Failure of Prophylactic Retinopexy in Fellow Eyes Without a Posterior Vitreous Detachment

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Objective: To describe adverse sequelae of retinal prophylaxis in fellow eyes of patients with rhegmatogenous retinal detachment.

Design: Records were reviewed for 17 patients who had retinal breaks or detachment subsequent to prophylactic retinopexy applied to the fellow eye (without posterior vitreous detachment) at the time of primary rhegmatogenous retinal detachment surgery. Subsequent treatment included cryotherapeutic and laser retinopexy, scleral buckling, and vitrectomy.

Results: Of the 17 patients, 12 were male (mean age, 49 years). Laser retinopexy alone was used in 6 cases. Sixteen (94%) developed retinal tears related to acute posterior vitreous detachment, of which 8 (47%) were at the edge of retinopexy and 8 (47%) were in the normal or untreated retina. Thirteen (76%) developed a retinal detachment, of which 11 (85%) did not involve the fovea. Median visual acuity following treatment was 0.18 logMAR (6/9 Snellen equivalent).

Conclusions: Prophylactic retinopexy in fellow eyes without posterior detachment is not completely successful and may cause breaks to develop at the edge of treated areas during subsequent acute posterior vitreous detachment. Patient education alone regarding the symptoms of retinal tear and detachment may be preferable to prophylactic retinopexy of the fellow eye in the absence of a posterior vitreous detachment.

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Methods

Following spontaneous, non-traumatic rhegmatogenous retinal detachment in a previously asymptomatic eye, the risk of the same occurring in the second or fellow eye is between 8% to 40% depending on the follow-up period and other factors such as the development of posterior vitreous detachment.\(^1\,\,\text{4}\) Attempting to prevent retinal detachment is an important issue in vitreoretinal practice; the development of cryotherapy and laser retinopexy has enabled a more liberal application of prophylactic treatment.\(^1\) However, opinions regarding the appropriate prophylaxis of retinal detachment in the fellow eye differ, from treatment of all lesions\(^4\) to a more selective approach.\(^5\) There is no higher level of evidence than personal impressions for intervention.\(^6\,\,\text{7}\)

Byer\(^8\) and others\(^9\,\,\text{11}\) have described an approach to lattice degeneration and retinal breaks in patients unaffected by retinal detachment. However, the approach for patients who have suffered a retinal detachment in one eye is unclear. The presence or absence of a posterior vitreous detachment is an important factor.\(^1\) In the fellow eye with a posterior vitreous detachment, the presence or absence of a break guides the course of action. If no break is present, there is little risk of retinal detachment and prophylactic treatment is not required.\(^1\) If a tractional retinal tear is present, treatment is appropriate because the risk of detachment in fellow eyes with traction tears is 17%, according to Davis.\(^1\) Davis reported a much lower risk of detachment (5%) if a round hole was found in the presence of a posterior vitreous detachment.\(^1\)

However, no guidelines exist for the management of a fellow eye without a posterior vitreous detachment. The relevant literature is incomplete and difficult to use as a guide for management. Information regarding refractive error, the type of break, the extent of lattice degeneration, the status of the vitreous, fellow eye status, and symptoms is often lacking,\(^2\) and diverse patients are often considered as a single group.\(^3\) We describe a group of patients who developed retinal detachments in their second or fellow eye despite prophylactic treatment and we discuss the reasons for failure of prophylaxis.

Seventeen patients who developed a retinal break or detachment in their fellow eye despite prophylactic treatment to this eye at the
time of their primary retinal detachment were identified under the care of the Vitreoretinal Unit at Moorfields Eye Hospital, London, England. Patients with giant retinal tears, Stickler syndrome, and Marfan syndrome were excluded, as were patients with a posterior vitreous detachment in the eye receiving prophylactic treatment. Approval by the institutional review board and ethics committee was not required for this study.

Information regarding date of birth, sex, refractive error, lens status, and the characteristics of the retinal detachment in the first eye was sought from the case notes. For the fellow eye, the type of prophylactic treatment, the lesions treated, the time interval between prophylactic treatment and retinal break or detachment formation, the status of the vitreous, and the site and type of subsequent retinal breaks were recorded. The number of retinal reattachment procedures and the final visual acuity were noted.

**RESULTS**

The important demographic and clinical features of the patient group are summarized in Table 1. The average age of patients was 49 years and included a wide age range. Most eyes were myopic, with 41% being highly myopic and only 2 eyes (12%) being pseudophakic.

