutive case series of 40 eyes of 40 patients treated by a single surgeon.

Results: The mean preoperative visual acuity was 20/50 +2 (range, 20/30 +1 to 20/50 –3). The mean visual acuity improved to 20/40 +2 (P = .02) by the final examination at a mean of 2.4 years following surgery. The status of the lens at the final examination was correlated with the visual results of surgery. Twenty-one eyes were phakic preoperatively, and 14 of these eyes had cataracts removed by the final examination. The mean preoperative visual acuity in seven eyes that were still phakic at the final examination was 20/50, and this decreased to 20/50 –2 (P = .82). The mean preoperative visual acuity was 20/50 +2 in 33 eyes that were pseudophakic by the final examination, and this improved to 20/32 –2 (P = .005). The visual acuity improved by 2 or more Snellen lines in only one in seven eyes (14%) that were still phakic on the final examination and in 14 of 33 eyes (42.4%) that were pseudophakic by the final examination. There were no serious surgical complications.

Conclusions: Vitrectomy for epiretinal membranes is beneficial in eyes with relatively good preoperative visual acuities, but cataract surgery is necessary in phakic eyes to achieve long-term visual acuity improvement.

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INTRODUCTION

Vitrectomy has become a common procedure for the treatment of visual loss due to epiretinal membranes (macular pucker) over the past two decades. Epiretinal membranes result from fibroglial proliferation on the surface of the retina.[1,2] The prevalence of epiretinal membranes in the macula detectable by fundus photographs was 7% in a study of 3,654 persons who were aged 49 years or more.[3] Multiple studies have reported visual acuity improvement following this surgery, but most published series have reported eyes with preoperative visual acuities of 20/60 or worse. The decision to recommend vitrectomy is largely based on patients' symptoms and the preoperative visual acuity. Vitrectomy is sometimes recommended and performed in eyes with better visual acuities in patients who need excellent visual acuity or a high degree of stereopsis for occupational reasons. Some patients with good visual acuity who have severe metamorphopsia are also offered surgery. Performing surgery in patients with good visual acuity also carries some increased risks. Vitreous surgery in an eye with 20/40 visual acuity is much less likely to achieve large improvements in visual acuity. A 2-line improvement would require an increase in visual acuity from 20/40 to 20/25, and a 3-line improvement would require a postoperative visual acuity of 20/20. The purpose of this study was to evaluate the visual acuity results and complications of vitrectomy for epiretinal membrane removal in eyes with a preoperative visual acuity better than 20/60 to determine if the risks of surgery are justified in most eyes.

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METHODS

Vitrectomy was performed in a retrospective case series of 40 consecutive eyes of 40 patients with symptomatic visual acuity loss or distortion due to epiretinal membranes. The surgeries were performed from December 1992 to November 2002 by a single surgeon (J.T.T.). All patients had symptomatic visual loss and desired vitrectomy despite relatively good visual acuities. No institutional

review board approval was obtained, but all patients consented to surgery after a discussion of the risks and benefits. Most epiretinal membranes were idiopathic, but some were secondary to retinal tears. Eyes with epiretinal membranes following retinal detachment repair were excluded, because most of the membranes developed in eyes with prior macular detachment, which may have decreased the best potential visual acuity. Eyes with intrinsic macular diseases that may have decreased visual acuity, such as diabetic retinopathy, branch retinal vein occlusion, or pars planitis, were excluded. All eyes had a visual acuity of 20/50 –3 or better. Visual acuities were measured preoperatively and postoperatively using a projected-light Snellen chart with best current correction, but without refraction.

The surgical technique consisted of a standard three-port pars plana vitrectomy using 20-gauge instrumentation. Most eyes had a posterior vitreous detachment at the time of surgery. A posterior vitreous detachment was created if none was present. Then a blunt vitreoretinal pick was used to lift the edge of the epiretinal membrane if an edge was identified intraoperatively. The elevated edge was then grasped with diamond dusted forceps and removed from the eye. If the edge of the epiretinal membrane could not be identified, then a sharp vitreoretinal pick or bent microvitreoretinal blade was used to create an edge of the epiretinal membrane, which was then grasped with the forceps. Indocyanine green was not used to help identify the epiretinal membrane or internal limiting membrane in any eyes, and the internal limiting membrane was not intentionally removed. Staining of the internal limiting membrane in eyes with epiretinal membranes using indocyanine green or trypan blue has the theoretical advantage of ensuring more complete removal of epiretinal membrane and is advocated by some surgeons.[4-6] Other surgeons prefer to avoid removal of the internal limiting membrane, if possible, because the presence of internal limiting membrane in epiretinal membrane histology specimens was associated with poorer visual outcomes in one study.[7] Intentional removal of internal limiting membrane in eyes with epiretinal membranes was associated with poorer visual results and higher visual field loss in another study.[8]

