

## Original Article

## Prevalence of Peripheral Retinal Degenerations in LASIK Patients : A Prospective Observational Study

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## Abstract

**Background :** Laser-assisted in Situ Keratomileusis (LASIK) is widely performed for refractive error correction. However, concerns exist regarding potential retinal complications, particularly in myopic patients who may have pre-existing Peripheral Retinal Degenerations (PRD).

**Aims and Objective :** To assess the prevalence of Peripheral Retinal Degenerations in patients undergoing LASIK surgery and evaluate the association between myopia severity.

**Materials and Methods :** This prospective observational study was conducted at the Department of Ophthalmology, Dhiraj Hospital, Vadodara, from June, 2023 to January, 2025. A total of 110 patients (220 eyes) undergoing LASIK surgery were included. Comprehensive ophthalmic evaluation including dilated fundus examination was performed preoperatively and at days 7, 30, 90 and 180 postoperatively. Patients were categorized based on myopia severity: Low (<-3.0D), Moderate (-3.0 to -6.0D) and High (>-6.0D). Statistical analysis was performed using Chi-square test for categorical variables and unpaired t-test for continuous variables.

**Results :** The mean age was 24.5±3.9 years with 54.5% females. High myopia was present in 76.4% (84/110), Moderate in 22.7% (25/110) and Low in 0.9% (1/110) patients. Peripheral Retinal Degenerations were found in 17.3% (19/110) patients. The prevalence of PRD varied significantly across myopia groups: Moderate myopia 48.0% (12/25), High myopia 7.1% (6/84) and Low myopia 100% (1/1) (p<0.001). Types of PRD included lattice degeneration (n=11), pigmentary alterations (n=3), white without pressure (n=4), peripheral retinal breaks (n=1), snail track degeneration and retinoschisis. All patients achieved 6/6 visual acuity postoperatively with no progression of PRD during 180-day follow-up.

**Conclusion :** The prevalence of Peripheral Retinal Degenerations in LASIK candidates was 17.3%, with Moderate myopia patients showing the highest prevalence at 48.0%. Preoperative detailed peripheral fundus evaluation is crucial across all myopia severities to identify and prophylactically treat PRD before LASIK.

**Key words :** High Myopia, LASIK, Peripheral Retinal Degeneration, Refractive Surgery.

Laser-assisted in Situ Keratomileusis (LASIK) has become the most popular refractive surgical procedure Worldwide for correcting myopia, hyperopia, and astigmatism<sup>1</sup>. LASIK is particularly indicated in patients with Low to Moderate myopia (-0.5D to -9.0D) due to higher probability of achieving emmetropia<sup>2</sup>. While LASIK demonstrates excellent safety and efficacy profiles, concerns remain regarding potential vitreoretinal complications, especially in myopic patients<sup>3</sup>.

Peripheral Retinal Degeneration encompasses various lesions including lattice degeneration, snail-track degeneration, atrophic retinal holes, peripheral retinal tears, and retinoschisis<sup>4</sup>. Although most PRDs are clinically benign, certain types can predispose to rhegmatogenous retinal detachment, particularly in the presence of posterior vitreous detachment<sup>5</sup>. The mechanical stress during LASIK, including intraocular

## Editor's Comment :

- The prevalence of Peripheral Retinal Degenerations (PRD) in LASIK candidates was 17.3%, highlighting that retinal screening is essential before refractive surgery.
- Moderate myopia (-3 to -6 D) showed the highest prevalence of PRD (48%), an unexpected but clinically significant finding—screening should not be limited only to high myopes.
- Lattice degeneration was the most common peripheral retinal lesion identified.
- Careful preoperative dilated peripheral fundus examination is mandatory in all myopia severities.
- Prophylactic laser treatment, when indicated, allows safe progression to LASIK.
- No progression of PRD or new retinal lesions were observed over 6 months follow-up, and all patients achieved 6/6 visual acuity, supporting the safety of LASIK in properly screened patients.
- LASIK-related mechanical stress does not appear to worsen stable peripheral retinal lesions in the short term.
- Long-term follow-up remains important, especially in patients with identified peripheral retinal changes.

pressure elevation >65 mmHg during microkeratome suction and rapid decompression, may theoretically affect vitreoretinal structures<sup>6</sup>.

