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Lesions of Vision: Distribution, Diagnosis and Diversity in Ophthalmic Pathology

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ABSTRACT

Introduction: The eye, a highly specialized sensory organ, is susceptible to a wide range of pathologies, including trauma, inflammatory, neoplastic, and degenerative diseases. Histopathology plays a pivotal role in diagnosing ocular conditions, guiding management and treatment decisions, and advancing knowledge in this specialized field.
Material and Methods: This retrospective study reviewed 105 ophthalmic specimens received from January 2021 to December 2023. Clinical data, including patient demographics, lesion site, and clinical summary, were extracted from histopathology requisition forms. Specimens from the eyelid, conjunctiva, and other ocular sites were included.
Results: Among 105 cases, males accounted for 57.2% and females for 42.8%. The highest prevalence was observed in the 41-50 age group (18.1%). Lesions were most located on the eyelids (57.3%), followed by the conjunctiva (22.9%). Hidrocystoma was the most frequent benign lesion, representing 13.3% of cases, all located on the eyelid. Other diagnoses included inclusion cysts, seborrheic keratosis, pilomatrixoma, capillary hemangioma, conjunctival intraepithelial neoplasia, granulomatous lesions, and Langerhans cell histiocytosis. Malignant lesions comprised 10.4% of cases, with squamous cell carcinoma being the most common. Benign lesions accounted for 83.8%, and premalignant conditions for 5.7%.
Conclusion: Hidrocystoma was the most common benign lesion, while squamous cell carcinoma was the most frequent malignant lesion. Geographic variations influenced lesion distribution, emphasizing the importance of region-specific studies in understanding ophthalmic pathology.

Keywords: Histopathology, eyelid, conjunctiva, Hidrocystoma, Squamous cell carcinoma, non-neoplastic lesions.

INTRODUCTION

The eye is a unique and highly specialized sensory organ of sight, distinguished by its complex and diverse histological features. [1] Orbit ocular pathology, a specialized segment of histopathology, demands a high level of expertise in tissue processing, diagnosing, and characterizing diseases. [2] This subspecialty focuses on the pathology of the eye and its surrounding tissues. [3]A

thorough understanding of normal eye anatomy, histology, and the spectrum of disease-related changes is essential for accurate diagnosis of ocular lesions. [1]

Ophthalmic pathology encompasses a variety of techniques that differ significantly from standard tissue fixation, processing, sectioning, and microscopy. These techniques require a skilled practitioner to accurately diagnose the diseases unique to the eye. [2] The pathology of the eye involves a wide range of conditions, including trauma, inflammatory, neoplastic, and degenerative diseases. [4] Due to the eye's critical function and the potential for vision loss and disability, understanding these diseases is crucial.

However, there is a notable scarcity of studies focused on this important organ, and a lack of awareness can lead to misdiagnosis and inadequate treatment, ultimately resulting in significant visual impairment. The role of histopathology is pivotal in diagnosing ocular conditions, serving as the foundation upon which further management and treatment decisions are based.

Given the critical importance of accurate diagnosis in preventing vision loss and debility, this study aims to examine the histopathological spectrum of various ophthalmic lesions. By doing so, it seeks to contribute to the body of knowledge in this specialized field and improve diagnostic and treatment outcomes for patients with eye diseases.

MATERIALS & METHODS

This is a retrospective study in which we carried out the review of all ophthalmic specimens received over a period of 3 years from January 2021 to December 2023. Clinical data including age, sex of the patients and site of the lesions and clinical summary were extracted from the histopathology requisition forms. All the biopsies from the eye lid, conjunctiva and any site related with eye were included in the study. Cases with recurrence were excluded from study. The slides of all ophthalmic specimens were studied which comprised of a total 105 biopsies & whole specimens. Histomorphological diagnosis was made and evaluated as per epidemiological and clinico-pathological data.

