ORIGINALARTICLE

A Clinical Study to Appraise the Correlation between Histopathological Changes and Different Grades and Types of Pterygium

Shreya Thatte, Shlok O. Singh

[1]Department of Ophthalmology, Sri Aurobindo Medical College and Post Graduate Institute, Indore, Madhya Pradesh, India

ABSTRACT

Purpose: Pterygium is a fleshy, triangular, or wing-shaped growth of the conjunctiva that encroaches onto the cornea. Fleshiness and fibrovascular proliferation suggest progression and vary in different types and grades of pterygium. Histopathologically, elastotic degeneration along with fibrovascular proliferation is characteristic of pterygium. Histopathological changes differ in various grades and types of pterygium. This study was conducted to evaluate the clinical and histopathological parameters of pterygium and to determine significant correlations between histopathological changes in different grades and types of pterygium. **Materials and Methods:** This is a prospective study of 40 eyes with primary nasal pterygium of Grade 2 and more operated by pterygium excision with conjunctival limbal autograft and excised tissue was sent for histopathological evaluation. Histopathological deviations were recorded and correlated with diverse types and grades of pterygium. **Results:** Forty primary nasal pterygia included with 72.5% progressive and 27.5% atrophic pterygium with 70% Grade 2 pterygium without any gender preponderance. On histopathological reports, no correlation could be established with grades of pterygium, but nature of pterygium visibly documented vascularity and fibrocollagenous changes in progressive pterygium, whereas elastotic degeneration (63.64%), fibrocollagenous changes, goblet cell hyperplasia, and microcalcification (45.45%) were predominantly perceived in atrophic pterygium. **Conclusion:** The nature of pterygium was co-related with histological changes like vascularity and fibrocollagenous variation in progression and proliferation of pterygium. Elastotic degeneration and microcalcification were a pointer of atrophic pterygium. An increase in grade of pterygium was directly correlated with the goblet cell changes signifying more ocular surface damage.

Key words: Atrophic pterygium, elastotic degeneration, fibrocollagenous changes, progressive pterygium, vascular changes

INTRODUCTION

Pterygium is a common ocular disorder. It has a prevalence of 0.3–29% in different regions of the world.[1] Pterygium is diagnosed by the presence of a wing of thick, reddish, and fleshy growth encroaching on the cornea. The nasal side is more commonly affected than the temporal side.[2,3] Progression over cornea and fleshiness denoting fibrovascular proliferation vary in different types and grades of pterygium. Histopathologically, elastotic degenerative of collagen with fibrovascular proliferation is characteristic of pterygium.[4] Various histological features reported are goblet cell hyperplasia, subepithelial neovascularization, stromal elastosis, and intravascular inflammation.[5,6] Histopathological changes explain etiology behind pterygium. Clinical presentation of pterygium, its correlation with histopathological changes can reveal the etiology for progression of pterygium, which can further help to evolve treatment to stop progression.

Address for correspondence:
Dr. Shreya Thatte, Department of Ophthalmology, Sri Aurobindo Medical College and Post Graduate Institute, Chaitanya, 17, Yeshwant Colony, Indore - 452 003, Madhya Pradesh, India. Phone: +91-9302104864.
E-mail: shreyathatte@gmail.com

Therefore, this study was conducted to understand the correlation of histopathological variation in various types and grades of pterygium.

MATERIALS AND METHODS

After approval from the Institutional Scientific Ethical Committee and in accordance with the health Helsinki law, this prospective study was conducted with 40 primary nasal pterygia of Grade 2 or more. Pterygium with previous medical treatment, conjunctival surgery, and associated ocular surface disease were excluded from the study.

A written informed consent was taken from selected patients and demographic data were recorded. Pterygia were graded according to size and extent of corneal involvement, according to Sejalmaheshwari:[7]

- Grade 1: At the limbus
- Grade 2: Between the limbus and a point midway between the limbus and pupillary margin
- Grade 3: Head of the pterygium reaching the pupillary margin
- Grade 4: Crossing the pupillary margin.

They were also classified as per nature into atrophic/degenerative and fleshy/progressive.

All patients underwent a complete ocular examination including slit-lamp biomicroscopy and photography.