Most patients were seen at 1 day, 1.5 weeks, 6 weeks, 3 months, and at variable times thereafter. Patients were monitored for complications. Cataracts were measured preoperatively and following surgery using the lens opacity classification system II (LOCS II) grading scale developed by Chylack.[9] This scale grades nuclear sclerosis, posterior subcapsular cataract, and cortical spoking on a scale of 0 to 4 using reference photographs. Intermediate numerical values were assigned if a patient's lens was judged between two standard photographs. The nuclear sclerosis was graded as 1.5 if it was between the 1.0 and 2.0 standards. This grading scale is very similar to the clinical lens standard photographs used in the Age-Related Eye Disease Study (AREDS).[10] Cortical spoking was not routinely recorded for patients treated between 1992 and 1995, so this cataract variable was not analyzed in this manuscript. Prior studies have shown minimal effect of vitrectomy on cortical spoking, though.[11] Follow-up of at least 1 year was attempted, but some patients were discharged from care because of transportation difficulties or were lost to follow-up before 1 year. Attempts were made to contact referring ophthalmologists in patients who were lost to follow-up or to obtain visual acuity data subsequent to cataract extraction if patients had not returned to the author for examination after cataract surgery. Paired sample *t* tests were performed when comparing numerical data such as a patient's preoperative to postoperative visual acuity.

RESULTS

The baseline characteristics for the 40 eyes in the study are summarized in Table 1. The mean preoperative visual acuity was 20/50 +2 (logMAR = .367) with a range of 20/30 +1 to 20/50 –3. The mean duration of follow-up was 2.4 years with a range of 3 months to 11 years. Figures 1 through 3 report the visual results based on the *preoperative* lens status. Figure 1 compares the visual acuity data for all eyes, eyes that were phakic preoperatively, and eyes that were pseudophakic preoperatively. Overall, the mean visual acuity improved from 20/50 +2 to 20/40 +2 (P = .02) in the group of 40 eyes. This represents an improvement of 26.9% when the visual acuity improvement is compared against a benchmark "perfect" visual acuity of 20/20. This percentage improvement is calculated by the following equation:

$$\%I = \frac{-(\log MARpreop - \log MARfinal)}{(\log MARpreop - \log MAR20/20acuity} = \frac{-(\log MARpreop - \log MARfinal)}{\log MARpreop}$$

where %I is % improvement; logMARpreop is logMAR of preoperative visual acuity; logMARfinal is logMAR of final visual acuity; and logMAR 20/20 acuity is 0.

Visual acuity showed consistent improvements in pseudophakic eyes following removal of the epiretinal membrane, whereas visual acuity actually decreased at 3 months in phakic eyes, presumably due to early cataract formation. All three groups showed improved mean visual acuity at the final examination, although the improvement did not reach statistical significance in eyes that were phakic preoperatively, primarily because of some eyes with substantial cataracts at the final examination.

TABLE 1. BASELINE DEMOGRAPHICS OF 40 PATIENTS AND 40 STUDY EYES

Age	68.9 ± 2 years
Sex	22 females (55%), 18 males (45%)
Preoperative visual acuity	.367 (20/50 +2) (range, 20/30 +1 to 20/50 –3)
Preoperative lens status	21 phakic eyes, 19 pseudophakic eyes
Mean cataract score in phakic eyes	Nuclear sclerosis mean score = .64, posterior subcapsular cataract mean score = .02
Follow-up duration	2.4 years (range, .25 to 11 years)