RESULT

In this study, we observed a total of 105 cases of ophthalmic lesions, providing a comprehensive overview of their distribution across different age groups, sexes, locations, and histological types. A notable finding was that these lesions were more common in males, accounting for 57.2% of the cases, compared to 42.8% in females.

Age and Sex Distribution

The age distribution of the lesions revealed that the highest number of cases occurred in the 41-50 years age group, which constituted 18.1% of the total cases. This was followed closely by the 51-60 years age group, representing 17.3%, and the 71-80 years age group with 15.2% of the cases. [Table 1]

Distribution Based on Location

The analysis of the anatomical location of these lesions highlighted that the majority were found on the eyelids, accounting for 57.3% (60 cases) of the total [Table 2 and Figure 1]. Conjunctival lesions were the second most common, comprising 22.9% (24 cases). Orbital lesions accounted for 14.1% (15 cases), and the least number of cases were seen in the external and internal angular eye, constituting 5.7% (6 cases).

Histological Types of Ophthalmic Lesions

The histological examination of these lesions revealed a wide variety of diagnoses described [Table 3] The most common histological diagnosis was hidrocystoma or sudoriferous cyst, which accounted for 14 cases (13.3%), all located on the eyelid. Inclusion cysts were the second most prevalent, with 12 cases, also primarily affecting the eyelid.

Seborrheic keratosis of the eyelid was another frequent diagnosis, with 4 cases. Pilomatrixoma was diagnosed in 5 cases, affecting both the eyelid and the external angular eye. Capillary hemangioma was observed in 2 cases, both on the eyelid.

Among conjunctival lesions, conjunctival intraepithelial neoplasia was the most common, with 6 cases. Compound nevus was identified in 4 cases, affecting both the conjunctiva and the eyelid. In one case, no conclusive diagnosis could be rendered.

Granulomatous lesions (Chalazion) were seen in 3 cases, involving both the orbit and the eyelid. [Figure 2a, b.] Cyst of Moll glands were diagnosed in 2 cases, both on the eyelid. Schwannoma was a rare finding, with only 1 case affecting the Eyelid. Squamous papilloma was noted in 3 cases, with 2 affecting the eyelid and 1 the conjunctiva. Dermoid cysts were diagnosed in 4 cases, predominantly affecting the external and internal angular eye and the orbit. Solar elastosis was diagnosed in 1 case affecting conjunctiva.

Other notable findings included cavernous hemangioma in 3 cases (2 affecting the orbit and 1 the eyelid), traumatic rupture to the eye with global rupture in 2 cases (orbit), and histiocytic proliferation with eosinophilic infiltration (Langerhans cell histiocytosis) in 1 case. [Figure 3 a, b]

Malignant and Premalignant Lesions

From the malignancy perspective, the majority of the lesions were benign. Out of the 105 cases, 88 (83.8%) were benign. Premalignant conditions accounted for 6 cases (5.7%), and malignant lesions comprised 11 cases (10.4%) [Figure 4]

Among the malignant lesions, squamous cell carcinoma was identified in 4 cases. Basal cell carcinoma was diagnosed in 2 cases. Malignant melanoma was observed in 1 case affecting the uvea/conjunctiva, and mucinous carcinoma was identified in 2 cases affecting the eyelid. [Figure 5a, b.] Sebaceous carcinoma was another rare malignancy observed in 1 case on the eyelid. [Figure 6a, b.] Atypical lipomatous tumor with spindle cell component seen in 1 case. [Figure 7a, b.]

