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REFRAKSİYA QÜSURLARI OLAN GƏNC KİŞİLƏRDƏ TOR QİŞANIN PERİFERİK DEGENERASİYALARININ RASTGƏLMƏ TEZLİYİ VƏ KLİNİK PROFİLİ

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XÜLASƏ

Məqsəd – refraksiya qüsurları olan gənc kişilərdə tor qişanın periferik degenerasiyalarının (TPD) rastgəlmə tezliyini, refraktiv göstəricilərlə əlaqəsini və klinik xüsusiyyətlərini müəyyən etmək.

Material və metodlar
Retrospektiv analitik tədqiqata yaşı 16-35 arasında olan 649 kişi daxil edilmişdir. Bütün iştirakçılarda ümumi oftalmoloji müayinə aparılmışdır. Refraksiya göstəriciləri siklоplegiyadan sonra müəyyən edilmiş, hər göz üçün sferik ekvivalent (SE) hesablanmışdır. Tor qişanın periferik dəyişiklikləri göz dibinin detallı, genişləndirilmiş müayinəsi vasitəsilə aşkar olunmuş və morfoloji alt tiplərə bölünmüşdür. TPD-nin yayılma tezliyi, pasiyent və göz səviyyəsində 95% etibarlılıq intervalı (EI) ilə hesablanmışdır. Statistik analizdə χ^2 testi və çoxfaktorlu loqistik reqressiya tətbiq edilmişdir.

Nəticələr
Tor qişanın periferik degenerasiyaları 649 pasiyentdən 55-də aşkar olunmuşdur (8,47%; 95% EI: 6,5-10,8). Aşkar olunan halların 47,3%-də patalogiya ikitərəfli olmuşdur. TPD olan pasiyentlərin 12,7%-də yırtıqlar, 1 pasiyentdə (1,8%) isə periferik tor qişa qopması qeydə alınmışdır. TPD-nin rastgəlmə tezliyi miopiyanın dərəcəsi artdıqca statistik cəhətdən əhəmiyyətli şəkildə yüksəlmişdir (p = 0,0478). Çoxfaktorlu logistik reqressiya analizi göstərmişdir ki, miopiyanın dərəcəsinin artması TPD üçün müstəqil risk faktorudur (OR = 0,905; 95% EI: 0,841–0,973; p = 0,0073). TPD əsasən miopiyada müşahidə olunsa da, digər refraksiya qüsurlarında da aşkar edilmişdir. Ocaqların lokalizasiyasının təhlili ən çox yuxarı-temporal kvadrant rast gəlindiyini aşkara çıxartmışdır.

Yekun
Tor qişanın periferik degenerasiyası refraksiya qüsurları olan gənc şəxslərdə az rast gəlinən hal deyildir və miopiyanın dərəcəsi artdıqca onların yaranma ehtimalı yüksəlir. Bununla yanaşı, bu dəyişikliklər qeyri-miopik gözlərdə də müşahidə oluna bilər. Refraktiv cərrahiyyə öncəsi və fiziki yüklənməyə məruz qala bilən şəxslərdə periferik tor qişanın sistemli müayinəsi klinik baxımdan əsaslandırılmışdır.

Açar sözlər: *tor qişanın periferk degenerasiyaları, tor qişanın qopması, refraksiya qüsurları, refraktiv cərrahiyyə, arxa hialoid membranın qopması*

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PREVALENCE AND CLINICAL PROFILE OF PERIPHERAL RETINAL DEGENERATION IN YOUNG MALES WITH REFRACTIVE ERRORS

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SUMMARY

Purpose – to determine the prevalence, refractive associations, and clinical characteristics of peripheral retinal degeneration (PRD) in young male individuals with refractive errors.

Material and methods

This retrospective analytical study included 649 male participants aged 16-35 years who underwent comprehensive ophthalmologic examination. Refractive error was assessed using cycloplegic refraction, and spherical equivalent (SE) was calculated for each eye. Peripheral retinal findings were documented using dilated fundus examination and classified into predefined morphological subtypes. PRD prevalence was calculated at both patient and eye levels with 95% confidence intervals (CI). Associations were evaluated using χ^2 testing and multivariable logistic regression.

