Original Article

The Fellow Eye of Retinal Detachment Patients: Vision and Clinical Presentation

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Abstract

Background: The fellow eye of a retinal detachment is at risk of developing a retinal detachment and other visually debilitating disease. **Aim:** To investigate the rate of bilaterality of retinal detachment (RD), the presenting visual acuity (VA), and the presence of ocular morbidity in the fellow eye of patients with RD. **Patients and Methods:** A multicenter, prospective, cross-sectional study examining the fellow eye of consecutive patients who were diagnosed with different types of RD. The patients were seen within one year and examined in four Nigerian eye hospitals and clinics. Demographics, VA, and clinical findings at the presentation were reported on examination of the fellow eyes. **Results:** Twenty-seven (11.4%) out of 237 patients (264 eyes) had an RD in the fellow eye. The mean age of all study patients was 46.2 ± 16.8 years, M/F: 161 (67.9%)/76 (32.1%). The rates of bilaterality for rhegmatogenous, exudative, and tractional RDs were 4.2%, 11.1%, and 31.1%, respectively. Diagnosis of RD in an eye was associated with a risk of developing fellow eye rhegmatogenous retinal detachment (RRD) ($P < 0.001$) and tractional RD ($P < 0.001$), respectively. RRD in an eye was associated with a 17% risk of developing RD in the fellow eye ($\beta = -1.6$, OR = 0.202, $P < 0.001$). The BCVA in the fellow eye of the three types of RD varied significantly ($P < 0.001$). The fellow eye was blind in 25.2% of RRD, 54.1% of tractional retinal detachment (TRD), and 11.1% of exudative retinal detachment (ERD). Bilateral RD eyes were blind in RRD (85.7%), TRD (71.1%), and ERD (50%). One hundred and seven eyes (40.5%) of the total 264 RD eyes studied had other fellow eye events at the presentation. **Conclusion:** A patient with an RD in one eye is at significant risk of developing a blinding RD in the fellow eye. This risk varies with the type of RD and is highest with TRD. However, RRD, the commonest type of RD, can benefit from prophylactic treatment to the fellow eye RD predisposing lesions.

Keywords: *African eyes, Nigeria, peripheral retinal degeneration, prophylactic retinal laser photocoagulation, retinal detachment fellow eye, rhegmatogenous retinal detachment, risk of retinal detachment*

Introduction

Retinal detachment (RD) is a sight-threatening disease requiring urgent intervention to prevent vision loss. In several instances, it is an ocular emergency. To treat primary RD, prompt specialized care, which is often not available in many developing countries, is required. The risk of RD-related blindness is also higher in developing countries due to inadequate facilities to manage each case. The burden of blindness from RD has been demonstrated by the observed 71.4% rate of blindness (vision <3/60) in 219 eyes at presentation in a series of rhegmatogenous retinal detachments (RRD)

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reported from Africa.[1] RRD has been reported to rank within the first three retina diseases in reports examining the prevalence of retinal diseases in Africa.[2,3] The prevalence of RD from three African studies is 15.4%, 24.5%, and 4.5%, respectively.[3-5] RD most frequently affects the middle-aged and elderly. RRD is the most common form of RD and has a male predilection.

The fellow eye of RRD is at increased risk of a rhegmatogenous event and can ultimately develop RD. The proportion of RRD patients having visual acuity (VA) less than 6/60 in their fellow eye was reported as 3% from Scotland, indicating the significance of RRD as a cause of blindness.[6] Okonkwo *et al*.[1] reported a 28.9% rate of poor vision in the fellow eye of RRD.

Previous reports on the clinical findings in the fellow eye of RRD from Africa have been retrospective and single-center reports. Therefore, we designed a multicenter, prospective study to examine the presenting VA and determine the presence of ocular disease in the fellow eye of RD eyes to establish eyes that have a vision-threatening disease at presentation. We sought to determine the rate of bilaterality in eyes diagnosed with rhegmatogenous, tractional, and exudative retinal detachment (ERD).