Legends to the Table:

Table 1. Ophthalmic lesions distribution according to age and sex

Table 2. Ophthalmic lesions distribution based on Location

Table 3. Prevalence of different Ophthalmic lesions based on the Histological types

Table 4. Prevalence of Location in other studies

Table 5. Comparison of Incidence of Benign and Malignant Lesions with other studies

AGE GROUP (YEARS)	MALE (60)	FEMALE (45)	TOTAL (105)
1-10	3	1	4 (3.8%)
11-20	4	7	11 (10.5%)
21-30	4	6	10 (9.5%)
31-40	5	3	8 (7.6%)
41-50	11	8	19 (18.1%)
51-60	8	10	18 (17.1%)
61-70	14	1	15 (14.3%)
71-80	8	8	16 (15.2%)
81-90	3	1	4 (3.8%)

LOCATION	NO. OF CASES (105)
Eyelid	60 (57.3%)
Conjunctiva	24 (22.9%)
Orbit	15 (14.1%)
External and Internal angular eye	6 (5.7%)

LESION	NO. OF CASES (105)
Hidrocystoma	14 (14.4%)
Inclusion Cyst	12 (11.4%)

Compound Nevus	4 (3.8%)
Granulomatous Lesion (Chalazion)	3 (2.8%)
Cyst of Moll Glands	2 (1.9%)
Seborrheic Keratosis	4 (3.8%)
Intradermal Nevus	3 (2.8%)
Solar Elastosis	1 (0.9%)
Squamous Papilloma	3 (2.8%)
Dermoid Cyst	4 (3.8%)
Capillary Haemangioma	2 (1.9%)
Cavernous Haemangioma	3 (2.8%)
Traumatic rupture of Eye with global rupture	2 (1.9%)
Conjunctival Intraepithelial Neoplasia	6 (5.7%)
No Conclusive Diagnosis	3 (2.8%)
Pilomatrixoma	5 (4.7%)
Malignant Melanoma	1 (0.9%)
Mucinous Carcinoma	2 (1.9%)
Benign spindle lesion	1 (0.9%)
Sebaceous Carcinoma	1 (0.9%)
Schwannoma	1 (0.9%)
AVM	1 (0.9%)
Chemical Injury	1 (0.9%)
Meningothelial Nerve sheath Tumor	1 (0.9%)
Tenon Cyst	1 (0.9%)
Sebaceous Adenoma	1 (0.9%)
Chondroid Syringoma	1 (0.9%)
Fat Tissue	12 (11.4%)
Trichilemmal Cyst	1 (0.9%)
Implantation Cyst	1 (0.9%)
Langerhans Cell Histiocytosis	1 (0.9%)
Squamous cell carcinoma	4 (3.8%)
Basal cell Carcinoma	2 (1.9%)
Atypical Lipomatous tumor with spindle cell component	1 (0.9%)

STUDIES **LOCATION**	**Chauhan SC et al. [3]**	**Shaikh IY et al. [7]**	**Gupta et al. [1]**	**Hanmante et al. [4]**	**Patel et al. [8]**	**Present study**
Eyelid	57%	38%	33%	52.6%	45%	57.6%
Conjunctiva	22%	20%	15%	23.3%	18%	23%

STUDY	**BENIGN LESIONS %**	**MALIGNANT LESIONS %**
Kujur et al. [2]	61.29	38.71
Patel et al. [8]	34	14
Shaikh [7]	52.3	47.7
Sushma TA et al. [10]	92.76	7.24
Kafle et al. [11]	53.24	46.76
Kapurdov and kapurdova et al. [12]	27.1	17.6
Ud Din N et al. [9]	38.5	61.5
Gupta et al. [1]	7.8	31.1
Present study	83.8	10.4