Results

Peripheral retinal degeneration was identified in 55 of 649 patients (8.47%; 95% CI: 6.5–10.8). Bilateral involvement was observed in 47.3% of cases. Retinal holes were detected in 12.7% of PRD cases, and one patient (1.8%) presented with PRD. PRD prevalence increased significantly with myopia severity ($p = 0.0478$). Logistic regression analysis confirmed increasing myopic refractive error as an independent predictor of PRD (OR = 0.905 per 1 D increase; 95% CI: 0.841–0.973; $p = 0.0073$). Although PRD was more frequent in myopic individuals, degeneration was also identified in non-myopic refractive profiles. Lesion-based analysis demonstrated predominant involvement of the superior temporal quadrant.

Conclusion

Peripheral retinal degeneration is not uncommon in young individuals with refractive errors and is strongly associated with increasing myopia severity, although it may also occur in non-myopic eyes. Systematic peripheral retinal screening is clinically justified, particularly prior to refractive surgery and in individuals exposed to mechanical ocular stress.

Key words: *peripheral retinal degenerations, retinal detachment, refractive errors, refractive surgery, posterior vitreous detachment*

Peripheral retinal degeneration (PRD) represents a heterogeneous group of structural alterations affecting the peripheral retina and vitreoretinal interface. These degenerative changes may include intraretinal, vitreoretinal, and chorioretinal abnormalities and are frequently detected during routine fundoscopic examination. While many peripheral lesions remain asymptomatic, certain morphologic subtypes – such as snail-track and lattice degeneration – are recognized as potential precursors of retinal tears and rhegmatogenous retinal detachment [1 - 4].

Refractive errors, particularly myopia, are among the most prevalent ocular conditions worldwide and continue to increase in global prevalence [5 - 7]. Myopic eyes are characterized by axial elongation and peripheral retinal thinning, predisposing them to structural fragility and vitreoretinal interface changes. Numerous studies have demonstrated a higher frequency of PRD in myopic individuals, especially in moderate and high degrees of myopia. Therefore, the evaluation of peripheral retinal status in patients with refractive errors carries both diagnostic and prognostic importance [8 - 11].

In contemporary ophthalmic practice, individuals with refractive errors frequently seek refractive surgical correction. Laser refractive procedures, although generally safe, may involve transient intraocular pressure fluctuations and biomechanical changes that could theoretically influence the vitreoretinal interface. Identification of peripheral retinal lesions prior to refractive surgery is therefore considered a critical component of preoperative assessment to reduce the risk of postoperative retinal complications [12 - 18].

Beyond surgical considerations, young individuals with refractive errors frequently participate in physically demanding activities and sports. In addition, young males often undergo medical screening for physically demanding occupations, including military service. Vigorous physical exertion and acceleration-deceleration forces may increase vitreoretinal traction in predisposed eyes, potentially triggering retinal breaks in the presence of peripheral degeneration. Early detection and appropriate management of such lesions are therefore clinically relevant for long-term ocular safety.

Despite the recognized clinical importance of PRD in myopic populations, data regarding its prevalence and morphological distribution in young male individuals with refractive errors remain limited. Understanding the frequency and clinical profile of these lesions is essential for risk stratification, preventive decision-making, and appropriate ophthalmologic counseling.

The aim of the present study was to determine the prevalence of PRD in young male individuals with refractive errors and to analyze their clinical characteristics.

Material and methods

This retrospective analytical study was conducted at the National Ophthalmology Centre named after Academician Zarifa Aliyeva. The study included 649 male individuals aged 16 - 35 years who underwent comprehensive ophthalmologic examination as part of routine medical screening.

All examinations were performed in accordance with the principles of the Declaration of Helsinki. The study was based on anonymized retrospective clinical data.

All participants underwent complete ophthalmologic assessment, including: measurement of refractive error using cycloplegic retinoscopy and autorefractometry, calculation of spherical equivalent (SE = sphere + ½ cylinder) for each eye, dilated fundus examination using a 90 D non-contact lens and ultra-wide-field retinal imaging (ZEISS CLARUS 500 (Germany) when PRD was detected.