Methods

This study was part of a more extensive study in which the characteristics of RD cases at presentation and risk factors for poor vision were studied. We conducted a prospective multicenter study involving the ophthalmic clinics of four tertiary health institutions. In each clinic, a retina specialist was designated the principal investigator and was responsible for ensuring timely and accurate data reporting. The data were obtained from April 2019 to March 2020. Ethical approval for the study was obtained from the Health Research Ethics Committee of the participating hospitals. The study was performed adhering to the guidelines of the Declaration of Helsinki. Patients who attended the retina clinic and ophthalmic outpatient clinic of the day were informed about the study and given a choice to participate or not. Consenting participants were, after that, given a consent form to sign. Parents/Caregivers signed the consent on behalf of minors.

Demographic data were obtained from patients with complaints of sudden or gradual loss of vision, who were then asked for an associated history of floaters, flashes of light, ocular trauma, and past intraocular surgery (including cataract surgery, glaucoma surgery, retina surgery, or lasers). History pertaining to the fellow eye was specifically requested. The patients were asked about a history of fellow eye loss of vision, ocular trauma, any previous ocular diagnosis, and the occurrence of RD. Also, a history of systemic illness that could have ocular manifestation was asked.

An ocular examination of both eyes was performed, including VA assessment of each eye using a Snellen chart. Refraction was done (if the vision was sufficient) to determine the best-corrected visual acuity (BCVA). The BCVA obtained from each participant was used in the data analysis. VA was categorized using the ICD 10 code for visual impairment, as indicated below.

Near normal/mild visual impairment ≥6/18, moderate visual impairment 6/24 to 6/60, severe visual impairment <6/60 to 3/60, and blindness <3/60 to no perception of light.

Other ocular examinations performed were intraocular pressure measurement by applanation tonometry and slit-lamp examination of the anterior segment (including the iris and anterior chamber angle for neovascularization). The lens was examined for the presence of cataracts. Pharmacological dilation of each pupil was performed using topical mydriatic available in the clinic after consent was obtained. A dilated fundus biomicroscopy using a + 20D lens with scleral indentation was done to visualize the entire retina up to the retina periphery (including the ora serrata) when possible.

A diagnosis of RRD was made if there was convex-shaped RD (with subretinal fluid) and break (s) in the retina were evident. The characteristics of the RD were observed and documented, including the number of quadrants affected by the RD, macula involvement, presence and category of proliferative vitreoretinopathy (PVR), giant retinal tear, and occurrence of vitreous hemorrhage.

Tractional retinal detachment (TRD) was diagnosed in an immobile retina with concave contours and surfaces, fibrovascular membranes, neovascular tufts, areas of tractional detachments, and subretinal bands. In some TRD eyes, a retinal break was also present, diagnosed as a combined RRD-TRD.

An exudative retinal detachment (ERD) was diagnosed in subretinal fluid, assuming a convex pattern of RD without a retinal break. There could be associated intraocular inflammation in some of the eyes having ERD.

We paid attention to the examination of the fellow eye of RD eyes and reported a diagnosis of any ocular pathology. An ocular B-scan was performed in eyes having poor fundal view due to media opacities (such

as a cataract or vitreous hemorrhage). A detached retina was diagnosed as an RD, evident by V-shaped insertion into the optic disc and ora serrata. A free-floating echogenic membrane attached at either the ora serrata or optic nerve was also taken as an RD.

Data Management

Data from each of the four collaborating hospitals were entered into an Excel spreadsheet and transmitted at the end of each month to a central data collection point. Analysis was done using IBM SPSS Statistics Version 22 (IBM Corp. Armonk, NY, USA). Categorical variables were expressed as frequency and percentage. Crosstabulation with Pearson Chi-square was performed to determine the association between categorical variables. An Independent *t*-test was used to compare quantitative variables and categorical variables. Test for statistical significance was calculated, and values <0.05 was considered significant.

Results

There were 237 patients (264 eyes) diagnosed with RD during the entire study period. Of this, a total of 27 patients (11.4%) had one of three forms of RD in their fellow eye. The mean age for all study patients was 46.2 ± 16.8 years, and the M/F ratio was 161 (67.9%)/76 (32.1%).

One hundred and sixty-seven patients (70.5%)/174 eyes had RRD, and seven patients (4.2%) had bilateral RRD at presentation. The mean age for the RRD patients was 40 ± 17.5 years, and the M/F ratio was 117 (70.1%)/50 (29.9%).