Legends to the figure

Figure 1. Distribution based on the Location

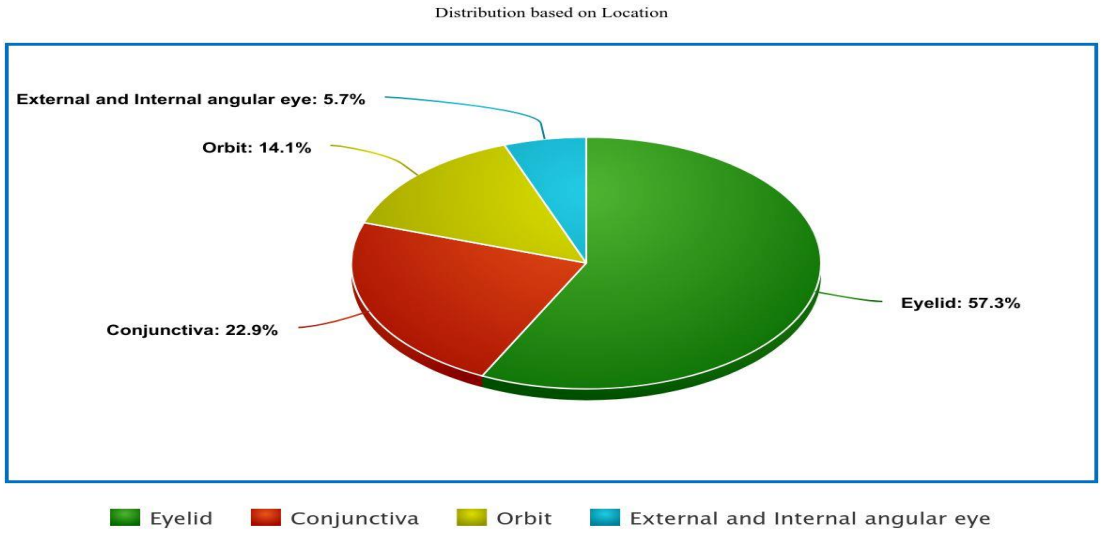


Figure 2a, b. Section examined shows vascular proliferation with dense inflammation comprising of lymphocytes and granulation tissue formation. Many foreign body giant cells are seen suggestive of Chalazion. (H & E stain- 4x, 40x)

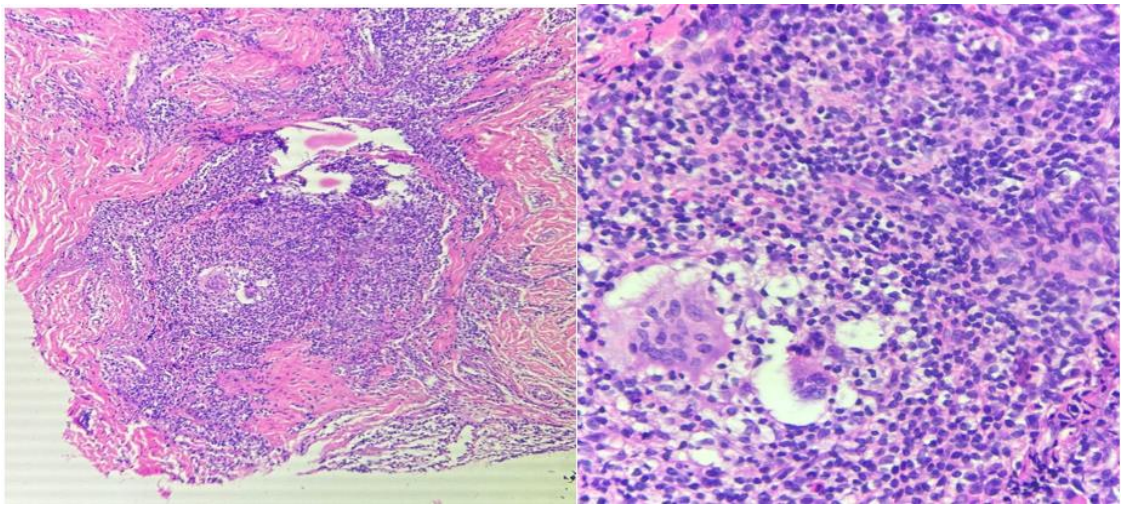


Figure 3a, b. Sections show circumscribed lesion in the dermis comprising of langhan's cell histiocytes with collection of eosinophils and lymphocytes. Langhan's show indended lobulated nuclei with inconspicuous nuclei and abundant cytoplasm. A solitary are shows Charcot Leyden crystals suggestive of Langerhans's cell Histiocytosis. (H & E stain- 10x & 40x)