Pterygium was managed by same technique of pterygium excision with conjunctival limbal autograft. The excised tissues were preserved in 10% formalin. Tissue blocks were processed, cut, and stained with hematoxylin and eosin stain. Assessment of squamous epithelial hyperplasia (absent or present), number of goblet cells (few cells or prominent cells), severity of lymphocytic infiltration, epithelial pigmentation in basal cells (absent/present), elastotic degeneration, stromal vascularity and fibrosis, stromal inflammation (mild perivascular or diffuse), and type of inflammatory cells (chronic [lymphocytes with or without plasma cells] or mixed [lymphocytes with neutrophils]) were evaluated and documented.

Table 1: Age and sex ratio in the series

Age (years)	Male		Female		Total	
	n	%	*n*	%	*n*	%
40–50	5	26.32	8	38.10	13	32.50
51–60	8	42.11	8	38.10	16	40.00
61–70	6	31.58	5	23.81	11	27.50
Total	19	100.00	21	100.00	40	100.00

RESULTS

This study included 40 patients: 19 males (48%) and 21 females (52%). The age ranged from 40 to 70 years.

Patients were divided into three age groups: 40–50 years (32.5%), 51–60 (40%), and 61–70 (27.5%). Maximum cases belong to the age group of 51–60 years.

Of 40 cases of pterygium, 73% were fleshy and 27% were atrophic.

Only Grade 2 and Grade 3 were included in the study. Grade 2 was maximum in 70% of cases and Grade 3 in 30% of cases.

Progressive pterygium (72.50%) cases were more as compare to atrophic (27.50%).

While correlating nature of pterygium to histopathological changes, in (29) progressive/fleshy pterygium increased vascularity (72%) was seen frequently followed by fibrocollagenous changes (51.72%) and squamous hyperplasia (44.83%). A total of 11 cases of atrophic/degenerative pterygium show elastotic degeneration in 63%, 45% reported goblet cell hyperplasia, fibrocollagenous changes, and microcalcification. *P* value (0.031%) was statistically significant for vascularity which was more in progressive pterygium (72%). *P* value (0.014%) for microcalcification was found to be significantly high in atrophic pterygium [Figures 1 and 2].

Histopathological changes correlated to grades of pterygium. In Grade 2 nasal pterygium, 62.96% showed fibrocollagenous changes and vascularity. In Grade 3, pterygium vascularity (61.54%) and elastotic degeneration (53.85%) were seen predominantly. $P = 0.008$ was statistically significant for fibrocollagenous changes [Figures 3 and 4].

No significant correlation was found between histopathological changes and age, sex, occupation, or duration of the pterygium.

Table 2: Gender distribution in different natures of pterygium

Type	Male		Female		Total	
	n	%	*n*	%	*n*	%
Atrophic/degenerative	7	36.84	4	19.05	11	27.50
Progressive/fleshy	12	63.16	17	80.95	29	72.50
Total	19	100.00	21	100.00	40	100.00

DISCUSSION

This study was designed to evaluate histopathological changes in pterygium in its correlation with clinical presentation of pterygium.

Equal gender distribution (males [48%] and females [52%]) was observed but other studies reported gender variation.[8,9]

A maximum number of patients were in the age group 50–70 which was concurrent with other studies done by Ahmed that indicate that age is not a contributing factor for pterygium.[8,10]

Pterygium is classified according to the corneal involvement in our study. We operated only Grades 2 and 3, of which Grade 2 pterygium was maximum similar to other studies.[11,12]