Peripheral retinal degeneration was classified into these morphological subtypes: snail-track degeneration, peripheral vitreoretinal degeneration, peripheral chorioretinal degeneration, frost-like degeneration, white without pressure, lattice degeneration.

The presence of retinal holes, peripheral retinal detachment, and prophylactic laser photocoagulation was recorded.

At the patient level, refractive status was categorized as: myopia (any eye ≤ −0.5 D), hyperopia (both eyes ≥ +0.5 D) and mixed astigmatism refractive errors.

Myopia severity was further classified according to the worse-eye spherical equivalent (SE_worse) as:low (≥ −3.0 D), moderate (−3.25 to −6.0 D), high (≤ −6.25 D).

In patient-level analyses, when bilateral PRD was detected, refractive data from the worse eye were used for statistical evaluation. Eye-level analysis was performed descriptively. Emmetropic-range eyes represented fellow (clinically unaffected) eyes of patients with anisometropia.

Statistical analysis was performed using IBM SPSS (SPSS 23) Statistics software.

Continuous variables were tested for normality using the Shapiro-Wilk test and are presented as mean ± standard deviation (SD). Categorical variables are expressed as frequencies and percentages.

Peripheral retinal degeneration prevalence was calculated at both patient and eye levels with corresponding 95% CI.

Comparisons between categorical variables were performed using the χ^2 test. Differences in continuous variables were assessed using independent samples t-test.

Multivariable binary logistic regression analysis was performed to identify independent predictors of PRD. Odds ratios (OR) with 95% CI were calculated.

All statistical tests were two-tailed, and $p < 0.05$ was considered statistically significant.

Results

A total of 649 male participants were included in the analysis. The mean age of the study population was 23.08 ± 4.23 years. PRD was identified in 55 of 649 patients (8.47%, 95% CI: 6.5-10.8), as illustrated in **Figure** 1.

The distribution of refractive errors and PRD prevalence at both patient and eye levels is presented in **Table 1**.

At the patient level, myopia (any) was present in 554 participants (85.4%), while 95 participants (14.6%) were classified as hyperopic. PRD was identified in 53 myopic participants (9.57%) and in 2 hyperopic participants (2.11%).

At the eye level, 79 of 1298 eyes (6.09%) demonstrated PRD. The prevalence was higher in myopic eyes (6.90%) compared to hyperopic eyes (2.07%).

Peripheral retinal degeneration was observed predominantly in myopic individuals at both patient and eye levels.

The prevalence of PRD increased with increasing myopia severity (**Table 2**): low myopia: 6.1%, moderate myopia: 10.6%, high myopia: 12.7%. The distribution of PRD according to myopia severity is presented in **Figure 2**.

The association between myopia severity and PRD was statistically significant (χ^2, $p = 0.0478$).

Multivariable logistic regression analysis demonstrated that increasing myopic refractive error (SE worse) was independently associated with PRD (OR = 0.905 per 1 D increase; 95% CI: 0.841–0.973; $p = 0.0073$) (**Table 3**).

Age was not significantly associated with PRD ($p = 0.2510$).

Clinical Profile of PRD

Among the 55 patients diagnosed with PRD, bilateral involvement was observed in 47.3% of cases. Snail-track degeneration (41.8%) and lattice degeneration (29.1%) were the most common morphological subtypes (**Table 4** and **Figure 2**). Retinal holes were identified in 12.7% of PRD cases, and PRD was observed in 1.8%.

Lesions were most frequently localized in the superior temporal quadrant (38.2%), followed by superior (25.5%) and inferior temporal (25.5%) regions (**Figure 4**). A total of 66 peripheral lesions were identified among 55 patients. The superior temporal quadrant was the most frequently involved site (n = 21, 31.8%), followed by the superior (n = 14, 21.2%) and inferior temporal quadrants (n = 14, 21.2%). The localization distribution is presented in **Figure 4**.