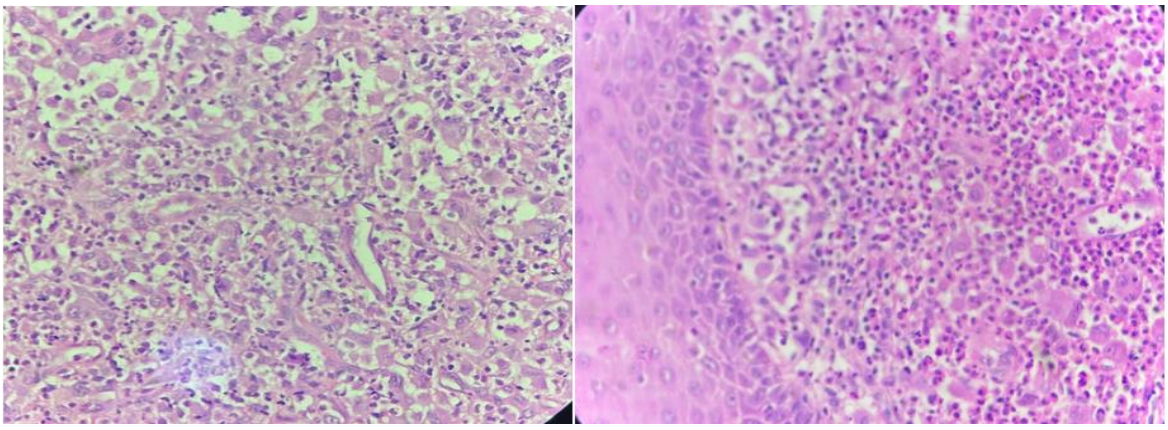


Figure 4. Incidence of Benign, Premalignant and Malignant Lesions

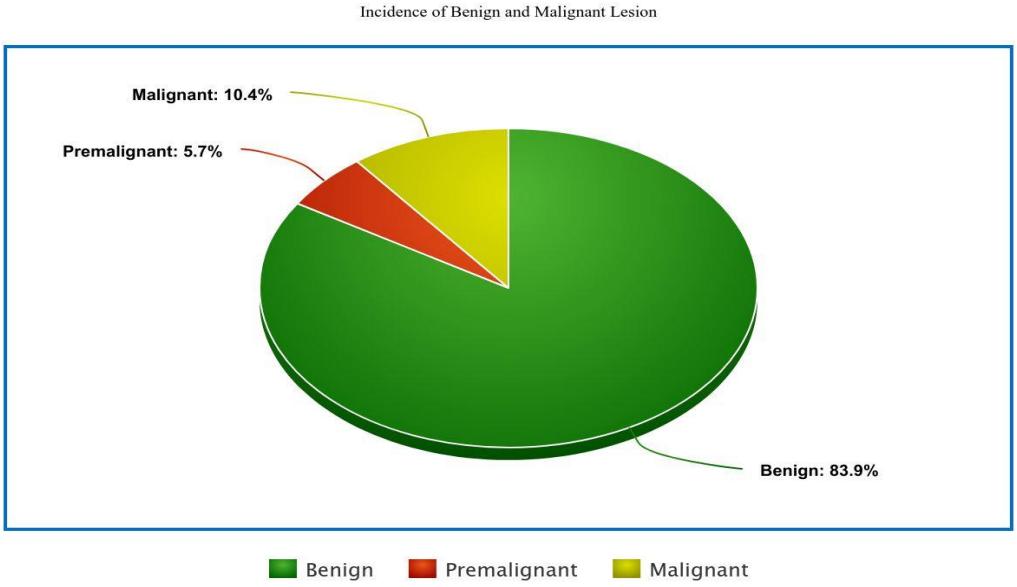


Figure 5a, b: Section examined shows lid lined by stratified squamous epithelium with dermal tumor. Tumor shows island of neoplastic basaloid cells with large pools of mucin portioned by fibrous septae. Mitotic cells seen suggestive of Mucinous Carcinoma (H & E stain- 4x, 10x)

