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Original Research Article

Pterygium – A clinicopathologic study

Priyanka Katikaneni[1], Sikander A K Lodhi[1]*, Sirisha Dogga[1], Aishwarya Pallam[1]

[1]*Dept. of Ophthalmology, Malla Reddy Medical College for Women, Hyderabad, Telangana, India*

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ABSTRACT

Background: To correlate histopathologic features with clinical types of pterygia that may influence the management strategies.
Study Design: Prospective clinico-pathological study.
Place and Duration of Study: This study was conducted at Malla Reddy Narayana Multispeciality Hospital, affiliated to Malla Reddy Medical College for Women, between June 2020 and February 2022.
Materials and Methods: This study comprised of 52 eyes with primary pterygium that underwent surgical excision followed by a graft. Clinical features of the pterygia like their dimensions over the ocular surface, redness (congestion), fleshiness (assessed by amount of concealment of episcleral vessels) and flattening of Plica Semilunaris were evaluated. Excised pterygia were evaluated for histopatologic characteristics like vascularity, leucocyte infiltration, subepithelial and stromal fibrosis and leucocyte infiltraton.
Results: The dimensions of the pterygium were positively correlated with the extent of redness and fleshiness. Plica semilunaris was flattened correlating with the length and width of the pterygium. Vascular density and stromal elastosis were reflected clinically in significant fleshiness of the pterygium.
Conclusion: Histopathology, with morphological and clinical characteristics, forms the basis of the assessment of the evolution and the growth of perygium. The clinical nature of the perygium is correlated with histopathological variables.

1. Introduction

The pathogenesis of Pterygium, a common ophthalmic disorder, still remains in bewilderment. Several etiological factors are reported in the literature, like ultraviolet radiation, chronic inflammation and recently some viruses.[1] The induced limbal cell insufficiency activates tissue growth factors which cause angiogenesis and cell proliferation.[2] Pterygium was regarded as a chronic degenerative condition but as a matter of fact, it is a disorder of growth and development of the epithelial structures of the corneo-scleral limbus causing a fleshy growth on the corneal surface.[3] The incidence of pterygium is more in tropical and subtropical regions. The incidence of pterygium in India is around 5.2%.[4,5] The reported prevalence of pterygium is 52.1 per 1000 elderly persons in a study of ocular morbidity among elderly population in a rural area of central India.[6] The extension of pterygia over the cornea and its fleshinss varies widely among different cases. The histopathologic changes in pterygia reported in various studies include goblet cell hyperplasia, vascular density, elastoid degeneration, fibrosis, fibrovascular proliferation, leucocyte infiltration and angiogenesis. In the present study we have evaluated the relationship between the histopathology and the clinical features of the pterygium.

* *Corresponding author*.
E-mail address: sikanderlodhi@gmail.com (S. A. K. Lodhi).

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2. Materials and Methods

This prospective study was carried out with 52 cases of primary nasal pterygium between June 2020 and February 2022, after taking the approval of Institutional scientific ethics committee. Informed written consent was taken from the patients before the surgery was undertaken. Pseudopterygium, co-existing conjunctival diseases, conjunctival cicatricial diseases and dry eye disease were excluded from the study. All patients underwent a comprehensive ophthalmic examination, including slit-lamp photography. The dimensions of the pterygium, the length and width over the ocular surface, were measured using the scale of the slit lamp. (Figure 1) Morphologic characteristics (fleshiness, redness and presence or absence of plica semilunaris) were also evaluated. Redness was graded, according to the method described by Hamid Safi etal, into three grades: no redness or pink hue, moderate redness, marked and significant redness. (Figure 2).[7] Fleshiness of the pterygium was graded as: T1 – atrophic pterygium where the underlying episcleral vessels were not obscured, T2 – partially obscured and T3 – fleshy pterygium with total obscuration of the episcleral vessels. (Figure 3)[8] Plica semilunaris was looked for its presence or absence. (Figures 4 and 5) All patients underwent a uniformly similar surgical technique. Surgical excision of the pterygium was done after blunt dissection from cornea surface and incisions at the borders and 2.5 mm in front of the caruncle. A conjunctival autograft (removed from the superoteporal quadrant) was applied immediately. Excised pterygium samples were fixed in buffered formalin 10% (pH 7.3) and embedded in paraxin. Four micron thick sections were prepared and stained with hematoxylin / eosin. All the specimens were evaluated by a Pathologist. The histopathologic characteristics that were studied included vascular density (average vessel count in three high power fields), subepithelial fibrosis, stromal fibrosis, stromal elastosis, leucocyte infiltration, myxoid changes and Goblet cell hyperplasia. Only those vessels lined by endothelium and containing RBC's were counted. Statistical analysis was performed using SPSS version.