Table 1. *Baseline Characteristics of the Study Population (Patient-Level and Eye-Level Analysis)*

Variable	*n (%) / Eyes (n)*	*Age (mean ± SD)*	*SE (mean ± SD)*	*PRD (n)*	*PRD prevalence % (95% CI)*
Patient-Level					
Myopia	554 (85.4%)	22.9 ± 4.2	−3.81 ± 2.82	53	9.57% (7.1–12.0)
Hyperopia	95 (14.6%)	24.1 ± 4.0	+3.02 ± 2.65	2	2.11% (0.3–7.4)
Total patients	649 (100%)	23.08 ± 4.23	−2.81 ± 3.69	55	8.47% (6.5–10.8)
Eye-Level					
Myopic eyes	1087	23.08 ± 4.20	−3.21 ± 3.05	75	6.90% (5.4–8.4)
Hyperopic eyes	193	23.11 ± 4.39	+1.58 ± 1.12	4	2.07% (0–4.1)
Emmetropic-range*	18	22.89 ± 4.11	0.12 ± 0.18	0	0%
Total eyes	1298	23.08 ± 4.23	−2.81 ± 3.69	79	6.09% (4.8–7.4)

Note: **Emmetropic-range eyes represent fellow (clinically unaffected) eyes of patients with anisometropia.*

Table 2. *Prevalence of PRD According to Myopia Severity (Patient-Level Analysis)*

Myopia Severity	*Total (n)*	*PRD (n)*	*PRD prevalence (%)*
Low	359	22	6.1
Moderate	188	20	10.6
High	102	13	12.7
p-value (χ^2)			0.0478

Table 3. *Multivariable Logistic Regression Analysis for Predictors of PRD*

Variable	*OR*	*95% CI*	*p-value*
SE_worse (per 1 D increase)	0.905	0.841–0.973	0.0073
Age (years)	1.039	0.973–1.110	0.2510

Table 4. *Clinical Profile of PRD*

Variable	*n*	*%*
Bilateral involvement (OU)	26	47.3
Right eye (OD)	14	25.5
Left eye (OS)	15	27.2
Snail-track degeneration	23	41.8
Lattice degeneration	16	29.1
Peripheral chorioretinal	6	10.9
Frost-like	6	10.9
Vitreoretinal	2	3.6
White without pressure	2	3.6
Retinal hole	7	12.7
Retinal detachment	1	1.8
Laser photocoagulation	13	23.6