Sixty-one patients (25.7%)/80 eyes had TRD, and 19 patients (31.1%) had bilateral TRD at presentation. The mean age for the TRD patients was 52.3 ± 12.7 years, and the M/F ratio was 38 (62.3%)/23 (37.7%).

Nine patients (3.8%)/10 eyes had an ERD, and only one patient (11.1%) had bilateral ERD. The mean age for ERD patients was 45.2 ± 20.4 years. The M/F ratio was 6 (66.7%)/3 (33.3%).

Being diagnosed with an RD in one eye was associated with a risk of developing fellow eye RRD ($P < 0.001$) and TRD ($P < 0.001$), respectively. Having an RRD in one eye was associated with a 17% risk of developing RRD in the fellow eye ($\beta = -1.6$, OR = 0.202, $P < 0.001$), and having a TRD in one eye was associated with an 84% risk of developing TRD in the fellow eye ($\beta = 1.644$, OR = 5.175, $P < 0.001$). ERD was not associated with a significant risk of developing a fellow eye ERD ($P = 0.995$).

The BCVA of the fellow eye of the three types of RD varied significantly ($P < 0.001$) [Table 1]. The fellow eye of 25.2% of RRD was blind (<3/60) compared to 54.1% of the TRD fellow eyes. Only 11.1% of the ERD fellow eyes were blind.

A large proportion of the bilateral RD eyes were blind. The blindness rate in RRD was 85.7%, and in TRD it

Table 1: The best-corrected visual acuity in fellow eyes of retinal detachment patients

Types of retinal detachment	Classification of visual acuity	Frequency	Percentage
RRD	6/12 and better (normal)	104	62.3
	<6/12 to 6/18 (mild visual impairment)	3	1.8
	<6/18 to 6/60 (moderate visual impairment)	15	9.0
	<6/60 to 3/60 (severe visual impairment)	3	1.8
	<3/60 and worse (blind)	24	14.4
	NPL (No light perception)	18	10.8
	Total	167	100.0
TRD	6/12 and better (normal)	16	26.2
	<6/12 to 6/18 (mild visual impairment)	3	4.9
	<6/18 to 6/60 (moderate visual impairment)	5	8.2
	<6/60 to 3/60 (severe visual impairment)	4	6.6
	<3/60 and worse (blind)	28	45.9
	NPL (No light perception)	5	8.2
	Total	61	100.0
ERD	6/12 and better (normal)	5	55.6
	<6/12 to 6/18 (mild visual impairment)	1	11.1
	<6/18 to 6/60 (moderate visual impairment)	1	11.1
	<3/60 and worse (blind)	1	11.1
	Preverbal VA (CSM)	1	11.1
	Total	9	100.0

RRD: Rhegmatogenous retinal detachment; TRD: Tractional retinal detachment; ERD: Exudative retinal detachment

Table 2: Visual acuity categorization of bilateral retinal detachment eyes

Classification of visual status	Type of RD		
	RRD	TRD	ERD
6/12 and better (normal)	0 (0.0%)	2 (5.3%)	0 (0.0%)
<6/12 to 6/18 (mild visual impairment)	1 (7.1%)	0 (0.0%)	0 (0.0%)
<6/18 to 6/60 (moderate visual impairment)	1 (7.1%)	3 (7.9%)	0 (0.0%)
<6/60 to 3/60 (severe visual impairment)	0 (0.0%)	6 (15.8%)	0 (0.0%)
<3/60 and worse (blind)	10 (71.4%)	24 (63.2%)	1 (50.0%)
NPL (No light perception)	2 (14.3%)	3 (7.9%)	0 (0.0%)
Preverbal visual acuity	0 (0.0%)	0 (0.0%)	1 (50.0%)
Total	14 (100%)	38 (100%)	2 (100%)

RRD: Rhegmatogenous retinal detachment; TRD: Tractional retinal detachment; ERD: Exudative retinal detachment

Table 3: Other fellow eye diagnoses

Fellow eye diagnosis	*n*	(%)
Complicated cataract	34	31.8
Diabetic retinopathy	21	19.6
Peripheral retinal degenerations/Retinal holes or breaks	17	15.9
Glaucoma or glaucoma suspect	9	8.4
Vitreous hemorrhage	5	4.7
Choroidal detachment	6	5.6
Corneal opacity	4	3.8
Chorioretinitis or scars	2	1.9
High myopia	2	1.9
Phthisis bulbi	2	1.9
Age-related macular degeneration (AMD)	1	0.9
Aphakia	1	0.9
Proliferative sickle cell retinopathy (PSCR)	1	0.9
Posterior vitreous detachment (PVD)	1	0.9
Subluxated intraocular lens (IOL)	1	0.9
Total	107	100

was 71.1%. However, there were only two eyes with bilateral ERD, one eye (50%) was blind [Table 2].