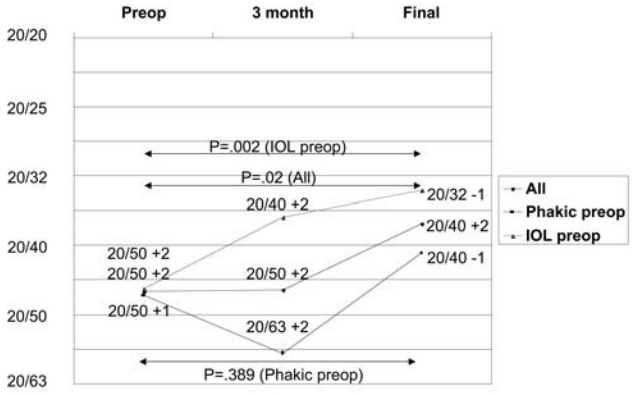

FIGURE 1

Comparison of visual acuity data for all eyes and eyes that were phakic and pseudophakic preoperatively. Visual acuity remained unchanged for the entire group at 3 months but improved by the final examination (P = .02). Visual acuity improved in pseudophakic eyes at 3 months and at the final examination (P = .002). Visual acuity decreased in phakic eyes at 3 months and improved marginally by the final examination primarily due to visually significant cataracts remaining in some phakic eyes.

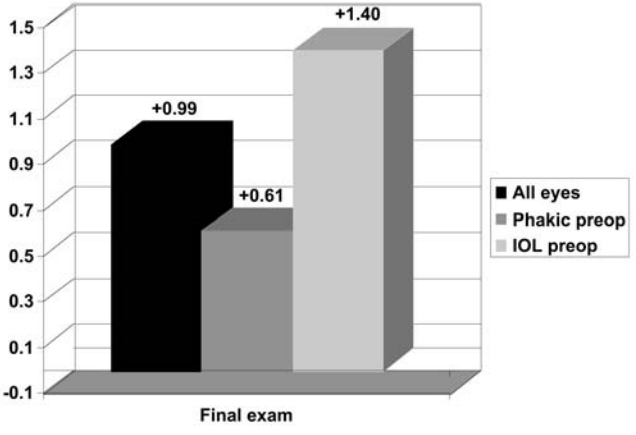

FIGURE 2

Visual acuity change in Snellen lines based on preoperative lens status. Visual acuities improved a mean of 1 line in all eyes. Phakic eyes had a smaller gain of 0.6 line, and pseudophakic eyes improved 1.4 lines.

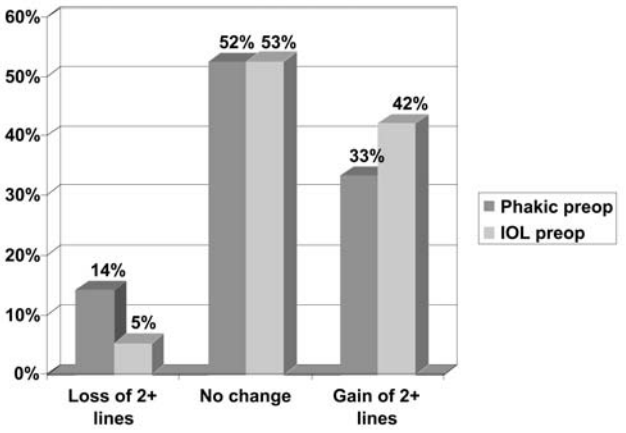

FIGURE 3

Visual acuity results based on preoperative lens status. Eyes that were phakic on the preoperative examination were more likely to lose 2 or more lines of acuity (0.2 logMAR units), and eyes that were pseudophakic were somewhat more likely to gain 2 or more lines between the preoperative and final examination.