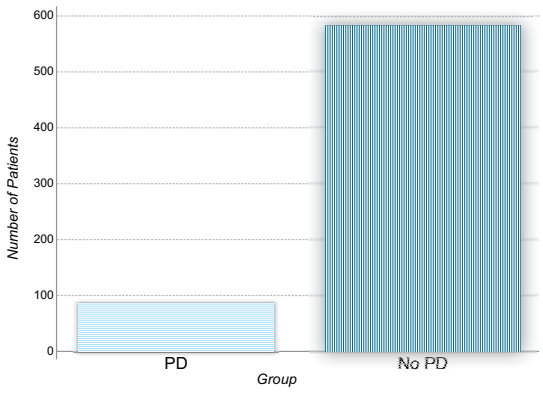

Figure 1. *Prevalence of PRD*

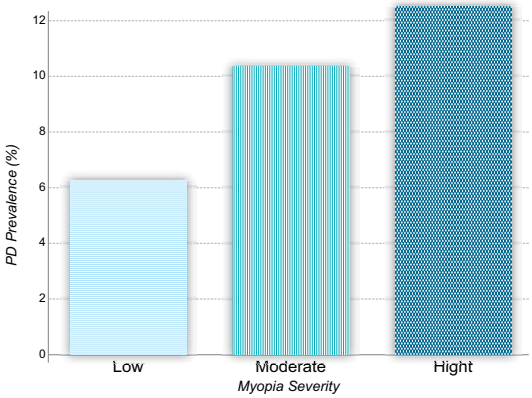

Figure 2. *Peripheral retinal degeneration by myopia severity.*

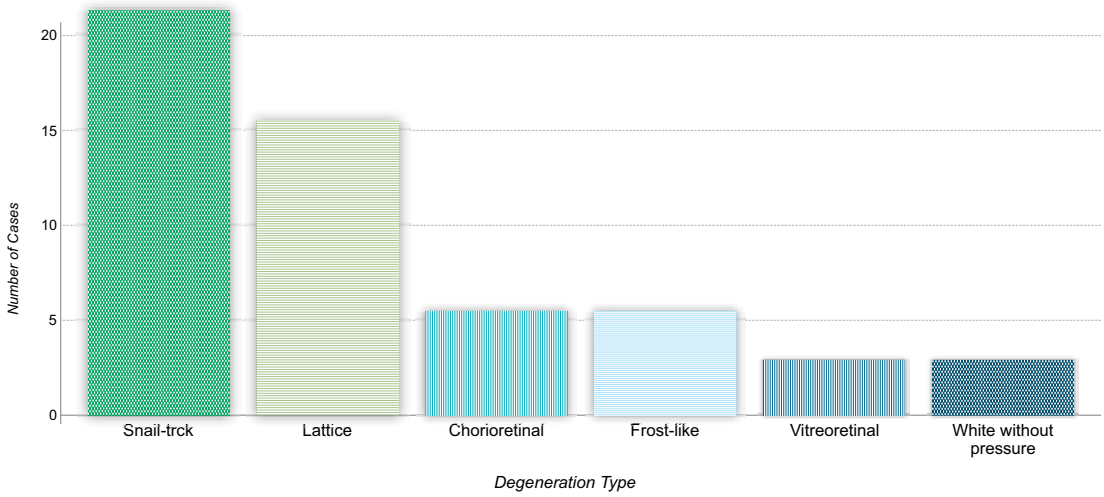

Figure 3. *Distribution of PRD types.*

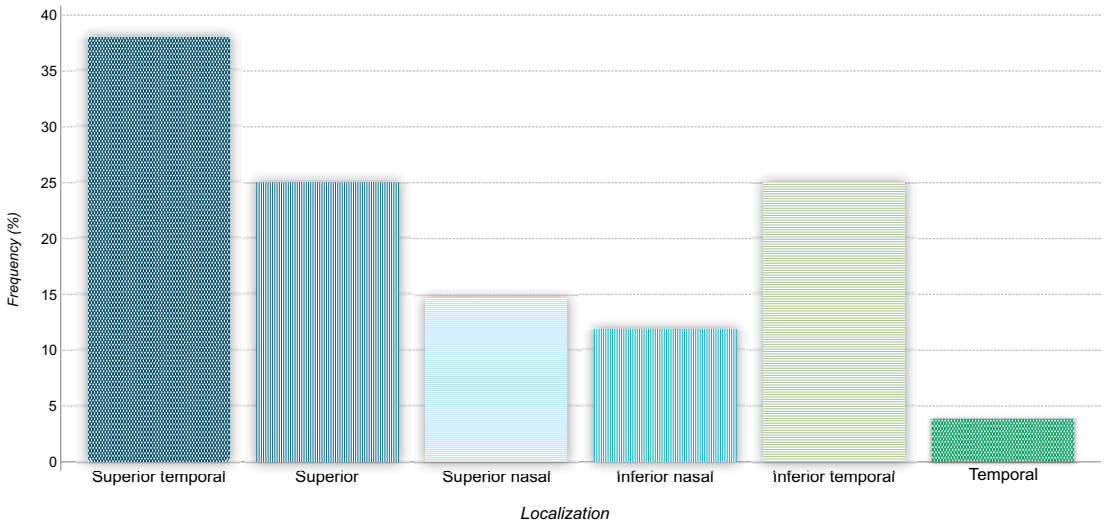

Figure 4. *Localization of PRD.*

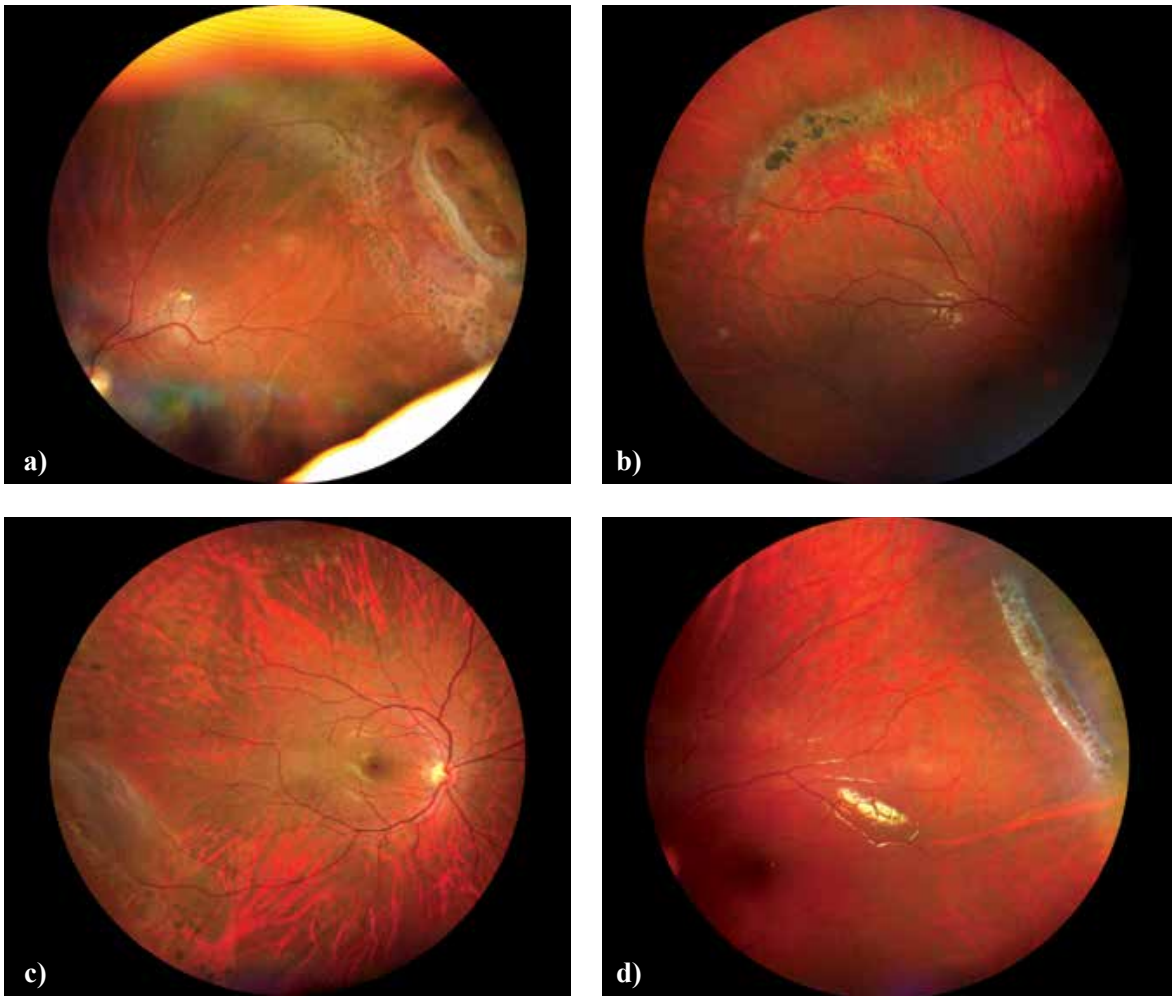

Figure 5. *Representative fundus images of PRD: a) Snail-track degeneration associated with round retinal tears and the post-laser photocoagulation appearance; b) Lattice degeneration surrounded by laser photocoagulation scars; c) Lattice degeneration accompanied by localized shallow retinal detachment; d) Snail-track–type degeneration.*

Representative fundus photographs of four patients with different forms of PRD are presented in Figure 5 (a, b, c, d).

