Risk Factors for Retinal Breaks in Patients with Symptom of Floaters

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Objective: *To identify the risk factors of retinal breaks in patients with the symptom of floaters, and to determine the association between those risk factors and retinal breaks.*

Material and Method: *A retrospective analytic study of 184 patients (55 males and 129 females) that included 220 eyes was conducted. Patient information such as age, symptoms (multiple floaters, flashing), duration of symptom, refractive error, history of cataract surgery, family history of retinal detachment, and complete eye examination were recorded. The patients were divided into two groups, the first group (control group) had symptoms of floaters and no retinal breaks, the second group (retinal breaks group) had symptoms of floaters with retinal breaks. Chi-square test, and the multiple logistic regression were used for statistical analysis.*

Results: *Two hundred twenty eyes, 175 eyes of the control group and 45 eyes of the retinal breaks group were examined and included in this study. The multiple logistic regression analysis revealed that patients with multiple floaters, and floaters and flashing increased the risk of retinal breaks to 5.8 and 4.3 times, respectively, when compared to patients with single floater or floaters alone. Lattice degeneration increased the risk of retinal breaks to 5.9 times when compared to eyes that did not have lattice degeneration.*

Conclusion: *Multiple floaters, flashing and lattice degeneration are risk factors of retinal breaks in patients with symptoms of floaters. Therefore, it is important for the ophthalmologists to be aware of these risk factors and the patients at risk should have follow-up examinations.*

Keywords: *Retinal break, Posterior vitreous detachment, Risk factors, Floaters, Flashing*

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Patients with symptoms of floaters or flashing are commonly found in elderly or in myopia. It is caused by vitreous degeneration and posterior vitreous detachment, which have a risk for retinal break and subsequent retinal detachment.

Patients aged more than 40 years may have vitreous degeneration. This is the liquefaction of vitreous gel forming a pocket of liquid vitreous. Later the liquid vitreous enters through a tear of the vitreous cortex, separates the vitreous cortex from the optic nerve and the retina causing posterior vitreous detachment (PVD). The posterior hyaloid membrane, which is the outer part of vitreous cortex, moves in front of the retina and produces a symptom of floater. In vitreous degeneration, the vitreous collagen fibrils aggregate into bundles seen as vitreous strand. The detached vitreous cortex and vitreous stand may have a traction to peripheral retina causing flashing of light and this traction may lead to retinal break.

In previous studies, patients with PVD presenting as floaters or flashing have retinal break 5-18.5%[1-9]. In the general population, the important risk factor for retinal break or detachment is PVD, other factors include high myopia, aphakia, pseudophakia, lattice degeneration, and trauma[10]. Patients with PVD combined with these other factors should have a higher risk of retinal break than those without them.

The objective of the present study was to find the risk factors that produce retinal break in the patient presenting with floaters and to determine the association between these risk factors and retinal breaks.

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Material and Method

Patients complaining of floaters or floaters and flashing, who attended the out-patient unit, Department of Ophthalmology, Siriraj Hospital, Mahidol University between May 2008 and March 2009 were studied.

The history of seeing a single floater as a black dot or line or web, multiple floaters or floaters with flashing, duration of symptoms, family history of retinal detachment or detachment in the fellow eye and systemic diseases were recorded.

Patients with a history of eye injury, previous vitreoretinal surgery in eyes with floaters, eyes with diabetic retinopathy or uveitis were excluded in the present study.

Eye examination included visual acuity measurement, tonometry, refractive error measurement, anterior segment and posterior segment of the eye were examined using slit lamp, indirect ophthalmoscopy, +90 Diopter lens, and Goldmann 3-mirror contact lens biomicroscopy. Vitreous was observed for vitreous strand and PVD. Posterior vitreous detachment was diagnosed when there was hyaloid membrane detached in front of the optic disc (Weiss ring). Lesions of the retina such as lattice degeneration, myopic changes, and retinal breaks were recorded.