Figure 2 shows the mean visual acuity change in Snellen lines (1 Snellen line = 0.1 logMAR unit). The visual acuity improved the most in eyes that were pseudophakic preoperatively with a mean gain of 1.4 Snellen lines. This represents a 38% improvement in visual acuity. Eyes that were phakic preoperatively gained only a mean of .61 line, which is a 16.9% improvement in visual acuity. Figure 3 shows the percentage of eyes that gained 2 or more lines, remained unchanged (final visual acuity within 0.2 logMAR of initial visual acuity), and lost 2 or more Snellen lines of acuity. Eyes that were pseudophakic preoperatively were more likely to gain 2 or more lines of acuity and less likely to lose 2 or more lines of acuity compared to phakic eyes. Figures 4 through 6 present the data based on the *postoperative* status of the lens at the final examination, since the lens status at the final examination was the most consistent predictor of visual outcome. Fourteen eyes that were initially phakic had cataract surgery by the final examination. The mean visual acuity improved from 20/50 +2 to 20/40 +2 in eyes that had subsequent cataract surgery (P = .242). Seven eyes remained phakic, and most had visually significant cataracts. Figure 4 presents the mean visual acuities for all eyes and eyes that were phakic or pseudophakic by the final examination. The mean visual acuity in phakic eyes decreased from 20/50 preoperatively to 20/50 –2 at the final examination, but this decrease was not statistically significant. The mean visual acuity improved significantly from 20/50 +2 to 20/32 –2 in eyes that were pseudophakic by the final examination (P = .005). Figure 5 shows the mean change in visual acuity. Eyes that remained phakic lost a mean of .28 lines, whereas eyes that were pseudophakic by the final examination gained 1.26 lines.

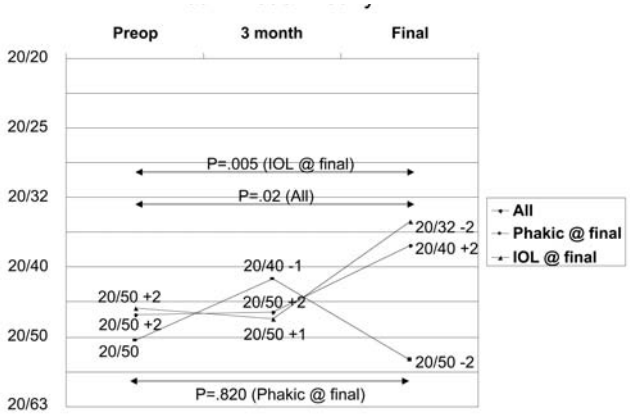

FIGURE 4

Mean visual acuity based on postoperative status of lens. The mean visual acuity remained essentially unchanged between the preoperative and 3-month examination in all eyes and eyes that were pseudophakic by the final examination. The visual acuity improved a little at 3 months in eyes that were phakic by the final examination. Visual acuities improved significantly in all eyes (P = .02) and eyes that were pseudophakic by the final examination (P = .005). Visual acuities deteriorated slightly in eyes that remained phakic at the final examination (P = .82), primarily because of visually significant cataracts.

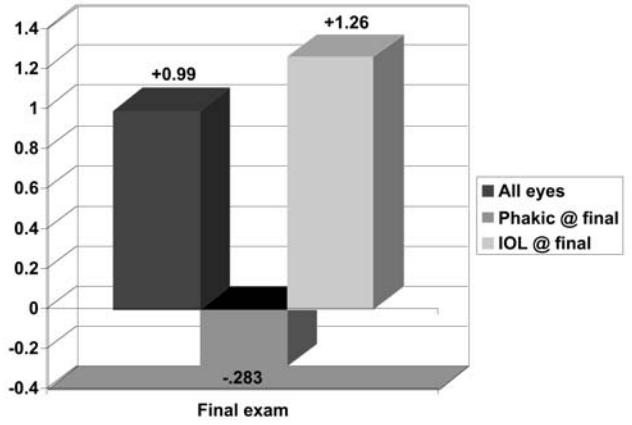

FIGURE 5

Visual acuity change based on final lens status. Visual acuities deteriorated .28 line in eyes that were phakic on the final examination and improved a mean of 1.26 lines in eyes that were pseudophakic by the final examination.