Previous studies have reported varying incidences of vitreoretinal complications after LASIK, ranging from 0.06% to 0.45%<sup>7,8</sup>. However, limited data exists on follow

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up of prevalent pre-existing peripheral retinal degenerations in LASIK candidates and their clinical significance. This study aimed to assess the prevalence of Peripheral Retinal Degenerations in patients undergoing LASIK and evaluate its association with myopia severity and 6 month follow up of PRDs.

**MATERIALS AND METHODS**

This prospective observational study was conducted at the Department of Ophthalmology, Dhiraj Hospital, Sumandeep Vidyapeeth University, Vadodara, Gujarat, from June, 2023 to January, 2025, after obtaining Institutional Ethics Committee approval (SVIEC/2023/06/15).

**Inclusion Criteria :**

The study included patients aged 21 years and older with stable myopia who demonstrated normal corneal topography and had no ocular pathology or lid abnormalities. Participants were required to have no history of previous ocular surgery. Patients with lattice degeneration and peripheral retinal breaks were included in the study following prophylactic laser barrage treatment.

**Exclusion Criteria :**

Patients were excluded from the study if they had inconsistent followup patterns, corneal pathology such as keratoconus or corneal ulcers, active ocular infections, or any history of previous ocular surgery.

Sample size was calculated using the formula:  $n = (Z^2 \times P \times (1-P)) / e^2$ , where  $Z=1.96$  for 95% confidence level,  $P=0.20$  (expected prevalence 20%) and  $e=0.05$  (precision 5%), yielding a minimum sample of 246 eyes. We enrolled 110 patients (220 eyes) during the study period.

**Preoperative Evaluation :** All patients underwent comprehensive ophthalmic examination including :  
 • Uncorrected and best-corrected visual acuity (Snellen chart)  
 • Autorefractometry  
 • Slit-lamp biomicroscopy  
 • Goldmann applanation tonometry  
 • Corneal topography (Carl Zeiss Atlas Model 9000)  
 • Pentacam analysis (Oculus Pentacam®)  
 • Dilated fundus examination with 20D lens and slit-lamp biomicroscopy with 90D lens  
 • Schirmer test and contrast sensitivity assessment.

**Surgical Procedure :**

LASIK was performed using Moria M2 Evolution microkeratome creating superior-hinged flaps (8.5-9mm diameter, 90-130µm thickness). Stromal ablation was performed using Carl Zeiss MEL 80 excimer laser (193nm wavelength, 0.7mm spot size). Optical zone ranged from 6-6.5mm with treatment zone >2.2mm larger than optical zone.

**Postoperative Management :**

Patients received moxifloxacin 0.5% QID, moxifloxacin dexamethasone combination QID (tapered weekly) and carboxymethylcellulose 0.5% every 2 hours for 3 months. Follow-up examinations were conducted on days 1, 1 week, 1 month, 3 months and 6 months.

**Statistical Analysis :**

Data was analyzed using SPSS version 25.0. Continuous variables were expressed as Mean±Standard Deviation and categorical variables as frequencies and percentages. Chi-square test was used for comparing categorical variables and unpaired t-test for continuous variables. P-value <0.05 was considered statistically significant.

**RESULTS**

The study flow shows excellent retention with all 110 enrolled patients completing the 180 day follow-up period (Fig 1).

The study population comprised predominantly young adults with mean age  $24.5 \pm 3.9$  years, slight female predominance (54.5%) and majority having high myopia (76.4%) (Table 1).

Peripheral Retinal Degenerations were identified in 19 patients (17.3%), with lattice degeneration being the most common finding (11 patients). PRD occurred across all myopia severity groups (Table 2).

