Frequency of Lattice Degeneration in one eye of the patients with Rhegmatogenous Retinal Detachment.

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ABSTRACT:

Objective: We carried out this study to analyze and tabulate frequency of lattice degeneration in the fellow eye of patients with Rhegmatogenous Retinal Detachment

Methodology: This prospective cross-sectional study was conducted in Department of Ophthalmology, Civil Hospital, Karachi. All participants aged between 18 to 60 years with rhegmatogenous retinal detachment of either gender, were enrolled through non probability consecutive sampling. Demographic details included age, gender, height, weight and BMI. Lattice degeneration was labeled as positive based on presence of one or more of the following features which includes retinal thinning with round, oval, or linear outlines, pigment changes, yellow-white flecks, white patches, red crater-type spots, small atrophic holes, branching white lines, and scattered yellow atrophic areas. Rarely, tractional tears occur near the ends or back margins of these lesions.

Results: Amongst the 98 patients, the mean age was 51.72 ±3.69 years. There were 68 (69.4%) females. Decreased vision as presenting symptoms was reported by 54 (55.2%) participants, flashes of light by 39 (39.8%) and peripheral shadow by 21 (21.4%) patients. The frequency of lattice degeneration was observed in 33 (33.7%) patients. Statistically significant correlation was found between symptoms and age groups with the presence of lattice degeneration in fellow eyes ($p<0.05$).

Conclusion: The frequency of lattice degeneration was observed in one third of the fellow eye of patients with rhegmatogenous retinal detachment. Hence, driving the need for correct and vigilant screening on first presentation to prevent any irreversible complications.

Keywords: Fellow eye, Frequency, Lattice degeneration, rhegmatogenous retinal detachment.

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Introduction:

The cause of global blindness varies amongst different regions. Cataract, refractory errors and retinal diseases remain major contributors.[1] Amongst retinal diseases Diabetic retinopathy predominates as a cause of vision loss but other retinal disorders leading to decrease vision includes retinal vein occlusion, retinal detachment, age related macular degeneration and other added macular disorders.[2] In developing countries retinal detachment is given less importance and has a low priority, due to the lack of ophthalmic personnel and services.[3] Shared factors that influence in the development of retinal detachment are lattice degeneration, trauma and intraocular surgery.[4]

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Retinal detachment is one of the important vision-threatening diseases and requires an emergency approach. Three main types of retinal detachments have been identified; Tractional Retinal Detachment (TRD), Exudative Retinal Detachment (ERD) and Rhegmatogenous Retinal Detachment (RRD). The yearly occurrence rate of rhegmatogenous retinal detachment is 12.17 /100,000 with an increasing temporal trend of 5.4/100,000 per decade.[5] Within the field of Asian studies, various population-based research efforts have reported the annual incidence rates of the condition in question across multiple locations. Specifically, the incidence rate per 100,000 people was found to be 8 in Beijing, 14.4 in Shanghai, 10.5 in Singapore, 10.4 in Japan, and 10.4 in Korea.[6] These figures highlight a consistent pattern in some regions while showing notable variation in others, underscoring regional differences in disease occurrence across Asia.

Rhegmatogenous retinal detachment (RRD) happens when a full-thickness tear develops in the neurosensory retina (NSR).[7] This opening allows fluid from the vitreous cavity to pass through and collect beneath the retina in the subretinal space. Consequently, the neurosensory retina separates from the underlying retinal pigment epithelium (RPE), breaking the normal adhesion between these layers and resulting in the retinal detachment characteristic of RRD. Rhegmatogenous retinal detachments (RRDs) are most commonly linked to the development of retinal tears that coincide with posterior vitreous detachment (PVD).[8] Nonetheless, RRDs can also develop in the absence of PVD, particularly in individuals with certain pre-existing retinal conditions. These include atrophic holes, lattice degeneration, and retinal dialyses, which may result from prior blunt eye trauma or may arise without a known cause

(idiopathic). The probability of retinal tear formation increases in eyes that exhibit localized thinning of the retina, especially in the presence of lattice degeneration. This condition is further complicated by abnormal adhesions between the vitreous and the retina, which heighten the risk of detachment.[9]