3. Results

This study included 52 eyes of 52 patients: 35 male and 17 female patients with mean age of 46±3.19 (range 25 – 79) years. Mean dimensions over the cornea were: width, 6.13±0.915 (range 2.4 – 12) mm, length 3.93±0.915 (range, 1.3 – 6.6) mm. Clinically, the redness of the pterygium was graded as: grade I in 4 (8.5%) eyes, grade II in 31 (59.5%) eyes, and grade III in 17 (31.9%) eyes. The pterygium fleshiness was graded as: T1 in 10 (19.1%) eyes, grade T2 in 12 (23.4%) eyes, and T3 in 30 (57.4%) eyes. (Table 1)

There was a positive correlation between pterygium dimensions and obliteration of the plica semilunaris.

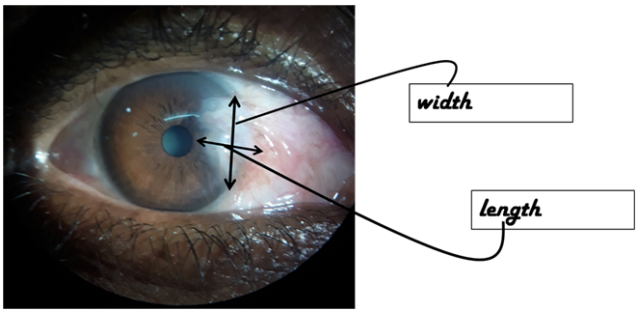

Figure 1: Pterygium dimensions, width (from pterygium apex to limbus) and length (distance between the opposite borders intersecting at limbus)

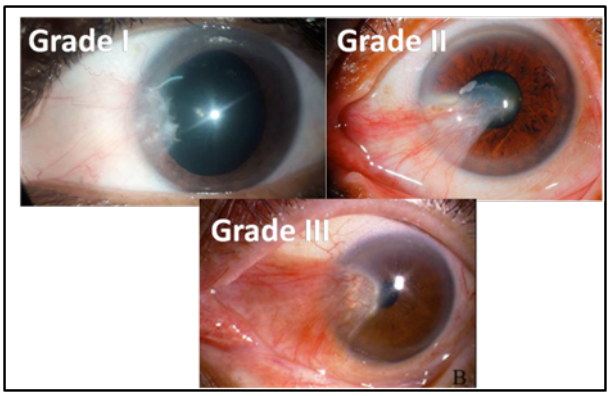

Figure 2: Grading of pterygium redness

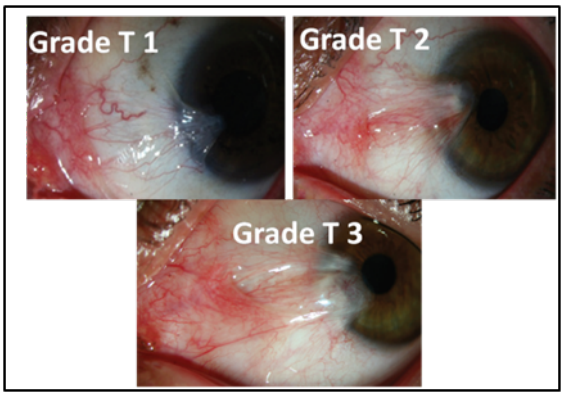

Figure 3: Grading of pterygium fleshiness

Plica semilunaris was present in 32 (61.7%) eyes and was obliterated in 20 (38.2%) eyes. (Table 2) There was a significant correlation of pterygium redness and fleshy pterygium with stromal elastosis, vascular density, and leucocyte infiltration.(Figures 6 and 8) There was also a positive correlation of progressive and fleshy pterygium with stromal fibrosis.(Figures 7 and 8) A positive association existed between pterygium dimensions over the cornea and vascular density.