Discussion

The present study evaluated the prevalence and clinical characteristics of PRD in a cohort of young male individuals with refractive errors. PRD was identified in 8.47% of patients, with nearly half of affected individuals demonstrating bilateral involvement. Retinal holes were detected in 12.7% of PRD cases, and PRD was observed in one patient (1.8%), underscoring that peripheral degenerative changes in this population are not merely incidental findings but may represent clinically relevant risk factors.

Myopia was significantly associated with the presence of PRD. Patients with degeneration exhibited a more negative SE compared to those without PRD, and the prevalence of PRD increased progressively with increasing myopia severity. Multivariable logistic regression analysis confirmed refractive error as an independent predictor of PRD. These findings are consistent with known structural alterations in myopic eyes, including axial elongation, peripheral chorioretinal thinning, and increased vitreoretinal traction, which predispose to degenerative changes.

These observations align with previously published international data demonstrating a strong association between increasing myopia severity and PRD. Several population-based

studies have reported substantially higher rates of peripheral degenerative lesions in high myopia compared with low myopia. For instance, data from the Beijing Eye Study indicated that PRD was observed in 3.8% of individuals with refractive error < −4.0 D, whereas the prevalence increased markedly to 89.6% in eyes with refractive error below −10.0 D. Similarly, studies conducted in Indian populations reported lattice degeneration in 5.4% of low myopes compared with 37% in myopia exceeding −10.0 D, while the prevalence of white-without-pressure lesions increased from 6.3% in low myopia to 32.6% in high myopia [3, 10, 11, 18 - 21].

In the present study, although PRD was more frequently observed in myopic individuals and its prevalence increased with myopia severity, degeneration was also detected in low myopia and in non-myopic refractive profiles. This suggests that while axial elongation and increasing vitreoretinal traction contribute substantially to the development of peripheral degenerations, such lesions are not confined exclusively to extreme refractive errors.

The relatively high proportion of bilateral involvement emphasizes the necessity of careful examination of both eyes during routine ophthalmologic assessment. Bilaterality may reflect symmetrical structural susceptibility and further supports the need for systematic peripheral retinal evaluation rather than targeted unilateral assessment.

Lesion-based localization analysis demonstrated that the superior temporal quadrant was the most frequently involved anatomical site. This distribution pattern has been described in previous reports and may be related to regional variations in peripheral retinal thickness, vascular architecture, and vitreoretinal adhesion. Recognition of these high-risk quadrants is clinically valuable, enabling more focused evaluation during screening examinations.

The identification of retinal holes and a case of PRD within this relatively young population highlights the potential clinical consequences of untreated peripheral lesions. Even in asymptomatic individuals, such changes may represent a predisposing stage for future retinal breaks, particularly under conditions associated with increased vitreoretinal traction.

Refractive error screening is particularly relevant in the context of refractive surgical planning. Individuals with myopia constitute the primary candidates for laser refractive procedures. Although modern refractive techniques are generally safe, intraoperative fluctuations in intraocular pressure and biomechanical alterations may theoretically influence the vitreoretinal interface. Preoperative identification of peripheral retinal lesions allows timely prophylactic management and may reduce the risk of postoperative retinal complications [12 - 18].

Additionally, young individuals with refractive errors frequently engage in physically demanding activities and sports. Sudden acceleration-deceleration forces and vigorous physical exertion may increase vitreoretinal traction in predisposed eyes. Early detection and appropriate counseling regarding PRD may therefore contribute to long-term visual safety in physically active populations [22 - 24].

Conclusion

Peripheral retinal degeneration may be encountered across a broad spectrum of refractive errors and is not restricted solely to high myopia. Although PRD was more frequently observed in myopic individuals and its prevalence increased with myopia severity, degeneration was also identified in non-myopic refractive profiles. These findings indicate that peripheral retinal changes may develop irrespective of refractive category, although the risk remains significantly higher in myopic eyes.

Given the documented presence of retinal holes and peripheral retinal detachment in this young population, systematic peripheral retinal screening is clinically justified. Comprehensive peripheral fundus examination-particularly prior to refractive surgery and in individuals exposed to mechanical ocular stress-plays a crucial role in optimizing long-term retinal safety and surgical planning.

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