



HISTO-MORPHOLOGICAL SPECTRUM OF PRIMARY PTERYGIUM: A ONE-YEAR PATHOLOGY-BASED STUDY

Histopathology

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ABSTRACT

Introduction: Pterygium is a common ocular surface lesion characterized by fibrovascular proliferation of conjunctival tissue extending onto the cornea. Although traditionally considered a degenerative condition, increasing histopathological evidence suggests a proliferative and inflammatory pathogenesis. **Objective:** To study the spectrum of histomorphological findings in surgically excised primary pterygium specimens over a one-year period. **Methods:** This descriptive observational study was conducted in the Department of Pathology at a tertiary care medical college in North India over a one-year period from August 2024 to July 2025. A total of 57 surgically excised primary pterygium specimens were examined. Tissues were processed routinely and stained with hematoxylin and eosin. Various epithelial and stromal histomorphological features were evaluated. **Results:** The study included 57 cases, with a male-to-female ratio of 1.2:1. The most commonly affected age group was 31-40 years (33.3%). Vascular proliferation was the most frequent histopathological finding (75.4%), followed by solar elastosis (61.4%) and chronic inflammatory infiltrate (43.9%). Epithelial hyperplasia and goblet cell hyperplasia were each observed in 33.3% of cases. Focal epithelial dysplasia was identified in 7% of cases, and conjunctival intraepithelial neoplasia was seen in one case. **Conclusion:** Primary pterygium demonstrates a wide range of histomorphological changes, supporting the concept that it is a proliferative and inflammatory condition rather than a purely degenerative lesion. Routine histopathological examination is essential for identifying premalignant changes.

KEYWORDS

Primary Pterygium, Dysplasia, Epithelial Hyperplasia, Vascular Proliferation, Solar Elastosis, Goblet Cell

INTRODUCTION

Pterygium is a common ocular surface lesion characterized by a fibrovascular proliferation of conjunctival tissue extending onto the cornea. It is frequently encountered in populations exposed to high levels of ultraviolet radiation and chronic environmental irritants such as dust and wind [1]. Although traditionally regarded as a degenerative condition, increasing evidence suggests that pterygium represents a proliferative and inflammatory disorder with complex epithelial and stromal involvement [2]. Histopathological examination of excised specimens provides valuable insights into disease pathogenesis and aids in the identification of associated epithelial alterations. The present study aims to evaluate the histomorphological spectrum of primary pterygium over a one-year period at a tertiary care medical college in North India.

MATERIALS & METHODS

This descriptive observational study was conducted in the Department of Pathology at a tertiary care medical college in North India over a one-year period from August 2024 to July 2025. A total of 57 surgically excised primary pterygium specimens were included in the study. The age- and gender-wise distribution of cases is summarized in Table 1.

Table 1. Age- And Gender-wise Distribution Of Primary Pterygium Cases

Age group (years)	Male	Female	Total
10-20	2	3	5
21-30	6	8	14
31-40	10	9	19
41-50	5	6	11
51-60	2	1	3
≥61	6	-	6

All specimens were fixed in 10% neutral buffered formalin, processed routinely, and embedded in paraffin. Sections of 3-5 μm thickness were stained with hematoxylin and eosin. Histomorphological features including epithelial changes, stromal alterations, vascular proliferation, inflammatory infiltrate, goblet cell hyperplasia, and melanosis were evaluated. The overall frequency of histopathological findings is presented in Table 2.

Table 2. Histopathological Findings In Primary Pterygium

Histopathological feature	Number of cases	Percentage (%)
Vascular proliferation	43	75.4
Solar elastosis	35	61.4
Chronic inflammatory infiltrate	25	43.9

Epithelial hyperplasia	19	33.3
Goblet cell hyperplasia	19	33.3
Melanosis	14	24.6
Atrophic epithelium	6	10.5
Epithelial dysplasia	4	7.0
Conjunctival intraepithelial neoplasia	1	1.8
Fibrosis	3	5.3

RESULTS

A total of 57 cases were analyzed, comprising 31 males (54.4%) and 26 females (45.6%), with a male-to-female ratio of 1.2:1. The most commonly affected age group was 31-40 years, followed by the 21-30 years age group. Histopathological examination revealed vascular proliferation as the most frequent finding, followed by solar elastosis and chronic inflammatory infiltrate. Epithelial hyperplasia, goblet cell hyperplasia, melanosis, atrophic epithelial lining, focal epithelial dysplasia, conjunctival intraepithelial neoplasia, and fibrosis were also observed in varying proportions.

Representative histopathological features observed in the study include stromal vascular proliferation, solar elastosis, epithelial hyperplasia with melanosis, and goblet cell hyperplasia, as illustrated in Figures 1-4.