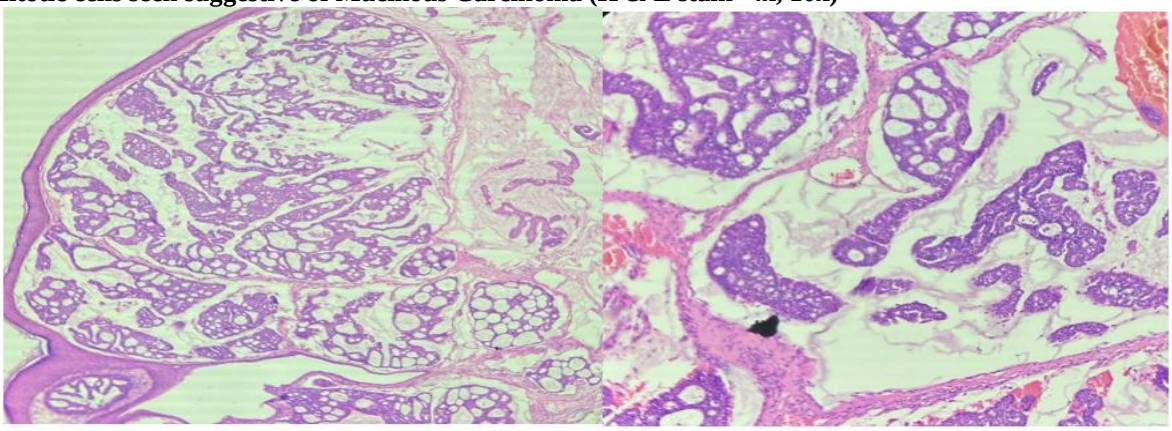


Figure 6a, b. Sections show invasive tumor composed of sheets, islands and lobules of tumor cells separated by fibrovascular septae. Individual cells show moderate to multi-vacuolated cytoplasm, vesicular to hyperchromatic irregular nuclei and prominent nucleoli. Tumor is highly pleomorphic with brisk mitotic activity and focal necrosis suggestive of Moderately differentiated Sebaceous Carcinoma. (H & E stain- 4x, 40x)