This improvement represents an 11% reduction in visual acuity in phakic eyes and a 35% improvement in visual acuity in pseudophakic eyes on the final examination. Figure 6 shows the percentage of eyes that gained 2 or more lines, lost 2 or more lines, or remained unchanged based on the postoperative lens status. Twenty-nine percent of eyes that were phakic on the final examination lost 2 or more lines, and only 14% gained 2 or more lines. By contrast, only 6% of eyes that were pseudophakic by

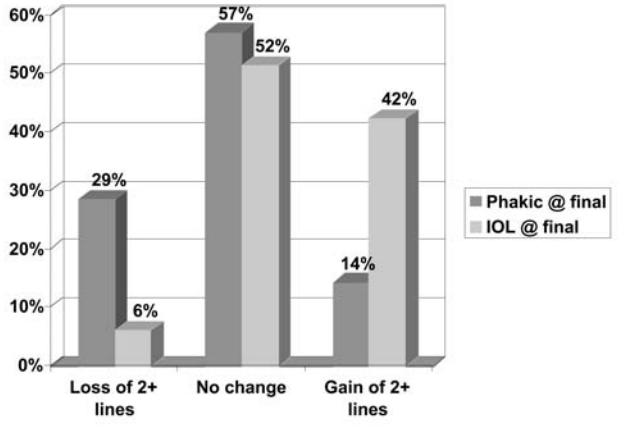

FIGURE 6

Visual acuity results based on final lens status. Eyes that were phakic by the final examination were much more likely to lose 2 or more lines of visual acuity by the final examination. Eyes that were pseudophakic by the final examination were much more likely to gain 2 or more Snellen lines.

the final examination lost 2 or more lines, and 42% gained 2 or more lines despite the relatively good preoperative visual acuities in this group of eyes with epiretinal membranes.

Causes of Decreased Acuity

Four of 40 eyes (10%) lost 2 or more lines of visual acuity. The causes of decreased acuity were evaluated in each patient. The first patient was pseudophakic preoperatively and had a history of chronic cystoid macular edema. The visual acuity decreased from 20/50 –1 prior to epiretinal membrane removal to 20/400 on the final examination, primarily on account of worsening cystoid macular edema**.** The eye also had a 2+ posterior capsule opacity. The visual potential of the eye is likely no better than 20/200 based on severe cystoid macular edema and the recorded visual acuity prior to development of the posterior capsular opacity. The second eye was 20/40 –2 preoperatively, and the visual acuity decreased to 20/200 due to a 2+ nuclear sclerotic cataract. This eye had been 20/40 at 3 months following epiretinal membrane removal, so the visual potential is believed to be favorable. The third eye was 20/40 +2 prior to epiretinal membrane removal. The visual acuity decreased to 20/80 –2 after 2 years for unknown reasons, but had been 20/40 at 17 months with a similar examination. No other ophthalmic abnormalities were seen to explain the decrease in acuity. The fourth eye had a preoperative visual acuity of 20/50 –2, which decreased to 20/80 –2 from a 2+ nuclear sclerotic cataract. Hence, of this group of 40 eyes, only two eyes (5%) had substantial loss of visual acuity independent of cataract formation. This emphasizes the relatively low risk of substantial visual loss following vitrectomy for epiretinal

membranes in eyes with relatively good preoperative visual acuities.

Complications

All phakic eyes developed increased nuclear sclerotic cataracts, and cataract surgery had been performed in 14 eyes by the final examination. The mean nuclear score increased from 0.68 (range, 0.25 to 1.50) preoperatively to 1.93 (range, 1.0 to 2.50) in eyes that were still phakic at the final examination. The mean posterior subcapsular cataract score remained essentially unchanged. This emphasizes the importance of nuclear sclerosis progression in causing decreased acuity in phakic eyes of patients over age 50 following epiretinal membrane removal.[12] One eye (2.5%) developed a recurrent epiretinal membrane and required a second vitrectomy. Another eye developed decreased acuity associated with a macular hole 3 years following epiretinal membrane removal. This macular hole was closed with one additional surgery. There were no serious surgical complications such as infectious endophthalmitis or retinal detachment.