The patients were divided into two groups Group 1: control group, patients with floaters without retinal break were included into the control group. Group 2: retinal break group, patients with floaters and retinal breaks were included into the retinal break group.

Statistical analysis

Demographic data were assessed by mean, median, range, and standard deviation (SD) for continuous data or in number and percent for categorical data. Continuous data were compared with use of Student's *t*-test if the distribution of samples was normal or with the Mann-Whitney U test if the sample distribution was asymmetrical. Chi-square test was analyzed for determining the difference between the control group and the retinal break group for categorical data.

Possible risk factors for retinal breaks were analyzed using Chi-square test, Fisher's exact test and logistic regression for univariate analyses. The relationships between the risk factors and retinal break were examined through Chi-square test and Fisher's exact test. The strength of association was measured using Odds Ratio (OR) and its 95% confidence intervals [CI (95%)]. Multiple logistic regression was used to adjust for confounding for multivariate analysis. Results were considered statistically significant at a p-value < 0.05. All statistical analyses were performed with SPSS for Windows version 11.5 (SPSS Inc. Chicago, Illinois).

The present study was approved by Siriraj Institutional Review Board.

Results

One hundred and eighty four patients with floaters (220 eyes) included 175 eyes in the control group and 45 eyes in the retinal break group.

Demographic data are shown in Table 1. There were 129 females (161 eyes, 73.2%) and 55 males (59 eyes, 26.8%). The control group and the retinal break group had statistically significant difference in the duration of symptom and sex. The authors adjusted for sex, when variables were analyzed with multivariate analysis.

Variety of factors such as multiple floaters, flashing, duration of floaters, lattice degeneration, vitreous hemorrhage, and myopia were analyzed. The univariate analysis showed that all of these risk factors were associated with the occurrence of retinal breaks (Table 2, 3).

The authors did not analyze myopia variable by the multiple logistic regression method because it showed multicollinearity with other risk factors. All other risk factors when analyzed with multiple logistic regression showed that multiple floaters increased the risk of retinal break 5.8 times more than patients with only a single floater. Patients with floaters combined with flashing had a risk 4.3 times more than patients with floater alone. Lattice degeneration increased the risk of retinal breaks to 5.9 times when compared to eyes that did not have lattice degeneration (Table 4). In the present study, the authors found no relationship between the duration of the symptom and the retinal break. There was no case of vitreous hemorrhage in the control group, the result of analysis showed very large standard error (SE), and from the presented data, the authors found no association between the vitreous hemorrhage and the retinal break.

Discussion

In the general population, the incidence of retinal break is 3.3-3.6%[11-13]. PVD is frequently found and associated with the retinal break and retinal detachment. In patients with sudden onset of floaters, PVD was found in 83-87%[14,15], the common cause of floater was prepapillary ring (Weiss ring). In symptomatic eyes with PVD, retinal break incidence

Table 1. Patient demographic data

Variable	Group (%) or mean ± SD		Total (%) or mean ± SD	Remark
	Retinal break (n = 45)	Control (n = 175)		
Sex (eyes)				
Male	22 (48.9)	37 (21.1)	59 (26.8)	$\chi^2_{df=1}$ = 14.051, p < 0.001*
Female	23 (51.1)	138 (78.9)	161 (73.2)	
Age (yrs)				
Mean age ± SD	55.29 ± 8.02	55.88 ± 13.58	53.37 ± 12.66	$t_{df=116.6}$ = -1.578, p = 0.129
Range	20-76	38-70	20-76	(95% CI: -5.531-0.713)
Duration of symptom (days)				
Mean ± SD	84.40 ± 137.01	200.35 ± 313.19	176.64 ± 289.66	Mann-Whitney U test,
Median (range)	14 (1-365)	60 (1-1,950)	30 (1-1,950)	(Z) = -3.454, p = 0.001*
Posterior vitreous detachment				
Weiss ring	14 (68.9)	45 (25.7)	59 (26.8)	$\chi^2_{df=1}$ = 0.531, p = 0.466
No Weiss ring	31 (31.1)	130 (74.3)	161 (73.2)	