Table 1: Correlations between pterygium dimensions over the cornea and clinical features

Pterygium dimension	Redness			P	Fleshiness			P
	Grade I	Grade II	Grade III		Grade T1	Grade T2	Grade T3	
Length (mm)	3.82 ±1.34	4.07 ± 0.46	4.98 ± 0.59	0.07	4.23 ± 0.89	3.69 ± 0.48	4.64 ± 0.51	0.16
Width (mm)	6.4 ± 1.39	5.39 ± 0.65	6.27 ± 0.49	0,15	4.98 ± 0.87	4.75 ± 0.81	6.42 ±0.50	0.002*

*Statistically significant (p<0.05)

Table 2: Correlation between pterygium dimensions and status of plica semilunaris

Pterygium dimension	Plica semilunaris		P
	Present	Absent	
Length (mm)	3.49 ± 0.523	4.27 ± 0.533	0.06
Width (mm)	5.62 ± o.689	6.88 ± 0.917	0.03*

*Statistically significant (p<0.05)

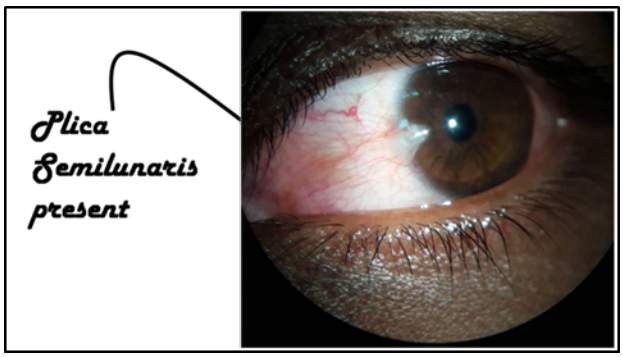

Figure 4: Status of plica semilunaris

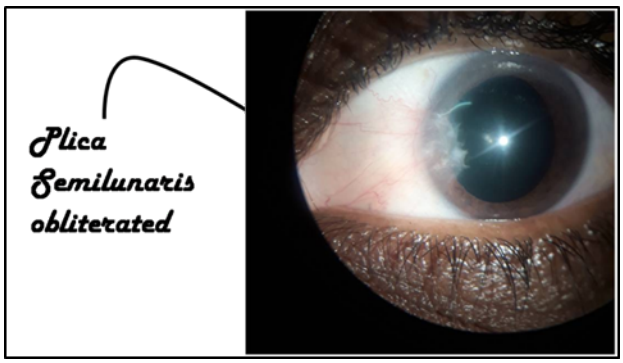

Figure 5: Status of plica semilunaris

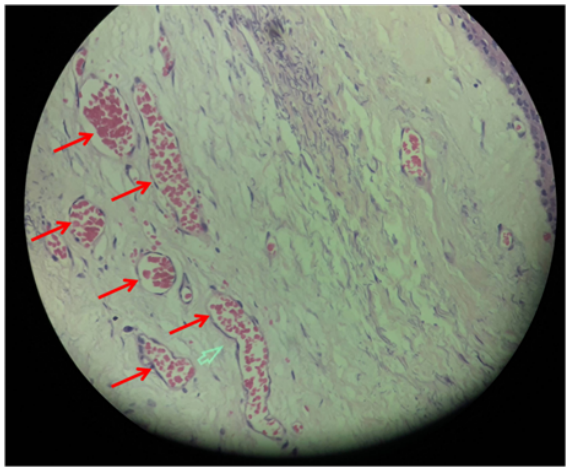

Figure 6: Marked vascular density correlated with pterygium redness and fleshiness