A highly statistically significant association was found between myopia severity and presence of Peripheral Retinal degenerations ( $p < 0.001$ ), with Moderate myopia

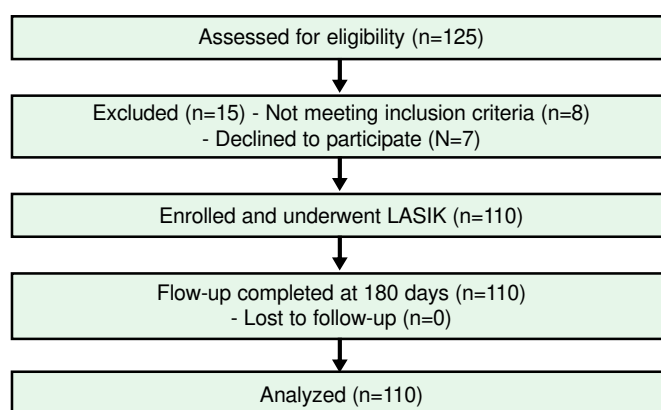


Fig 1 — Consort Flow Diagram

Table 1 — Demographic characteristics and myopia distribution		
Parameter	Value	n (%)
Age (years)	24.5 ± 3.9	-
Sex	Male	47 (42.7)
	Female	60 (54.5)
Myopia Severity	Low (<-3.0D)	1 (0.9)
	Moderate (-3.0 to -6.0D)	25 (22.7)
	High (>-6.0D)	84 (76.4)

Table 2 — Peripheral retinal findings distribution

Finding Type	Number of Patients	Myopia Distribution
Lattice degeneration	11	Low: 1, Moderate: 7, High: 3
Pigmentary alterations	3	Moderate: 2, High: 1
White Without Pressure (WWOP)	4	Moderate: 3, High: 1
Peripheral retinal breaks	1	High: 1
Snail track degeneration	0	
Retinoschisis	0	
Total	19 (17.3%)	All severities

patients showing the highest prevalence at 48.0% (Table 3).

All patients achieved excellent visual outcomes with 6/6 vision postoperatively. No progression of existing Peripheral Retinal Degenerations or development of new lesions was observed during the 180-day follow-up period (Table 4).

All patients with Peripheral Retinal Degenerations were young adults (age range 22-26 years) distributed across all myopia severity groups, with Moderate myopia showing the highest frequency (Table 5).

### DISCUSSION

The present study found a 17.3% prevalence of Peripheral Retinal Degenerations in LASIK candidates, with a surprising finding that Moderate myopia patients showed the highest prevalence at 48.0%, compared to 7.1% in High myopia and 100% in the single Low myopia patient. This finding challenges conventional understanding and emphasizes the importance of thorough preoperative peripheral fundus evaluation across all myopia severities.

Our overall prevalence rate of 17.3% is higher than previously reported rates of 10-15% in general myopic populations<sup>9,10</sup>. This difference may be attributed to our comprehensive examination protocol and inclusion of various PRD types including white without pressure and pigmentary alterations, which are often overlooked in routine examinations. The unexpected pattern of moderate myopia showing higher PRD prevalence than

Table 3 — Association between myopia severity and peripheral retinal degenerations

Myopia Severity	Total Patients	Patients with PRD	Prevalence (%)	p-value
Low	1	1	100.0	
Moderate	25	12	48.0	<0.001[S]
High	84	6	7.1	
Total	110	19	17.3	

Table 4 — Visual outcomes and PRD status at follow-up

Time Point	Visual Acuity 6/6 n(%)	PRD Progression	New PRD
Day 7	110 (100%)	None	None
Day 30	110 (100%)	None	None
Day 90	110 (100%)	None	None
Day 180	110 (100%)	None	None

Table 5 — Clinical characteristics of patients with peripheral retinal degenerations