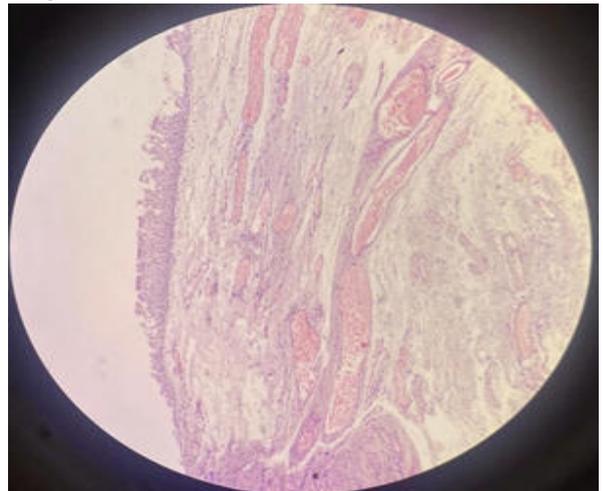


Figure 1. Vascular proliferation

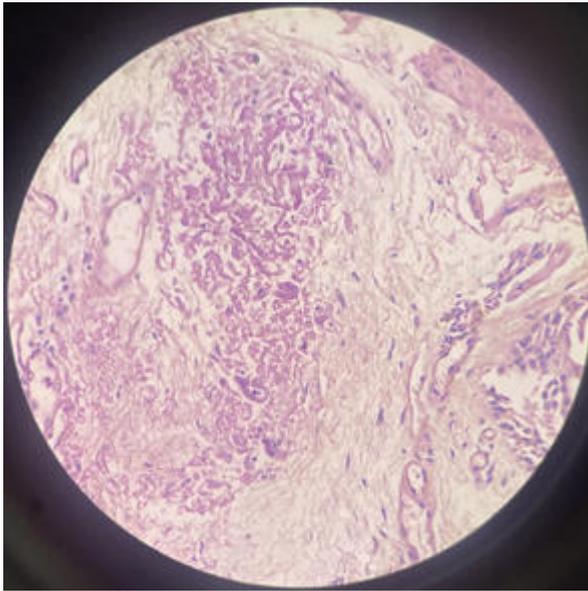


Figure 2. Solar Elastosis

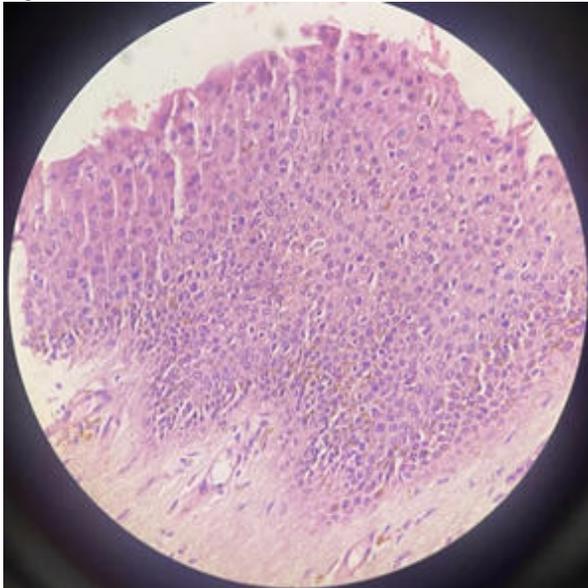


Figure 3. Hyperplastic Epithelium With Melanosis.

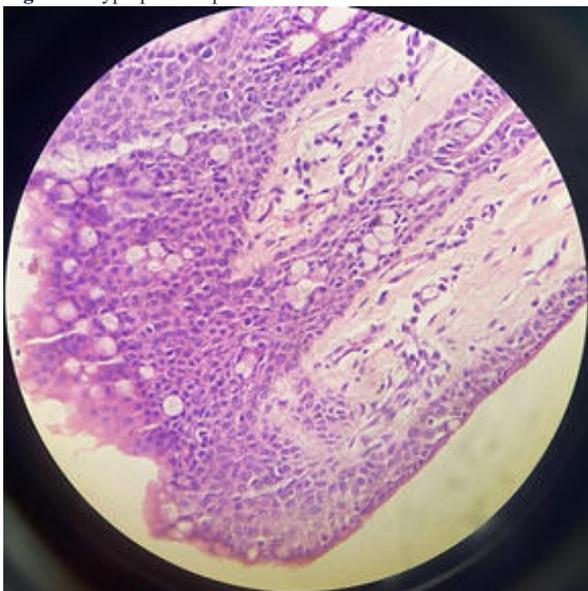


Figure 4. Goblet Cell Hyperplasia

DISCUSSION

Pterygium has traditionally been regarded as a degenerative conjunctival lesion; however, accumulating histopathological and molecular evidence supports its classification as a proliferative and inflammatory disorder [3,4]. The findings of the present study further reinforce this concept by demonstrating a wide spectrum of epithelial and stromal alterations in primary pterygium.

Vascular proliferation was the most frequently observed stromal feature in this study, emphasizing the role of angiogenesis in disease progression. Chronic ultraviolet radiation is believed to induce oxidative stress and angiogenic mediators, leading to fibrovascular proliferation and corneal encroachment [5,6]. The frequent presence of solar elastosis reflects long-standing ultraviolet-induced stromal damage and has been consistently documented in histopathological studies [7].

Epithelial alterations such as hyperplasia and melanosis were commonly identified, supporting the hypothesis of abnormal limbal epithelial behaviour and increased epithelial proliferation [8]. Variability in histomorphological patterns, including stromal inflammation and extracellular matrix remodelling, has been described across different populations [9].

Goblet cell hyperplasia observed in several cases suggests disruption of normal conjunctival epithelial homeostasis, which may contribute to ocular surface instability and altered tear film dynamics [10].

Although infrequent, the presence of epithelial dysplasia in some specimens is clinically significant. Previous studies have demonstrated altered expression of tumor suppressor genes and proliferative markers in pterygium, raising concerns regarding its potential premalignant nature [4,5]. This finding highlights the importance of routine histopathological examination of all excised pterygium specimens.

CONCLUSION

Primary pterygium shows diverse histomorphological features, indicating that it is a proliferative and inflammatory disorder rather than a purely degenerative condition. Routine histopathological evaluation remains essential for accurate diagnosis and early detection of associated dysplastic or premalignant changes.

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