Table 3: Grades of pterygium

Grade	Total	
	n	%
Grade 2	28	70.00
Grade 3	12	30.00
Total	40	100.00

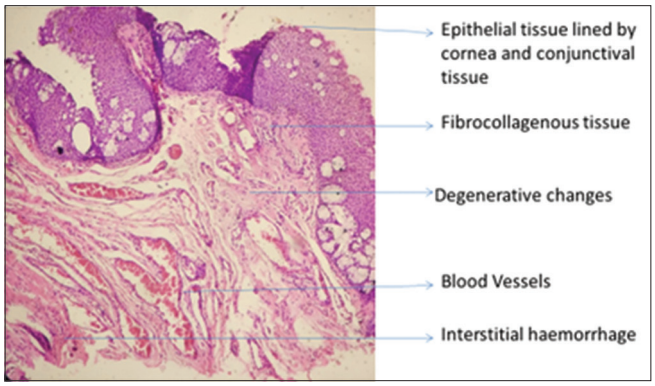

Figure 1: Histopathology in Grade 3 progressive pterygium

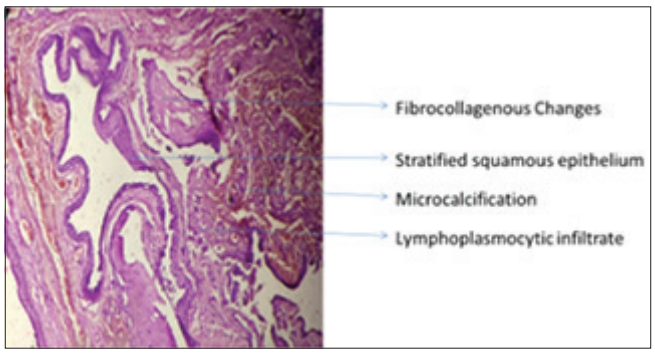

Figure 2: Histopathology in Grade 3 atrophic pterygium

For understanding the histopathological findings and its correlation to nature of pterygium, they grouped into progressive/fleshy (72%) and atrophic/degenerative (28%). This incidence is comparable to the study of Krishnaram.[13]

On histopathology common findings were squamous hyperplasia (37%), fibrinoid changes (22.5%), elastotic degeneration (32%), cell infiltration (27.5%), increased vascularity (62.5%), and goblet cell hyperplasia (22.5%) and other changes were epithelial pigmentation (30%), hyaline changes (18%), hemorrhage (22.5%), microcalcification (17.5%), and myxoid changes (10%).

Other studies have also shown similar more common histopathology, but they have not mentioned myxoid changes and microcalcification.[11,14]

There was no correlation observed with grading of pterygium on histopathology. The results were mixed and it was difficult to conclude. However, studies reported histological changes were directly proportionate to size of the pterygium.[15,11]

Studies also mentioned, larger lesions over the cornea may be associated with increased thickness and volume of the pterygium body, resulting in higher grades of redness and fleshiness.[16]

Nature of pterygium showed a definite relationship with histopathology. Vascularity was seen predominantly in progressive (72.41%) and both grades of pterygium (62.96%

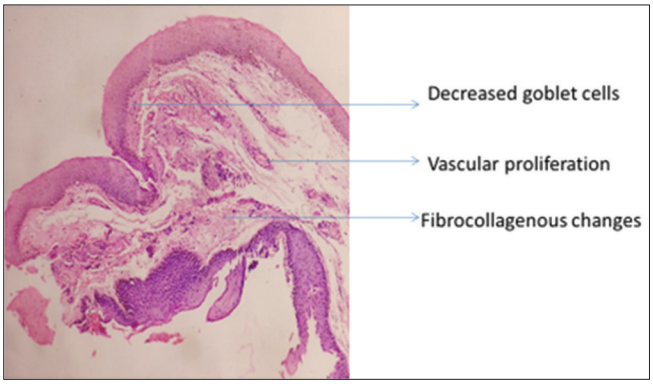

Figure 3: Histopathology in Grade 2 progressive pterygium

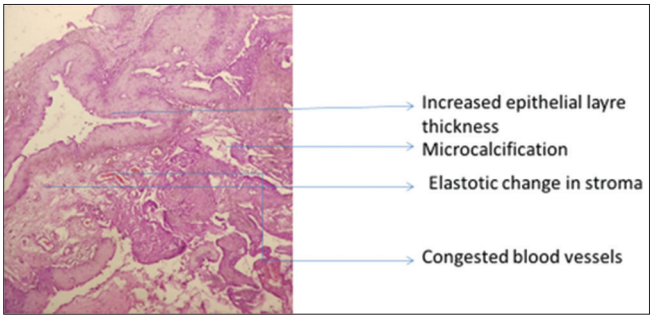

Figure 4: Histopathology in Grade 2 atrophic pterygium

Table 4: Ratio of grades and Nature of Pterygium

Type	Grade 2		Grade 3		Total	
	n	%	*n*	%	*n*	%
Atrophic/degenerative	8	28.57	3	25.00	11	27.50
Progressive/fleshy	20	71.43	9	75.00	29	72.50
Total	28	100.00	12	100.00	40	100.00