DISCUSSION

Indications for vitrectomy are strongly influenced by the potential benefits of surgery weighed against the risk of surgical complications. Most published reports of vitrectomy for epiretinal membranes consisted of eyes primarily with visual acuities of 20/60 or worse.[13-18] Eyes with visual acuities of 20/40 to 20/60 were lumped together with many eyes having worse preoperative acuities. The results of surgery for eyes with epiretinal membranes and better levels of visual acuity have not been reported as a separate group with sufficient follow-up to allow most phakic eyes to have visual acuity measured following cataract surgery. The results of vitrectomy in eyes with visual acuities of 20/50 or better can be extracted from some manuscripts that have grouped eyes by preoperative visual acuity. A study of 264 eyes with epiretinal membranes reported by Rice and coworkers[19] included six eyes with a visual acuity of 20/50. The mean acuity improved to 20/40. A report of vitrectomy in 70 eyes with idiopathic epiretinal membranes included three eyes with visual acuity of 20/50.[20] The visual acuity improved to 20/25 in two eyes and 20/40 in the third eye. Another study of 119 eyes with epiretinal membranes following treatment of a retinal tear or detachment included one eye that improved from 20/50– to 20/50.[21] A fourth study of epiretinal membranes in 11 eyes of persons younger than 30 years old had one eye with a preoperative visual acuity of 20/50, which improved to 20/25 following the surgery.[22]

Nuclear sclerosis progression was an important confounding factor, which decreased visual acuity postoperatively. Nuclear sclerosis develops following vitrectomy in virtually all patients over the age of 50 years.[12,23-26] Nuclear sclerosis progression caused decreasing visual acuities following vitrectomy, with a mean decrease in visual acuity of –.74 Snellen lines per year in 288 phakic eyes treated for macular hole or epiretinal membrane (J.T. Thompson, unpublished data). The effect of nuclear sclerosis progression on visual acuity was especially important in this study, since the eyes had relatively good visual acuities preoperatively, so these eyes could potentially lose much more visual acuity as a result of cataract progression. Nuclear sclerosis progression caused almost all phakic eyes to show decreased acuity compared to the preoperative visual acuity by 3 to 12 months following epiretinal membrane removal. The current study emphasized that cataract surgery is essential in phakic eyes to achieve long-term improvement in visual acuities in eyes with epiretinal membranes and good preoperative acuities. Pseudophakic eyes do not have this confounding factor, so the postoperative course usually shows gradual improvement following epiretinal membrane removal until the postoperative visual acuity reaches a plateau.

This dichotomy in postoperative visual acuity between phakic and pseudophakic eyes may influence the timing of vitrectomy and whether it is recommended in eyes with epiretinal membranes when the visual acuity is relatively good. It is reasonable to recommend epiretinal membrane removal in pseudophakic eyes with better levels of visual acuity. The visual indications for surgery should be tempered in phakic eyes by the reality that visual acuity will decrease postoperatively until cataract surgery is performed. Some surgeons have advocated combined cataract surgery and vitrectomy with epiretinal membrane removal to avoid this problem.[27]

This study had several limitations: It is likely that eyes with better visual prognoses were selected for surgery in that surgery was not routinely recommended in eyes with long-standing epiretinal membranes with no recent deterioration in visual acuity. Hence, this study does not imply that all eyes with epiretinal membranes and visual acuity between 20/30 and 20/50 should receive surgery. Instead, the study shows that good results can be obtained with surgery if similar surgical indications and techniques are used. A second limitation is that none of the eyes in this study had a preoperative visual acuity of 20/20 to 20/25, so the results do not evaluate the visual results in eyes with metamorphopsia and essentially normal visual acuity. The third limitation is that long-term postoperative follow-up could not be obtained in all eyes and, specifically, that visual acuity could not be measured in seven eyes that had not had cataract surgery by the final

examination. The fourth limitation is that the visual acuities measured preoperatively and postoperatively were Snellen visual acuity with current correction. The use of protocol refraction using ETDRS visual acuity charts is a more accurate method of measuring visual acuity. Standardized visual acuity testing may have compensated for some visual loss seen prior to cataract surgery in phakic eyes, which usually causes a myopic refraction shift induced by progressive nuclear sclerosis. The method of visual acuity determination used in this study does reflect the methods of testing commonly used in a community setting outside of a multicenter clinical trial. The author does not believe that any of these limitations would have changed the primary outcomes reported in this study, though.