In the first eye affected, the retinal breaks were traction tears in 11 (65%) eyes and round holes in 6 (35%) eyes. Patients with traction tears were older than those with round holes (52 years vs 43 years, respectively), but this was not a statistically significant difference. In the fellow eye, the majority of lesions treated prophylactically were lattice degenerations (13 eyes, 76%) either with or without a round hole. Retinopexy with cryotherapy was used more frequently than laser procedures (11 eyes vs 6 eyes, respectively) and focal treatment was applied to all focal lesions rather than 360° circumferential treatment. All patients were indented at their 2-week review after retinopexy. None of the cases required supplementary cryotherapy. No episodes of Bruch's membrane rupture, retinal perforation, or hemorrhage were seen with laser treatment and no immediate complications were seen with cryopexy treatment.

Events occurring after the application of prophylactic treatment are summarized in Table 2. The median interval between the application of prophylactic treatment and the development of retinal breaks or detachment in the fellow eye was 33 months and included a wide range. In all except one eye, the retinal breaks were caused by the development of a symptomatic posterior vitreous detachment. Breaks developed at the edge of prophylactic retinopexy (47% of eyes) or in the untreated retina (47% of eyes) in an equal proportion of eyes. Retinal detachment developed in 13 eyes (76%) and involved the macula in 2 eyes. Overall, 4 eyes (24%) were treated with laser and did not require further surgery. Primary scleral buckling surgery was performed in 9 eyes (53%) and primary vitrectomy in 4 eyes (24%). The median duration of follow-up was 6 months and the mean final visual acuity was 0.31 logMAR (median final visual acuity 0.18 logMAR or 6/9 Snellen equivalent).

**COMMENT**

Patients in this series developed retinal breaks or detachment despite prophylactic treatment aiming to prevent reti-
nal detachment. Prophylaxis was administered after the development of a retinal detachment in the first eye at a time when the fellow eye did not have a posterior vitreous detachment. Breaks developed in areas of the retina that were untreated and presumably appeared normal at the time of prophylaxis and in the retina at the site or edge of retinopexy. Detachment caused by inadequate treatment of a retinal break did not occur in any patient.

The risk of retinal detachment in the second or fellow eye is approximately 13%. This level of risk is much higher than both the lifetime risk of detachment (0.004%-0.01%) in the general population and the risk of detachment in eyes with asymptomatic lattice degeneration (0.5%). Hence, there is an understandable desire for treatment to prevent retinal detachment in the fellow eye. Additionally, lesions that are predisposed to retinal detachment are common in fellow eyes; lattice degeneration is found in 24% and retinal breaks in 19%. Treatment of these lesions is often perceived to offer a means of decreasing the rate of subsequent retinal detachment in this high-risk group of patients.

However, before treating any condition, it is important not only to prove benefit but also to demonstrate minimal harm. With respect to the former criterion, the benefits of prophylactic treatment of fellow eyes are uncertain. Bonnet found that 5.6% of eyes undergoing retinal reattachment surgery in her institution had undergone previous laser prophylactic treatment to prevent retinal detachment, which indicates that the failure of prophylactic treatment is a significant clinical problem.

To date, studies of prophylactic treatment for fellow eyes all have significant limitations; there is no irrefutable support for the treatment of fellow eye asymptomatic lattice degeneration. Folk et al presented the best study of the prophylactic treatment of lattice degeneration in the phakic fellow eye. Their study was retrospective and examined the following 3 groups: those receiving no treatment of asymptomatic lattice degeneration, those receiving partial treatment of lattice degeneration, and those receiving treatment of all lattice degeneration in the fellow eye. Groups were selected according to the routine preferences of the treating surgeon. No prophylactic therapy was given in 151 eyes, of which 6.6% developed new tears without detachment and 5.9% developed retinal detachment. In 164 eyes in which all areas of lattice degeneration were treated, new tears developed in 3.0% without detachment and 1.8% developed retinal detachment. The beneficial effect of treatment was statistically significant for both tears and new retinal detachments. Confounding, however, was the finding that there was no significant benefit of treatment for high-risk eyes such as patients with high myopia (>−6 diopters) or eyes with extensive lattice degeneration (>6 clock hours).