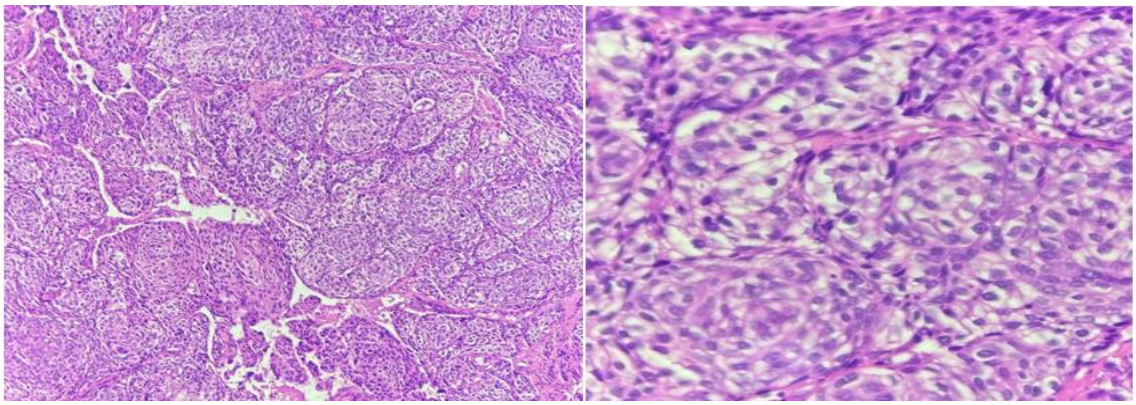
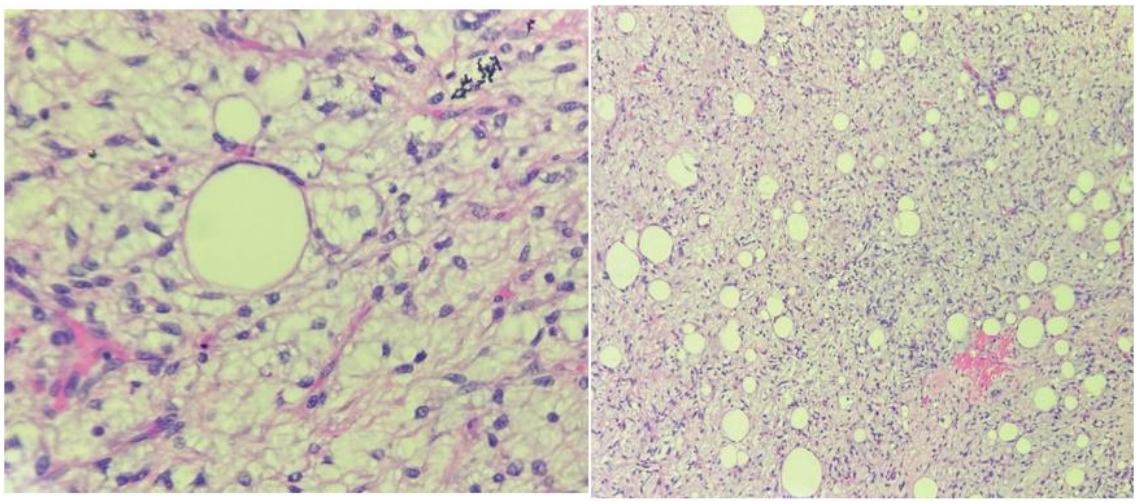


Figure 7a, b. Section examined shows tumor composed of mixture of atypical spindle cells, adipocytes, lipoblasts and few multinucleated cells. spindle cells show mild to moderate cytonuclear atypia, oval to elongated nuclei, pale eosinophilic cytoplasm and ill-defined cell border. Lipoblasts are mostly mature appearing in variable size and shape. Mitotic activity 1-2/10hpf noted suggestive of Atypical Lipomatous Tumor with spindle cell component. (H & E stain- 4x, 40x)



DISCUSSION

The results of the present study were comparable with various other similar studies. In our study, a total of 105 ophthalmic cases were seen. It was found that ophthalmic lesions were highest (18.1%) in the age group of 41-50 years of age followed by 51-60 years (17.3%). Similar findings were observed in Chauhan SC et al. [3] and Hanmante et al. [4]

Regardless, of Gender-wise distribution in our present study, 57.2% were males and 42.8% were females. Bastola et al. [5] reported 53.3% were males and 46.7% were females. Similar findings were also reported in Thakur SK et al. [6] having 51.2% males and 48 .8% females.

Location wise, Eyelid (57.3%) was the most involved site, similar findings have been observed by Chauhan SC et al. [3] Shaikh IY et al. [7] Hanmante et al. [4] as described in Table 4. External angular eye (5.7%) was the least commonly involved site in our study but the least common site in the study of Chauhan SC et al.,[3] was lacrimal sac (2%).

The foundation of an effective approach to treating ophthalmic lesions relies on a thorough histopathologic study and accurate diagnosis. Therefore, clinicopathological correlation is essential, necessitating strong communication between the clinician and the pathologist.

In the present study, nonneoplastic lesions were most common affecting 83.8% of cases. In a study by Kujur et al. [2] and Patel et al. [8] the incidence of nonneoplastic lesions was most common at 61.29% and 34%, respectively, which showed concordance with the present study. In a study by Ud Din N et al. [9] and Gupta et al. [1] malignant lesions were most common which showed discordance with the present study. Premalignant conditions comprise of 5.7% of cases in conjunctival area.