Visual acuity and patient symptoms are the most important factors to consider in deciding whether to recommend vitrectomy in an eye with an epiretinal membrane. The decision to recommend surgery is relatively straightforward in eyes with rapidly progressing epiretinal membranes causing decreased visual acuity. These eyes usually show substantial visual acuity improvements, because macular damage from the epiretinal membrane is short-lived and macular function recovers well. The greater clinical dilemma is to determine the appropriate timing of surgery in eyes with epiretinal membranes and a visual acuity of 20/30 with slow progression of the epiretinal membrane associated with decreasing acuity. Is it appropriate to operate at that point, or should the surgeon wait for the visual acuity to decrease to 20/60? If the surgeon waits until the visual acuity decreases from 20/30 to 20/60 over a period of 3 years, the final mean visual results will not be as favorable as if the patient would have received surgery when the visual acuity was 20/30. The current study showed that the risk of substantial decreases in visual acuity is small (about 5%), so it is at least reasonable to consider vitrectomy based on a discussion of the risks and benefits with the patient.

Ophthalmic coherence tomography (OCT) and fluorescein angiography are useful in evaluating eyes with epiretinal membranes and good visual acuity. The fluorescein angiogram may show lateral displacement of the macula with distortion of the normal macular architecture as well as the presence of cystoid macular edema, which has been shown to be a poorer prognostic factor for surgical outcomes.[19] The OCT is very useful for determining the extent of macular thickening induced by the epiretinal membrane. Eyes with substantial macular thickening usually have poorer visual acuities, but the author has observed substantial variability in the OCT findings in eyes with epiretinal membranes and similar visual acuities. It is reasonable to recommend surgery sooner (with better visual acuities) in eyes with greater anatomic abnormalities on the fluorescein angiogram or OCT compared with eyes with minimal findings on these diagnostic tests. It is also appropriate to recommend vitrectomy sooner in pseudophakic eyes that do very well following vitrectomy. Improvements in techniques and reduced complications have lowered the threshold for cataract surgery over the past decade, and the data in the current study suggests that the threshold for epiretinal membrane surgery may also be reevaluated in light of good surgical results.

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DISCUSSION

Dr George W. Blankenship. Decisions to recommend treatment are based on several factors. Potential side effects, complications, and benefits of the treatment being considered, as well as those of alternative treatments, must be compared to the probable natural history of the patient's condition. The patient's present and future needs, the cost of treatment, and the impact on the patient's quality of life must all be considered.

Dr Thompson has improved visual acuity and presumably reduced distortion by performing pars plana vitrectomies and removing idiopathic epimacular membranes and traction that had produced macular distortion and puckers in a large number of cases. This series differs from others because the eyes had better preoperative visual acuities. Vision improved from 20/50+2 to 20/32-1 for 19 eyes that were pseudophakic before vitrectomy and for 14 eyes that were phakic before vitrectomy but subsequently had cataract surgery following vitrectomy. However, vision remained basically unchanged (20/50 pre-op to 20/50-2 post-op) for seven phakic eyes, which presumably could have had better postoperative vision if cataract surgery had been performed.

Accurate measurement of visual acuity is especially important in this series with the relatively small differences (1 Snellen line) between pre- and post-op acuities. As Dr Thompson discusses, visual acuity measurements were made with a projected light Snellen chart with best current correction, which may not have been as accurate as those obtained by more refined techniques.

Nuclear sclerotic cataracts occurred in all phakic eyes and were a major factor in postoperative vision. Other undesired side effects and complications were very rare with only one eye having a recurrent epiretinal membrane, one eye having a macular hole develop several years following vitrectomy, one eye having worsening of preoperative cystoid macular edema, and one eye having additional loss of vision for unknown reasons.

The natural history of idiopathic epimacular membranes is to cause moderate loss of visual acuity and distortion that tends to gradually stabilize. This is in marked contrast to more severe epiretinal membranes associated with retinal detachments and other intraocular diseases that typically cause much greater loss of vision. Michels demonstrated good visual and anatomical results with vitrectomy and epimacular membrane removal of these more severe secondary epimacular membranes.[1]

Dr Thompson's manuscript does not include information on the visual acuity and condition of the fellow eyes. Obviously, 20/40+2 is better and preferable to 20/50+2 vision, but it is difficult to speculate on the impact this improvement of one Snellen line of acuity would have on an individual's overall visual function and the quality of his or her life.

The purpose of this study was to evaluate the visual acuity results and complications of vitrectomy for epiretinal membrane removal in eyes with a preoperative visual acuity of better than 20/60. Dr Thompson has nicely done this. The purpose was to also determine if the risks of surgery are justified in most eyes, and his results suggest so, especially in pseudophakic eyes. But, it is difficult to know if this operation is justified in most

people without knowing the function and status of the fellow eye.