Table 5: Histopathological correlation with Nature of Pterygium

Histopathology	Type of pterygium				*P* value
	Progressive/fleshy (*n*=29)		Atrophic/degenerative (*n*=11)		
	n	%	*n*	%	
Squamous hyperplasia	13	44.83	2	18.18	0.073
Fibrinoid changes	6	20.69	3	27.27	0.686
Hyaline changes	3	10.34	4	36.36	0.095
Fibrocollagenous changes	15	51.72	5	45.45	0.722
Epithelial pigmentation	9	31.03	3	27.27	0.813
Elastotic degeneration	11	37.93	7	63.64	0.132
Cell infiltration	7	24.14	4	36.36	0.460
Hemorrhage	6	20.69	3	27.27	0.669
Goblet cell hyperplasia	5	17.24	5	45.45	0.089
Microcalcification	2	6.90	5	45.45	0.014*
Myxoid changes	1	3.45	3	27.27	0.085
Vascularity	21	72.41	4	36.36	0.03*1

Table 6: Histopathological correlation with different Grades of Pterygium

Histopathology	Grade				*P* value
	Grade 2 (*n*=27)		Grade 3 (*n*=13)		
	n	%	*n*	%	
Squamous hyperplasia	12	44.44	3	23.08	0.157
Fibrinoid changes	4	14.81	5	38.46	0.118
Hyaline changes	4	14.81	3	23.08	0.542
Fibrocollagenous changes	17	62.96	3	23.08	0.008*
Epithelial pigmentation	10	37.04	2	15.38	0.113
Elastotic degeneration	11	40.74	7	53.85	0.434
Cell infiltration	8	29.63	3	23.08	0.654
Hemorrhage	7	25.93	2	15.38	0.421
Goblet cell hyperplasia	8	29.63	2	15.38	0.285
Microcalcification	5	18.52	2	15.38	0.802
Myxoid changes	2	7.41	2	15.38	0.476
Vascularity	17	62.96	8	61.54	0.931

and 61.54%) with statistically significant *P* value. Atrophic pterygium had less vascularity (36.36%). This finding of vascularity was quite encouraging to understand the etiology behind progression and can be used to prevent progression.

Studies also mentioned, larger lesions over the cornea may be associated with increased thickness and volume of the pterygium body, resulting in higher grades of redness and fleshiness.[16]

Increased vascularity (72.41%) and fibrocollagenous changes (51.72%) were predominant and responsible for progression of pterygium, but in degenerative/atrophic pterygium, elastotic degeneration (63.64%), fibrocollagenous changes, goblet cell hyperplasia, and microcalcification (45.45%) were accountable for atrophic nature of pterygium.

Gaton *et al*.[9] and Chan *et al*.[16] have not classified in progressive and degenerative pterygium but mentioned common histological changes epithelial hyperplasia and goblet cell hyperplasia.

Hemorrhage 22.5% was less common in our series, but in contrast hemorrhage with/without siderophages was observed in 76.6% of cases.

Epithelial pigmentation was described as the absence/presence of pigments in basal/suprabasal cells. Dodd *et al*.[14] and Perra *et al*.[17] defined it as acquired melanosis of conjunctiva/conjunctival hypermelanosis.[17,18] However, in our series epithelial pigmentation was present in 30% but there was no significant correlation between nature or grade of pterygium and pigmentation in our study.

Inflammatory cells were found in 27.5% of cases which were not significantly correlated to nature or grades of pterygium similar to results of Nassar *et al*.,[2] and Safi *et al*.[11]

No significant correlation was perceived between histopathological features and age, sex, occupation, or duration of the pterygium.

Increased vascularity and fibrocollagenous changes were clearly indicating predominant factors in progression of pterygium. This suggests reduction in vascularity may decrease or stop progression of pterygium.