Benign lesions were more prevalent than malignant lesions in research by Shaikh,[7], Sushma TA et al. [10], Kafle et al. [11] and Kapurdov and Kapurdova [12]. The results of the current research are thus compatible with the studies above described: [Table 5]

In the present study among the benign lesions, Hidrocystoma was most frequent 13.3% followed by inclusion cyst (11.4%), fat tissue (11.4%) and conjunctival intraepithelial neoplasia (5.7%). In other studies, discordance was seen by Chauhan SC et al. [3], Obata H et al., [13], Patel et al., [8], Sushma et al. [10] in which benign lesions dermoid cyst, vascular lesions, pterygium and epidermal cyst were most

common respectively in most common location of eyelid. Some studies by kafle et al., [11]., Hanmate et al. [4] shows predominantly nevus lesion. No studies show most common lesion of Hidrocystoma in any case series. One rare case of eye of Langerhans Cell Histiocytosis (LCH) is seen which a rare disorder is characterized by the abnormal proliferation of Langerhans cells, which are a type of dendritic cell normally involved in immune response. Pathologically, LCH can present in a variety of ways, ranging from isolated bone lesions to multisystem disease. Histologically, LCH is marked by the presence of Langerhans cells with their characteristic grooved, coffee bean-shaped nuclei and abundant eosinophilic cytoplasm. These cells often express CD1a, S100, and CD107 (langerin) on immunohistochemical staining, which are key markers used to confirm the diagnosis. Additionally, there may be an inflammatory infiltrate composed of eosinophils, lymphocytes, and multinucleated giant cells. Electron microscopy can reveal Birbeck granules, rod-shaped structures specific to Langerhans cells. Understanding the pathology of LCH is crucial for diagnosis and management, as it guides therapeutic decisions and helps predict clinical outcomes.

Considering the malignant lesions in the present study, SCC (3.8%) was the commonest lesion followed by BCC (1.9%), Mucinous carcinoma (1.9%), Sebaceous carcinoma (0.96%) and rarely Malignant Melanoma (0.96%). SCC (22.5%) was the commonest malignant lesion in the study by Chauhan SC et al. [3] SCC (28%) followed by Sebaceous carcinoma (20%) was the commonest malignant lesions in a study by Shaikh IY et al. [7] In a study by Navahi et al., [14] the most frequent malignant lesion was squamous cell carcinoma which showed concordance with the present study. Ultraviolet spectrum could be a factor for high incidence of this tumour, as large number of persons work in the open sun, especially farmers and workers are exposed to it. Poso MY et al.,[15], also reported it as the commonest tumour in their study with 33.5% cases. In a study by Kujur et al.,[2] and Gupta et al.,[1] the most common malignant lesion was retinoblastoma which showed discordance with our study. In a study by Punja et al. [16], Patel et al. [8], Sushma et al. [10] the most frequent malignant lesion was sebaceous gland carcinoma (48.15%, 28.57% and 42.85% respectively) which showed discordance with our present study. In one study, BCC (12.15%) followed by Malignant Melanoma (5%) was commonest by Srikanth S. [17] was also seen. The most common malignant eyelid tumour in the United States and the United Kingdom is reported to be the Basal cell carcinoma which occurs most frequently on the lower eyelid and medial canthus in elderly patients.[18] One rare case was observed in orbital tissue showing Atypical Lipomatous lesion with spindle cell component.

CONCLUSION

Eye is the vital sensory organ for vision. The most common benign lesion in our study was Hidrocystoma and Squamous cell carcinoma was the most common malignant lesion. The study of literature revealed that, different geographic areas had predilection for different ophthalmic lesions. It is thus emphasized that there is still a scarcity of studies to establish the geographical pattern of ophthalmic lesions. All the ophthalmic specimens should be subjected for histopathological examinations for accurate diagnosis and further management of patient. In conclusion there is a spectrum of benign, premalignant & malignant lesions and an early diagnosis is imminent for further treatment. A good histopathological analysis is therefore the core of treating ophthalmic lesion.

Declaration by Authors

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