* Statistically significant at p-value < 0.05

Table 2. Variables of the control group and the retinal break group

Variable	No of eyes (%)		Total (%)
	Control group	Retinal break group	
Duration of symptom (group)			
≤ 6 weeks	85 (48.6)	34 (75.6)	119 (54.1)
> 6 weeks	90 (51.4)	11 (24.4)	101 (45.9)
Flashing			
Yes	32 (18.3)	20 (44.4)	52 (23.6)
No	143 (81.7)	25 (55.6)	168 (76.4)
Multiple floaters			
Yes	27 (15.4)	20 (44.4)	47 (21.4)
No	148 (84.6)	25 (55.6)	173 (78.6)
Myopia			
< 3D	28 (68.3)	4 (26.7)	24 (42.9)
≥ 3D	13 (31.7)	11 (73.3)	32 (57.1)
Lattice degeneration			
Yes	10 (5.7)	13 (28.9)	23 (10.5)
No	165 (94.3)	32 (71.1)	197 (89.5)
Vitreous hemorrhage			
Yes	0 (0)	6 (13.6)	6 (3.6)
No	123 (100.0)	38 (86.4)	161 (96.4)

was found to be as high as 18.5%[3]. In the present study, the authors included patients with floaters alone or floaters combined with flashing. The complete PVD shown as Weiss ring found in 31.1% of the retinal break group and 25.7% of the control group. Most of the presented cases, floaters caused by vitreous strands and clumps of aggregated collagen fibrils, only about one quarter of the presented cases showed complete PVD. The median duration of symptom of the control group was two months and the retinal break group was two weeks. However, by multivariate analysis, there was no association between the duration

Table 3. Univariate analysis of the control group and the retinal break group

Variable	$\chi^2_{df=1}$	p-value	Odds ratio	95% CI
Duration of symptom (group ≤ 6 wks)	10.496	0.001*	3.273	1.559, 6.871
Multiple floaters	17.939	<0.001*	4.385	2.141, 8.971
Flashing	13.570	<0.001*	3.575	1.772, 7.213
Myopia	7.770	0.005*	5.923	1.582, 22.172
Lattice degeneration	20.535	<0.001*	6.703	2.706, 16.606
Vitreous hemorrhage	N/A	-	N/A	N/A

* Statistically significant at p-value < 0.05
N/A = non available

Table 4. Multivariate logistic regression analysis

Variable	β	SE	Wald χ^2 (df = 1)	p-value	Adjusted odds ratio (95% CI)
Lattice degeneration	1.781	0.616	8.373	0.004*	5.938 (1.777, 19.844)
Flashing	1.463	0.492	4.834	0.003*	4.319 (1.646, 11.336)
Duration of symptom	0.778	0.466	2.786	0.095	2.177 (0.873, 5.428)
Multiple floaters	1.759	0.551	10.173	0.001*	5.807 (1.970, 17.114)

This model was adjusted for sex
* Statistically significant at p-value < 0.05

of symptom and the retinal break. Boldrey found risk factors of retinal tears in 589 patients with vitreous floaters or light flashes or both. That study showed that visual symptoms of diffuse dots, many vitreous cells, and grossly visible vitreous or preretinal blood were the factors that had strongest associations with the retinal tear[3]. The present study showed that the risk factors that related to the occurrence of retinal breaks were symptoms of multiple floaters, flashing, and the finding of lattice degeneration at peripheral retina. Univariate analysis of the presented data showed that vitreous hemorrhage was significantly associated with the occurrence of the retinal break but multivariate logistic regression analysis showed the very large standard error of the coefficient and no association between vitreous hemorrhage and the retinal break. Generally when a standard error is very large, it is an indication of an inadequate sample size, so the authors could not find a significant association between the two variables.