Lattice degeneration is a peripheral retinal condition often defined by thin retinal areas, vitreous liquefaction over the lesion, and adhesive vitreoretinal borders.[10] In the general population, lattice degeneration occurs in about 8% of individuals, whereas in myopic patients the prevalence increases to nearly 17%.[11] But only a few of the normal patients with lattice degeneration end up having RRD in future. While patients who are already diagnosed with RRD in one eye and have lattice degeneration in the fellow eye are at a higher risk of developing RRD in the fellow eye in future. The retrospective study in Jordan by Al-Dwairi R et al,[12] regarding risk and preventive measures of rhegmatogenous retinal detachment found that in 47 patients, accounting for 13.7% of the study population, rhegmatogenous retinal detachment (RRD) also developed in the fellow (opposite) eye. Among these individuals, those who had retinal tears and lattice degeneration experienced the onset of RRD in the fellow eye after an average duration of approximately 45.22 months from the occurrence of RRD in the initially affected eye.

This study aims to assess how frequently lattice degeneration occurs in the fellow eye of patients diagnosed with rhegmatogenous retinal detachment within our local population, where such data remains limited. Recognizing this relationship can help reduce the occurrence of retinal detachment and limit its potential complications. For individuals at increased risk, regular follow-up examinations allow for the early detection of abnormal retinal changes, enabling timely intervention and preventing treatment delays. Early detection is likely to improve the effectiveness of surgical treatment and lead to more favorable clinical outcomes.

Methodology:

This prospective cross-sectional study was carried out in the Department of Ophthalmology and Visual Health Sciences at Dow University of Health Sciences, Civil Hospital Karachi. Approval from Institute of Research Board (IRB) was sought; dated (insert date). Sample size was calculated via a reference study conducted by Wasim S et al[13] who found that 29.1% of individuals with a rhegmatogenous retinal detachment (RRD) have lattice degeneration. Hence by using Open Source Epidemiologic and Statistical calculator (Open EPi) taking the occurrence percentage of lattice degeneration in the fellow eye of retinal detachment individual as 29.1%, confidence interval = 95% and margin of error = 9% a total sample of 98 was calculated. Non probability consecutive sampling technique was used to collect data.

Before inclusion in the study, each participant received a detailed description of the research and subsequently provided written informed consent. All patients presenting in the Outpatient Department of Ophthalmology, Civil Hospital Karachi meeting the eligibility criteria were enrolled in the study. Patients of either gender from age 18 to 65 years who were diagnosed with rhegmatogenous retinal detachment were included in study. Patients having only tractional and exudative retinal detachments or any form of combined retinal detachments were excluded. Patients having traumatic retinal detachment, bilateral rhegmatogenous retinal detachment or retinal detachment with vitreous hemorrhage were omitted from the research.

For each participant, the following information was recorded: age, sex, the affected eye, presenting symptoms, and presenting visual acuity (VA) measured with a Snellen chart. All the patients were assessed for outcome variable i.e. lattice degeneration on fundus examination by researcher himself/herself. Thorough history and slit lamp examination was carried out efficiently. Beforehand a proper visual assessment including refraction of all individuals was done by expert senior optometrist. Since people experiencing retinal detachment may notice a variety of symptoms including sudden flashes of light in their vision, as well as an increase in floaters, small shapes such as specks, threads, or squiggly lines that drift across the visual field. Another common sign is the darkening or blurring of peripheral vision, which may progress over time. In some cases, individuals report the appearance of a shadow or curtain spreading across a part of their vision, partially obscuring what they see. All these symptoms were inquired and recorded in structured tested questionnaire.

Fundoscopic examination was considered positive for lattice degeneration if characterized features like circular or oval, linear or patch like, pigmentation, holes, red or white craters are seen. Further signs considered positive for lattice degeneration included pale white or yellow branching lines on the lesion surface, infrequent tractional tears at the posterior or terminal edges, and yellow atrophic spots reflecting pigment epithelial thinning.

Weight of the patient was noted in kilograms using electronic measuring scale in standing position. While the patient is in standing position, his/her height will be recorded in through wall mounted scale in centimeters (cm). The Body Mass Index (BMI) for each participant was computed by dividing body weight (in kilograms) by height (in meters).