Age/Sex	Myopia	PRD Type	Location
22/F	Low	Lattice degeneration	Superotemporal
25/M	Moderate	Lattice degeneration	Superiorly at 12-o clock
23/F	Moderate	Lattice degeneration	Superotemporal
26/M	Moderate	Lattice degeneration	Superonasal
24/F	Moderate	Lattice degeneration	Inferiorly at 7-o clock
25/M	Moderate	Lattice degeneration	Inferonasal
23/F	Moderate	Lattice degeneration	Superotemporal
22/M	Moderate	Lattice degeneration	Superiorly at 11-o clock
24/F	High	Lattice degeneration	Inferotemporal
25/M	High	Lattice degeneration	Inferiorly at 5-o clock
23/F	High	Lattice degeneration	Superotemporal
26/M	Moderate	Pigmentary alterations	Inferiorly at 7-o clock
24/F	Moderate	Pigmentary alterations	Superiorly at 1-o clock
25/M	High	Pigmentary alterations	Inferotemporal
23/F	Moderate	WWOP	From 6-11-o clock
22/M	Moderate	WWOP	From 5-12-o clock
24/F	Moderate	WWOP	From 12-3 o clock
25/M	High	WWOP	From 6-8 o clock
26/F	High	Peripheral retinal breaks	Inferiorly at 7-o clock

High myopia warrants further investigation and may represent a unique characteristic of refractive surgery candidates.

The predominance of lattice degeneration (11/19 patients, 57.9%) aligns with established literature identifying it as the most common Peripheral Retinal Degeneration<sup>11</sup>. However, the distribution pattern across myopia severities, with 7 of 11 lattice degeneration cases occurring in Moderate myopia, represents a novel finding that may have important clinical implications for pre-LASIK screening protocols.

Mirshahi, *et al* reported a 9.5% incidence of partial posterior vitreous detachment following LASIK in myopic patients<sup>12</sup>. While we did not specifically evaluate PVD, the absence of new retinal lesions or progression during follow-up suggests that LASIK-induced mechanical stress did not adversely affect pre-existing peripheral retinal pathology in our cohort, regardless of myopia severity. This corroborates findings by Arevalo, *et al*, who reported a 0.06% incidence of vitreoretinal complications after LASIK<sup>13</sup>.

The inclusion of White Without Pressure (WWP) as a significant finding in 4 patients adds to our understanding of peripheral retinal changes in LASIK candidates. WWP, while generally considered benign, may represent early vitreoretinal interface changes that warrant monitoring in the post-LASIK period<sup>14</sup>. The single case of peripheral retinal breaks in our high myopia group emphasizes the continued importance of thorough screening in this population.

All patients achieved excellent visual outcomes (6/6 vision) without PRD-related complications during the 180-day follow-up. This suggests that LASIK can be safely performed in patients with stable Peripheral Retinal

Degenerations when appropriately evaluated and managed preoperatively, regardless of myopia severity. However, the high prevalence in Moderate myopia patients suggests that screening protocols should be equally rigorous across all myopia groups<sup>15</sup>.

The mechanical stress during LASIK, including IOP elevation during suction ring application and rapid decompression, theoretically poses risk to the vitreoretinal interface<sup>16</sup>. Our findings suggest these forces do not significantly impact stable peripheral retinal lesions in the immediate postoperative period. However, continued vigilance and regular fundus examinations remain important, particularly given the unexpectedly high PRD prevalence in moderate myopia patients.

#### Limitations :

The study limitations include a relatively short follow-up period (180 days), which may not capture late-onset complications. The small sample size in the low myopia group (n=1) limits statistical interpretation. Additionally, we did not perform optical coherence tomography or ultrawide-field imaging, which might have identified additional peripheral pathology.

#### CONCLUSION

The prevalence of Peripheral Retinal Degenerations in LASIK candidates was 17.3%, with Moderate myopia patients unexpectedly showing the highest prevalence at 48.0%. A thorough examination of the peripheral retina before LASIK is important for all levels of myopia so that any Peripheral Retinal Degenerations can be found and managed appropriately. This may help ensure a safe procedure. When stable peripheral lesions are present and appropriately managed, LASIK can be safely performed with excellent visual outcomes across all myopia groups. Long-term follow-up remains important, and clinicians should maintain heightened vigilance for peripheral retinal pathology in all myopia severities when considering LASIK surgery.

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**Conflict of Interest :** None.

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