The mean duration of symptoms for bilateral RRD patients was 13.3 months versus 12.4 months for patients with nonbilateral RD (P = 0.881). Bilateral RD patients did not present earlier than unilateral RD patients, as expected. Because of the significance of RRD, being the commonest of the three types of RD, the characteristics of RD in the 14 eyes of 7 patients who had bilateral RRD were reviewed as shown below.

The extent of RD.

Six (42.9%) of 14 eyes had subtotal RD at presentation, while the remaining eight (57.1%) had total RD. Of the six eyes with subtotal RD, three (50%) had RD in the inferior quadrants.

Quadratic involvement of RD.

Nine eyes (64.3%) had four quadrants of the retina involved, followed by two quadrant involvement in three eyes (21.4%), and two eyes (14.3%) had three quadrant involvement.

Macula status.

Thirteen of 14 eyes (92.9%) had macula-involving RD.

Occurrence and grade of PVR.

Two eyes could not be appropriately assessed for PVR due to media opacity precluding fundal assessment. Significant PVR (C&D) was observed in 10 eyes (71.4%), while PVR B was present in the remaining two eyes (14.2%).

One hundred and seven (40.5%) of the total 264 RD eyes studied had other fellow eye diagnoses, as listed in Table 3.

Discussion

Our multicenter study prospectively documents ocular findings in the fellow eyes at the presentation of patients diagnosed to have RD within a one-year study period in black Africans. Africans have been reported to have a lower predisposition to RRD compared to Caucasians. Nevertheless, RD has been reported severally by African studies to be a common retinal disease and, indeed, the commonest cause of retinal surgery.[1,3,5]

In this study, we report the presenting VA and the diagnosis upon clinical examination of the fellow eye of RD eyes. We observed significantly reduced vision or blindness in a high proportion of the fellow eye of RRD and, to a greater extent, TRD eyes. The rate of blindness in the fellow eye was 25.2% and 54.1% in RRD and TRD, respectively. The RRD fellow eye 25.2% rate of blindness in our study is slightly less than the previous report of 28.9% from Nigeria and much higher than the 3% from Scotland. A doubling of blindness rate in TRD fellow eyes compared to RRD indicates the more damaging effect of TRD on vision. TRD is often associated with systemic diseases such as diabetes mellitus, which often have a bilateral effect. A TRD eye could have a less or more severe form of diabetic retinopathy or diabetic macular edema in the fellow eye, resulting in reduced vision

in this fellow eye. Our finding suggests that RD in an eye carries a risk of impaired vision or blindness to the fellow eye.

The predisposing lesions for RRD, such as peripheral retinal degeneration, are known to occur bilaterally and, therefore, carry a risk of RRD in the fellow eye. This study provides valuable information on the rate of bilateral RD in Africans, which was 4.2% in RRD, 11.1% in ERD, and 31.1% in TRD. Our 11.4% overall rate of bilateral RD is lower than the 17.5% reported from southwest Ethiopia.[4] The reason for this difference is not apparent but could be related to the Ethiopian study's smaller sample size than ours. The Ethiopian study considered a quarter of the sampled patients in our study.