The name of the individual patient was not disclosed at any time during the study or at the time of publication. There was no identification of the patient at any level. Software called Statistical Package of Social Sciences (SPSS) version 26 will be used to enter and evaluate data . Shapiro– Wilk test was applied to check the normality of quantitative variables like regarding the patient's age, weight, height and BMI. If data followed normality (p-value > 0.05), mean and standard deviation was calculated otherwise median (range) was reported. Frequency and percentages was calculated for gender, eyes involved, symptoms upon initial presentation and visual acuity (VA) at the time of presentation and lattice degeneration. Effect modifiers were controlled through stratification of age, weight, height, BMI, gender, symptoms at presentation, side of the eye and visual acuity (VA) at presentation. After post stratification, the Chi-square or Fisher exact test was conducted to evaluate the impact of effect modifiers on the outcome variables. P-value < 0.05 was considered statistically significant.

Results:

In this study, a sample of 98 individuals were included for analysis. The average age of the participants was calculated to be 51.72 ±3.69 years, indicating a relatively narrow distribution around the mean. The ages of the participants ranged from 40 to 59 years. This reflected a predominantly middle-aged group distribution in the study population. Of the total sample, 25 individuals (approximately 25.5%) were 50 years old or younger, while the remaining 73 participants (74.5%) were over 50 years of age. The mean

body weight was 60 ± 5.16 kg, and the average height was 1.54 ± 0.06 m. Based on these measurements, the mean body mass index (BMI) was calculated out to be 26.97 ± 5.15 kg/m². All key demographic and physical data, including age distribution, weight, height, and BMI, are summarized in Table 1 for a comprehensive overview of the study population.

Table No 1: Demographics of the study population.

Variables	Mean ± SD	Minimum	Maximum
Age (year)	51.72 ±3.69	40	59
Weight (kg)	60.22 ±5.16	53	66
Height (m)	1.54 ±0.06	1.50	1.63
BMI (kg/m^2)	26.97 ±5.15	18.70	33.00

Analysis of gender distribution showed that the majority of participants were female; 68(69.4%) compared to 30 (30.6%) males. This resulted in a male-to-female ratio of roughly 1:2 and therefore indicating a female predominance in the study group. Regarding laterality, ocular involvement was more frequent in the left eye; 75 (76.5%) affected, while only 23 (23.5%) had right eye involvement.

Body mass index (BMI) was categorized using a cutoff of 26.5 kg/m². Based on this threshold, 46 (46.9%) participants had a BMI ≤26.5 kg/m² and 52 (53.1%) had a BMI above this value. This proved a fairly balanced distribution across the two categories.

At presentation in the clinic visual acuity was evaluated for all patients. Most participants, 67 (68.4%) individuals had relatively good vision (6/12 or better), while 15 (15.3%) patients had severely reduced vision (6/60 or worse). The results illustrated the variation in visual status at the time of initial assessment.

Regarding presenting symptoms, the most commonly reported complaint was decreased vision, affecting 54 participants (55.1%). Lattice degeneration was observed in 33 patients (33.7%). A detailed summary of symptom frequency and the prevalence of lattice degeneration is presented in Table 2.

Table 2: Frequency of symptoms and lattice degeneration of study population (n=98).

Variables	Yes	No
Flashes of light	39 (39.8%)	59 (60.2%)
Floaters	29 (29.6%)	69 (70.4%)
Decrease in Vision	54 (55.1%)	44 (44.9%)
Peripheral Shadow	21 (21.4%)	77(78.6%)
Lattice Degeneration	33 (33.70%)	65 (66.3%)

To investigate potential links, lattice degeneration was analyzed in relation to clinical characteristics such as age, gender, height, and body mass index (BMI). However, none of these factors showed a meaningful or statistically significant association, as all corresponding p-values >0.05.

Further statistically significant association was identified between the presence of lattice degeneration and both the symptoms reported at presentation and the patients' age groups. This relationship was assessed using the Fisher exact test, and the results indicated significance with a p-value <0.05, as illustrated in Table 3.

Table No 3: Clinical correlation between lattice degeneration and variables.