Many studies have tried to identify symptoms of patients with acute PVD to predict the late development of retinal breaks. In a prospective study of patients with acute symptomatic PVD, van Overdam, et al found that 3.7% of patients developed new retinal breaks within 6 weeks follow-up. The predictive factors for the development of new retinal breaks were multiple floaters, retinal or vitreous hemorrhage at the initial examination, and an increase in number of floaters after the initial examination[16]. Coffee, et al reported that in addition to vitreous hemorrhage and peripheral retinal hemorrhage at initial examination, new symptoms were also the factors of delayed-onset retinal break in patients with symptomatic PVD[9]. The ophthalmologists should be aware of new retinal break when there are vitreous hemorrhage, multiple floaters, or new symptoms.

In conclusion, the authors would like to suggest that patients complaining of floaters, history of the characteristics, number of floaters, and symptoms of flashing of lights should be taken into consideration. The full peripheral fundus examination looking for lattice degeneration should be performed. The subsequent follow-up is helpful in detecting the retinal break, especially in those who have risk factors.

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ปัจจัยเสี่ยงของการเกิดจอตาฉีกขาดในผู้ป่วยที่เห็นจุดดำลอยไปมา

อภิชาติ สิงคาลวณิช, ชุติวรรณ อมรรัตนพันธ์, กาญจนี นิติเรืองจรัส, ศศิมา ทองสาย

วัตถุประสงค์: *เพื่อหาปัจจัยเสี่ยงและหาความสัมพันธ์ระหว่างปัจจัยเสี่ยงกับการเกิดจอตาฉีกขาด ในผู้ป่วยที่เห็นจุดดำลอยไปมา*

วัสดุและวิธีการ: *ได้ศึกษาย้อนหลังผู้ป่วย 184 ราย (220 ตา) ที่มาโรงพยาบาลด้วยอาการเห็นเงาดำลอยไปมา แบ่งผู้ป่วยเป็น 2 กลุ่ม กลุ่มแรกเป็นกลุ่มที่มีเงาดำ และตรวจไม่พบจอตาฉีกขาด (175 ตา) กลุ่มที่สองผู้ป่วยที่มีเงาดำและตรวจพบจอตาฉีกขาด (45 ตา) ทำการวิเคราะห์หาปัจจัยเสี่ยงที่มีความสัมพันธ์กับจอตาฉีกขาดโดยใช้วิธีวิเคราะห์การถดถอยเชิงพหุแบบโลจิสติก*

ผลการศึกษา: *ปัจจัยเสี่ยงที่มีผลต่อการเกิดจอตาฉีกขาด ได้แก่ การเห็นจุดดำหลายจุด, การเห็นแสงวาบร่วมกับจุดดำ ซึ่งกลุ่มผู้ป่วยที่มีอาการเหล่านี้ เพิ่มความเสี่ยงในการเกิดจอตาฉีกขาดเป็น 5.8 และ 4.3 เท่า เมื่อเปรียบเทียบกับกลุ่มที่เห็นจุดดำจุดเดียว หรือ เห็นจุดดำเพียงอย่างเดียว และการตรวจพบ lattice degeneration เพิ่มความเสี่ยง 5.9 เท่า มากกว่าผู้ที่มีจอตาปกติ*

สรุป: *การเห็นจุดดำหลายจุด, การเห็นแสงวาบและการตรวจพบ lattice degeneration เป็นปัจจัยเสี่ยงที่มีผลต่อการเกิดจอตาฉีกขาด จักษุแพทย์ควรตระหนักเมื่อผู้ป่วยมีปัจจัยเสี่ยงเหล่านี้ ควรทำการตรวจจอตาอย่างละเอียดและนัดผู้ป่วยเพื่อตรวจติดตามการเปลี่ยนแปลงต่อไป*