We report on the rate of rhegmatogenous retinal events (retinal breaks) and peripheral retinal degenerations in fellow eyes of RRD patients, which we observed to be 10.2% (17/167 eyes) [Table 3]. These 17 eyes are not inclusive of the seven fellow eyes with RRD. With the inclusion of the seven excluded fellow eyes, this rate of fellow eye rhegmatogenous events rises to 14.3% (24/167 eyes). This rate is lower than the Scottish study, which reported 22.9% of fellow eye full-thickness breaks and lattice degeneration.[6] The difference between the rates in the two studies may be again due to the reports of racial differences in RRD, which is more prevalent in the Caucasian race compared to the Negro race.[7,8] This racial bias of RRD is further demonstrated by our lower rate of bilateral RRD of 4.2% compared to 7.3% and 6.7% for the Scottish and Danish studies, respectively.[6,9] However, the Scottish study was a two-year prospective study, and the Danish study was an 11-year report. Our bilaterality rate is also lower than the 12.9% of 248 patients reported by Gonzales *et al*.,[10] whose study excluded PVR eyes, which was included in our study. However, our findings agree with Fraser and Steel's reporting that the bilateral RRD rate is between 2% and 10%.[11] We estimated a 17% risk of developing a fellow eye RRD from our data, which is higher than the 10% risk reported in the USA. The fact that our study was a hospital-based study compared to the USA population-based survey may have contributed to our higher risk value.

It has been established that fellow eyes of RRD eye carry a risk of rhegmatogenous retinal events.[12] The rate of this event is known to increase over the period of follow-up. The additional information provided by this report quantifies the rate of this risk in an African context. In at-risk fellow eyes with asymptomatic fellow eye rhegmatogenous retinal events (retinal holes and tears), controversy exists over the value of prophylactic treatment. Some studies suggest that treatment is not beneficial and that such eyes should be followed with clinic visits. However, in situations of poor compliance to scheduled clinic visits, as seen in several low-income countries, the benefit of prophylactic treatment should be strongly considered, as McPherson strongly recommends. He reports the benefit of treatment of fellow eyes with lattice degeneration and breaks.[13] Because of delays in presenting for treatment (a mean symptom duration of 13.3 months recorded in our study), the 14 bilateral RRD eyes presented with severe and complex disease. This complexity is typical of RD in developing countries.[8] The 14 eyes present an 85.7% rate of blindness, four quadrant involvement in 64.3%, macular involvement in 92.9%, and significant PVR in 71.4%. This complexity suggests a likelihood of poor outcomes postsurgery. This finding makes a case for fellow eye RRD prevention using retinal prophylaxis with cryotherapy or retinal laser photocoagulation.

Prophylactically, treated eyes must still be followed since rhegmatogenous events can occur at other untreated retina sites. Fraser and Steel note that at least 50%, and possibly up to 80–90% of RRD in the fellow eye, will occur from ophthalmoscopically normal areas of the retina; therefore, prophylaxis to visible abnormal areas may not completely reduce the incidence of fellow-eye RRD.[11] Prophylactic treatment risks creating a false sense of confidence in the patient that the retina is secured forever. Treating physicians need to be aware of this risk and discuss the possibility of RD despite retinal prophylaxis.

Other fellow eye clinical diagnoses reported in Table 3 include cataracts, glaucoma, age-related macular degeneration, corneal scar, and chorioretinitis. Some listed clinical diagnoses can cause vision loss and can be managed effectively with the preservation or restoration of vision.

This study has some areas for improvement, including that longitudinal follow-up still needs to be done to determine how many fellow eyes will eventually develop vision-threatening diseases, including retinal tears and RD. The impact of treatment (prophylactic retina laser or cryotherapy to retina breaks) was not studied. Also, epidemiological studies would have provided the actual incidence of RD and other rhegmatogenous events in the population. Notwithstanding these defects, this multicenter study considers a reasonable number of RD eyes. It provides real-world data on the fellow eye VA of RD eyes, rate of bilaterality of RD, and approximate risk of occurrence of RD in the fellow eye. This study is the first report on this topic in Nigeria and our region of Africa. Our study provides a valuable basis for further research on the fellow eyes of RD cases.

To conclude, considering that a significant number of RD eyes are already blind at presentation, the VA of the fellow eye becomes a vital concern since this may be the better-seeing eye. However, a situation in which the fellow eye is blind or visually impaired means the patient is at risk of bilateral blindness. The high rates of fellow eye blindness, 25.2% and 54.1% in RRD and TRD, respectively, suggest that a quarter to half of the patients with RD could be blind in both eyes. This information is helpful for public enlightening on diseases of the retina, prioritizing eye care, and planning interventions for retinal diseases, including RD.

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Conflicts of interest

There are no conflicts of interest.

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