Variables		Lattice degeneration		p- value
		Yes	No	
Floaters	Yes	20 (69.0%)	9 (31.0%)	<0.001
	No	13 (18.8%)	56 (81.2%)	
Flashes of light	Yes	22 (56.4%)	17 (43.6%)	<0.001
	No	11 (18.6%)	48 (81.4%)	
Decrease in Vision	Yes	23 (42.6%)	31 (57.4%)	<0.038
	No	10 (22.7%)	34 (77.3%)	
Peripheral Shadow	Yes	2 (9.5%)	19 (90.5%)	<0.008
	No	31 (40.3%)	46 (59.7%)	
Age Group	≤50	15 (60.0%)	10 (40.0%)	<0.001
	>50	18 (24.7%)	55 (75.3%)	

Discussion:

Studies such as those by Byer et al.[14] have found the prevalence of lattice degeneration in the general population to range from 6% to 10%.[14] However, in patients with retinal detachment, the prevalence of lattice degeneration is significantly higher. Another study by Byer et al. demonstrated that lattice degeneration was present in the fellow eye of approximately 30% of patients experiencing retinal detachment.[15] Similarly, Wilkinson and Rice noted that the prevalence of lattice degeneration in fellow eyes of retinal detachment patients was around 25% to 30%.[16]

A study conducted in the USA by Gonzales CR et al. reported that among 27 patients,[17] (63%) exhibited retinal changes, including lattice degeneration in the fellow eye of individuals with rhegmatogenous retinal detachment .[17] Another retrospective case series by same author studied 248 patients over a period of 5.2years. Amongst these 27 patients (11%) had lattice degeneration in fellow eyes of RD patients.[18] A Scottish retinal Detachment Study over a period of 2 years prospectively concluded that from 1130 patients 164 participants had lattice degeneration in their fellow eye which turned out to be 14.5%.[19] A retrospective study of 348 patients carried out in King Abdullah University Hospital, Saudi Arabia analyzed that 76 (28%) had lattice degeneration in contralateral eye. Retrospective case series by Yuan M et al assessed clinical features in fellow eyes of patients with Familial Exudative Vitreoretinopathy (FEVR) associated retinal detachment. The available literature indicates that the study population had a mean age of 21.8 ± 10.9 years, and lattice degeneration was detected in 53.7% of fellow eyes.[20] Whereas, according to our study participants had a mean age of 51.72 ±3.69 years.

A four-year study from 1978-1981 estimated that in 312 patients operated for rhegmatogenous retinal detachment had lattice degeneration in 54 (21%) patients.[21] In a study conducted in Pakistan, nearly 29% of patients with rhegmatogenous retinal detachment were found to have lattice degeneration in the contralateral eye.[13] These comparisons validate our results which concluded that 33% had lattice degeneration. This highlighted the increased risk of lattice degeneration in patient group having Rhegmatogenous RD in one eye.

Our study had several limitations that should be acknowledged. Firstly, the cross-sectional design limits the ability to establish a causal relationship between lattice degeneration and rhegmatogenous retinal detachment. Secondly, the study was conducted at a single center, which may limit

the generalizability of the findings to other populations or settings. Additionally, the sample size, although sufficient for preliminary analysis, may not capture the full variability of the condition in the broader population. This study has some limitations. One important consideration is selection bias, since patients who come to the hospital may have more severe or noticeable symptoms of retinal detachment than people in the general population. Nevertheless, the study also has several strengths. It is one of the few studies to specifically examine how frequently lattice degeneration occurs in the fellow eye of patients with rhegmatogenous retinal detachment. By using clear diagnostic criteria, the study ensures reliable identification of lattice degeneration. Including both men and women across a wide age range makes the results more relevant to a broader group of patients. Moreover, carefully documenting patient symptoms and demographic information gives a thorough picture of the study population, providing useful data for comparison with other research.

Future research should consider following patients over time to better understand whether lattice degeneration directly contributes to retinal detachment. Larger, multicenter studies could confirm these results and make them more applicable to different populations. Investigating genetic and environmental factors may also help identify people at higher risk and suggest preventive strategies. Additionally, research should evaluate how effective early screening and treatment are in reducing the risk of retinal detachment in patients with lattice degeneration. Understanding the impact of early detection on long-term vision could guide practical recommendations for patient care.

Conclusion:

In this study, lattice degeneration was present in roughly one-third of fellow eyes in patients with rhegmatogenous retinal detachment. This highlights the need for regular monitoring to prevent further complications. Routine retinal examinations in these patients are important for early detection and timely management of lattice degeneration. Future studies should explore long-term outcomes and preventive measures to reduce the risk of retinal detachment in this high-risk

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Osama Bin Ahmed,	Concept, Literature Search, Manuscript writing
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Tahira Sadaf	Data collection, Proof reading
Fizzah Farooq	Data analysis, interpretation of data
Zaheer Sultan	Literature search
Qurat-ul-Ain Shaikh	Validatiion of the data