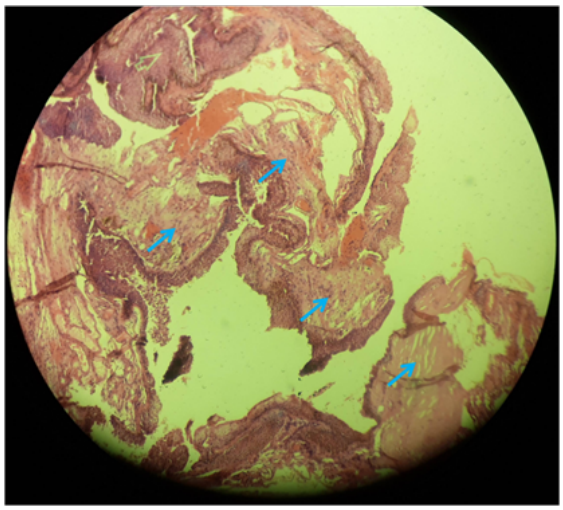

Figure 7:

4. Discussion

This study design evaluated the histopathological characteristics in pterygia with different clinical manifestations. This helps us understand the pathogenesis and gives additional clues for management strategies. There was a positive association between the lesion dimensions over the cornea and its inherent vascular density. The extent of pterygium congestion and its fleshiness were positively

	Progressive / Fleshy (34)	Atrophic / Degenerative (18)	P
Vascular density	28 (82.3%)	4 (22.2%)	0.0001
Subepithelial fibrosis	20 (58.8%)	9 (50%)	0.6
Stromal fibrosis	21 (61.7%)	8 (44.4%)	0.16
Stromal elastosis	17 (50%)	4 (22.2%)	0.05
Leucocyte infiltration	18 (52.9%)	2 (11.11%)	0.005
Myxoid changes	15 (44.1%)	5 (27.7%)	0.18
Micro calcification	5 (14.7%)	4 (22.2%)	0.29
Goblet cell hyperplasia	13 (38.2%)	8 (44.4%)	0.6

Figure 8: Histological correlation with nature of pterygium

correlated with lesion dimensions. This is in concurrence with the findings reported by Reda et al.[9] Chan et al. in their study found that pterygia had a common feature of squamous metaplasia (73.2%); goblet cell hyperplasia was found in 87.5%.[10] This study showed less evidence of goblet cell hyperplasia; just in 38.2%. Elastoid basophilic degeneration as a common finding is reported in most of the studies.[1,11,12] Our study showed stromal elastosis in about 50% of the cases, could be related to different environmental factors. Leucocyte infiltration was seen in 50% of cases; maybe inflammation, acting as a potentiating factor, is responsible for extension. This requires further studies. It is reported that pterygia with higher grades of fleshiness have more recurrences.[13] Stromal vascularity & fibrosis show a significant clinico-pathologic correlation with pterygium fleshiness, redness and progression. Stromal vascularity could be an important and promising therapeutic target; particularly for patients with cosmetic complaints. Targeting stromal vascularity could be a valid reason to use antiVascular endothelial growth factor (anti-VEGF) as target therapy for pterygium. Reducing vascularity may decrease or stop progression of pterygium Studies have shown positive histochemical staining for VEGF in the wall of the blood vessels.[14,15]

5. Conclusion

This study correlated many histopathological variables with different clinical aspects of pterygium. This could be of help to plan therapeutic targets (like VEGF) which can reduce the vascularity and fibrocollagenous multiplication. Features like the size, texture, and vascularity help to provide some predictability for the postoperative recurrence rate. There are some limitations to this study. The duration of pterygium is not correlated with histopatrhological studies. The grading of pterygium characteristics like dimensions, redness and fleshiness are subjective and semi-quantitative. Further study to correlate histopathological characteristics with surgical outcome is required.

6. Conflict of Interest

The authors declare no conflict of interest which could influence their opinions on the subject and/or the materials presented in the manuscript.

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Author biography

Priyanka Katikaneni, Assistant Professor

Sikander A K Lodhi, Professor https://orcid.org/0000-0003-0716-0851

Sirisha Dogga, Resident

Aishwarya Pallam, Resident

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