This study evidently demonstrated that nature of pterygium origins the vascularity and fibrocollagenous histopathological changes that are blamed for progress and proliferation of pterygium. Elastotic degeneration and microcalcification were indicator of atrophic pterygium. An increase in grade of pterygium was correlated with the goblet cell changes indicating more ocular surface damage in higher grades of pterygium.

CONCLUSION

This study correlates many histopathological variables answerable for the difference in nature of pterygium. This may be used for plan of treatment, including new therapeutic targets to reduce vascularity and fibrocollagenous fluctuations as anti-vascular endothelial growth factor and agents encouraging elastotic degeneration and microcalcification to regress the progression of pterygium. The size of pterygium is directly proportionate to ocular surface damage.

REFERENCES

1. Tafti MR, Khosravifard K, Mohammadpour M, Hashemian MN, Kiarud MY. Efficacy of intralesional bevacizumab injection in decreasing pterygium size. Cornea 2011;30:127-9.
2. Nassar MK, El-Sebaey AR, Abdel-Rahman MH, El-Ghonemy K, Sheb AM. Clinical, pathological, and molecular aspects of recurrent versus primary pterygium. Menoufia Med J 2014;27:386-94.
3. Golu T, Mogoanta L, Streba CT, Pirici DN, Malaescu D, Mateescu GO, *et al*. Pterygium: Histological and immunohistochemical aspects. Rom J Morphol Embryol 2011;52:153-8.
4. Chui J, Lien CM, Crouch R, Wakefield D, Di Girolamo N. Ophthalmic pterygium: A stem cell disorder with premalignant features. Am J Pathol 2011;178:817-27.
5. Di Girolamo N, Chui J, Coroneo MT, Wakefield D. Pathogenesis of pterygia: Role of cytokines, growth factors, and matrix metalloproteinases. Prog Retin Eye Res 2004;23:195-228.
6. Costed D. Pterygium: An ophthalmic enigma. Br J Ophthalmol 1995;74:304-5.
7. Maheshwari S. Pterygium induced corneal refractive changes. Indian J Ophthalmol 2007;55:383-6.
8. Mohammad-Salih PA, Sharif AF. Analysis of pterygium size and induced corneal astigmatism. Cornea 2008;27:434-8.
9. Gaton D, Reznick L, Cunitzezki M, Weinberger D, Avisar I, Avisar R. Goblet cell distribution and epithelial cell morphology in pterygium. Harefuah 2006;145:199-201.
10. Liu L, Yang D. Immunological studies on the pathogenesis of pterygium. Chin Med Sci J 1993;8:84-8.
11. Safi H, Kheirkhah A, Mahbod M, Molaei S, Hashemi H, Jabbarvand M. Correlations between histopathologic changes and clinical features in pterygia. J Ophthalmic Vis Res 2016;11:153-8.
12. Kao A, Afshar A, Bloomer M, Damato B. Management of primary acquired melanosis, nevus, and conjunctival melanoma. Cancer Control 2016;23:117-25.
13. Krishnaram K. Prevalaence and pattern of pterygium. Internet J Ophthalmol Vis Sci 2013;10:1-4.
14. Dodd AT, Mokrohisky ST, Byers TE, Crane LA. Melanocytic nevi and sun exposure in a cohort of Colorado children: Anatomic distribution and site-specific sunburn. Cancer Epidemiol Biomarkers Prev 2007;16:2136-43.
15. Chui J, Di Girolamo N, Wakefield D, Coroneo MT. The pathogenesis of pterygium: Current concepts and their therapeutic implications. Ocul Surf 2008;6:24-43.
16. Chan CM, Liu YP, Tan DT. Ocular surface changes in pterygium. Cornea 2002;21:38-42.
17. Perra MT, Colombari R, Maxia C, Zucca I, Piras F, Corbu A, *et al*. Finding of conjunctival melanocytic pigmented lesions within pterygium. Histopathology 2006;48:387-93.
18. Zembowicz A, Manda RV, Choopong P. Melanocytic lesions of the conjunctiva. Arch Pathol Lab Med 2010;134:1785-92.

How to cite this article: Thatte S, Singh SO. A Clinical Study to Appraise the Correlation between Histopathological Changes and Different Grades and Types of Pterygium. Clin Res Ophthalmol 2019;2(2):1-5