REFERENCE

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Dr David L. Guyton. As an adult strabismus surgeon, the most common thing I see in these patients with fairly good vision and an epiretinal membrane is central double vision from a little dragging of the central fovea in the presence of peripheral fusion. I have a poster at this meeting about the dragged fovea diplopia syndrome. Yet diplopia was not mentioned in this study. What is the denominator in these cases? How often does diplopia occur? We see the diplopia in some patients where the vision is pretty good in the eye to before surgery. Sometimes we see it arise in patients with worse epiretinal membranes when surgery is done to strip the membrane: the vision improved and now they have central diplopia.

Dr William S. Tasman. Do you have information on the fellow eye on these patients? How many had posterior vitreous detachments and normal maculas in the fellow eye and, in light of that, declined the surgery because of the perceived likelihood they wouldn't develop the same thing in the fellow eye. As a corollary to that, did any patients have surgery on both eyes?

Dr Carol L. Shields. Did you find that the OCT of patients with CME predicted worse visual outcome? Can you comment on the influence of OCT in deciding about epiretinal membrane peeling in general?

Dr Gary C. Brown. One particularly important aspect is the vision in the second eye. We've reviewed many of the clinical trials in ophthalmology in our study of quality of life and cost effectiveness. One issue that is critically important to patients is how is the other eye doing in these studies? If you ask the patient, they probably care more about the second eye than whether the laser is bringing the treated eye from 20/50 to 20/40. If one eye already has poor vision and you improve the second eye, then the patient does gain some quality of life. If one eye has 20/20 vision and you bring the other eye from 20/50 to 20/30, the patient might not even notice a difference in his lifestyle. However, it does become important if they lose vision in the second eye.

Dr Alan H. Friedman. Did you measure binocular vision acuity? Did you do Amsler grids? Did you measure reading vision in either eye or both eyes?

Dr John T. Thompson. Dr Blankenship raises the important question of how much value a patient derives from a mean visual acuity improvement of one Snellen line and the cost to society for that improvement. I do not want the healthcare bureaucrats to determine which surgeries we can do as doctors just based on what the quality-adjusted life-year values are for a particular surgery, although this information is valuable in helping to guide our recommendations to patients.

Dr Blankenship mentioned the visual acuity measurements. I would emphasize that these are the real-world visual acuities that patients walk around with. We're involved in a number of studies with ETDRS refractions and most of our patients don't walk around with correction that gives them their best ETDRS visual acuity for various reasons. For example, very few phakic patients have multiple glasses changes starting 3 months after surgery due to progressive myopia induced by increasing nuclear sclerosis.

Concerning Dr Guyton's questions, there should be a simpler way of determining this diplopia. People may get diplopia after this surgery because their vision is better. Diplopia was not measured in our group so I cannot tell you how many patients had diplopia. Some patients complained of distorted vision or blurred vision, and they might not have been able to articulate the diplopia issue.

In terms of Dr Tasman's comments, most patients in this study had good vision in the other eye. I reviewed the visual acuities in fellow eyes subsequent to this presentation. The eye with epiretinal membrane surgery had a better visual acuity than the fellow eye on final examination in 35% of eyes. I didn't tabulate the percentage of patients who declined surgery because of good visual acuity in their fellow eye but it is relatively common. In terms of Dr Shields' comment, I think the OCT is very useful, although I did not have enough numbers to really make a comment about the prognoses with angiographic cystoid macular edema. There is a previous study authored by Dr Thomas Rice that demonstrated that eyes with cystoid macular edema pre-operatively along with their epiretinal membranes had a worse visual outcome. I believe it is best to offer surgery before patients develop severe cystoid macular edema since it represents a poor prognostic factor.

I agree with Dr Brown's comment about the importance of the fellow eye status. By the final examination, about one-third of the surgery eyes had better visual acuity than the fellow eye due to pre-existing conditions in the fellow eye or subsequent visual loss.

Dr Friedman asked about binocular vision. We do not

measure the binocular visual acuity or near visual acuity in our office. Many of the patients had abnormal Amsler grids, but it's very hard to quantify the distortion using an Amsler grid.