Schroeder and Baden studied 3447 cases of retinal detachment and found that 7.2% had previous retinopexy for prophylaxis. Of this group, 45% developed retinal detachment within a year and 45% within the next 9 years. Additionally, they found that two thirds of the tears that developed happened within or adjacent to areas of previous treatment and that these occurred twice as fast as the rest.

An important observation in our series was that failure of prophylactic treatment (ie, the development of a retinal break with or without detachment) is associated with the development of a posterior vitreous detachment and traction-related tears in the majority of cases. In only one eye was the detachment in the fellow eye due to a round hole, not associated with a posterior vitreous detachment. This might reflect sampling bias or suggest that prophylactic treatment is more effective in this group of usually younger patients with myopia. Alternatively, these patients may not have reached the age at which a posterior vitreous detachment develops and induces retinal tear formation and detachment. This observation accords with that of Scott and Davis et al who agreed that the presence of a completed posterior vitreous detachment is protective against later retinal detachment.

In patients in this series, new retinal breaks developed away from the area of prophylaxis in 47% of eyes. This is usually the most common reason for failure of prophylaxis in both patients with and without a history of retinal detachment. In eyes with lattice degeneration, retinal tears developed in normal-appearing retina in approximately 25% of eyes, which is similar to rates reported in fellow eyes that have undergone prophylactic treatment (29%). In other studies, the rate of tear formation in normal retinas has been up to 89% with no prophylactic treatment. It is clearly not possible to prevent detachments if the areas requiring prophylactic treatment cannot be accurately identified.

Progression to retinal detachment may also ensue if prophylactic treatment has been inadequate (particularly at the anterior border of a retinal tear), or if progression owing to vitreoretinal traction occurs before the chorioretinal adhesion is adequate. This is unlikely in this series because prophylactic treatment was applied to areas of lattice degeneration in the majority of cases. The development of retinal tears at the site of previous laser prophylaxis was an important cause of failure of prophylaxis in our series and occurred in 47% of eyes. Bonnet noted that 55% of breaks in the eyes in her series of detachments after prophylactic laser were confined by the laser retinopexy, which suggests that tears frequently develop adjacent to areas treated prophylactically. The development of retinal breaks at the site of prophylactic retinopexy has 3 possible explanations. First, excessive prophylactic treatment may lead to necrosis of the retina and the development of a new break. Second, tears might be expected to form at sites where increased vitreoretinal adhesion is known to be present, ie, at the site of lattice degeneration. Third, a lesion of the intensity used for retinopexy may result in glial proliferation at the vitreoretinal interface and subsequently act as a focus for vitreoretinal traction during vitreous separation and lead to tear formation.

To overcome the fact that new tears develop in normal-appearing retina in a significant proportion of eyes with lattice degeneration, some have applied 360° prophylactic retinopexy. Indeed, Bonnet noted an association of macular hole formation and subsequent detachment in patients with high myopia receiving 360° prophylactic treat-
ment. She also reported that 59% of tears in these eyes developed posterior to the circumferential laser.17

A crucial guide to the level of risk for a fellow eye is the presence or absence of a posterior vitreous detachment. In the fellow eye with a posterior vitreous detachment, the presence or absence of a break guides the course of action. If no break is present, there is little risk of retinal detachment and prophylactic treatment is not required.13,14,25

This series was retrospective and selective and cannot indicate the frequency of failure of prophylaxis. However, similar to other published series,17,18 it demonstrates that prophylactic therapy to prevent retinal detachment in fellow eyes of patients with retinal detachment is not universally successful, and that the merit of prophylactic treatment needs to be carefully considered. Indeed, Folk et al2 reported that the application of prophylactic treatment in high-risk fellow eyes, ie, those that were highly myopic or had extensive lattice degeneration, was ineffective. The 2 equally important reasons for the failure of prophylaxis were the development of new retinal tears after posterior vitreous detachment in areas of the retina that previously appeared normal and tears at the edge of retinopexy. The latter, in particular, further cautions against liberal application of prophylactic treatment.

Because benefit has not been clearly demonstrated and harm certainly exists, we advocate no treatment for lattice degeneration (with or without round holes) in phakic fellow eyes without posterior vitreous detachment. Because the most significant event in our series and elsewhere is the development of a posterior vitreous detachment, patient education is more important. It is mandatory that patients be warned of the symptoms of vitreous and retinal detachment. They should have a clear understanding of the need to seek prompt ophthalmic review to exclude retinal tear and detachment formation when they notice new floaters, photopsia, and/or visual field defects in the fellow eye.

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