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A Study on the Histopathological Patterns of Ophthalmic Lesions at Tertiary Care Centre

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Abstract: ***Introduction: Ophthalmic lesions encompass a broad spectrum of neoplastic and non-neoplastic conditions involving the eye and its adnexa. Histopathological examination remains the cornerstone for accurate diagnosis and classification, aiding in effective clinical management. This study aimed to evaluate the clinico-pathological profile of ophthalmic lesions at a tertiary care centre in Mumbai, India. Materials and Methods: This was a prospective observational study conducted between March 2024 to March 2025 at a tertiary care hospital. A total of 28 ophthalmic specimens, including biopsies and excised tissues, were analysed. Tissues were fixed in 10% formalin, processed routinely, sectioned at 6 microns, and stained with haematoxylin and eosin. Special stains were used where necessary. Lesions were categorized as neoplastic or non-neoplastic, with neoplastic cases further sub-classified into benign and malignant tumours. Relevant clinical, radiological, and therapeutic data were collected from patient records. Results: Among the 28 cases studied, 18 (64.3%) were males and 10 (35.7%) were females, with a mean age of 48.6 years (range: 2 months to 83 years). The left eye was more commonly affected (60.7%). Non-neoplastic lesions predominated, accounting for 71.4% of cases, with inflammatory conditions being the most frequent (60%), particularly chronic dacryocystitis. Neoplastic lesions comprised 28.6% of cases, with a higher incidence of malignancy (62.5%) compared to benign tumours (37.5%). Malignant lesions included basal cell carcinoma, squamous cell carcinoma, retinoblastoma, carcinosarcoma, and malignant spindle cell tumour. Benign lesions observed were nevus, neurofibroma, and pyogenic granuloma. The lacrimal sac was the most commonly involved site (25%). Conclusion: This study highlights the predominance of non-neoplastic ophthalmic lesions, particularly inflammatory pathologies, in a tertiary care setting. A significant number of malignant tumours were also identified, underscoring the importance of histopathological evaluation for accurate diagnosis and timely intervention. Regional data such as this are essential for enhancing diagnostic accuracy and guiding effective clinical management of ocular diseases.***

Keywords: Ophthalmic lesions, histopathology, ocular tumours, inflammation, neoplastic lesions, dacryocystitis, eye pathology

1. Introduction

The human orbit is a complex anatomical space composed of diverse tissues, including both unique ocular structures and those resembling tissues from other body sites. An in-depth understanding of orbital and ocular anatomy is essential when addressing various ophthalmic diseases.[1,2] Ophthalmic pathology, a specialized branch at the intersection of pathology and ophthalmology, focuses on the study and diagnosis of diseases affecting the eye and its adnexal structures.[3] This subspecialty plays a vital role in establishing definitive diagnoses, guiding treatment strategies, and contributing to the overall management of ocular conditions.[3,4]

Histopathology remains the mainstay of diagnosis in tumoral growths. In addition to determining the malignant potential of the lesion, histology reveals its exact nature and structure.[5,6] Ocular malignant tumours are relatively rare compared with other eye lesions that require immediate diagnosis and management. However, ignorant care due to the unawareness of persons can result in debility and loss of vision.[6]

The present study aims to evaluate the clinico-pathological spectrum of ophthalmic lesions diagnosed at a tertiary care centre in India. The objectives include:

1) To analyse the histopathological spectrum of neoplastic and non-neoplastic ocular lesions.
2) To determine age and sex distribution patterns in these lesions

2. Materials and Methods

This was a retrospective observational study conducted over a period of 1 year (March 2024-March 2025) at a tertiary care hospital. Prior to inclusion, informed consent was obtained from all patients for the use of their surgical specimens in the study. A total of 28 cases were analysed. Clinical, radiological, and therapeutic details were collected from patient case files. The specimens included surgical biopsies and excised tissues, all of which were fixed in 10% neutral buffered formalin upon receipt. In cases of enucleation, the entire globe was immersed intact in formalin for 24 hours before being grossed and sectioned. Photographic documentation was carried out whenever deemed necessary for record-keeping or illustrative purposes. Tissues were sectioned at a thickness of 6 microns, stained with haematoxylin and eosin (H&E), and examined

microscopically. Special histochemical stains were employed as needed to aid in specific diagnoses. For the purpose of analysis, all ophthalmic lesions were broadly classified into neoplastic and non-neoplastic categories. The neoplastic lesions were further subdivided into benign and malignant tumours based on their histopathological characteristics.

3. Results

A total of 28 patients were included in the study. There were 18(64.3%) males, while 10 (35.7%) were females. There was male preponderance in both neoplastic and non-neoplastic ophthalmic lesions. The mean age of the study participants was 48.6 years with Standard deviation of 21.6 years. The youngest patient was 2 months old while the oldest was 83 years old. In our study,17 cases (60.7%) had left side lesions while 11 cases (39.3%) had right side lesions.

Ocular lesions occur over a wide histological distribution, Fig 1 shown below demonstrates the histological distribution, the most common being lacrimal sac (25%), followed by cornea and eyeball (21.4% each) and conjunctiva (17.9%) and eyelid (14.3%).

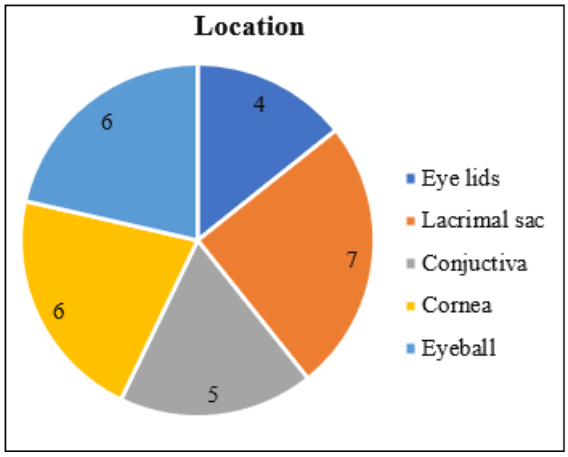

Figure 1: Location wise distribution of cases

In our study, we found that in the majority of the cases, 20 (71.4%) were having non-neoplastic lesions, while 8 cases (28.6%) were having neoplastic lesions. Among non-neoplastic lesions, inflammatory lesions,12(60%) were the most common, followed by cystic and infectious lesions, 4 (20%) cases each. Chronic dacryocystitis, 4 cases (33.33%) were the most common inflammatory lesions followed by keratitis and acute inflammation, both having 3 cases (25%) each. We observed malignant neoplastic lesions with an increased incidence compared to benign. Among neoplastic lesions, we found malignant lesions, 5 cases (62.5%) were more common than benign lesions, 3 cases (37.5%). Among malignant lesions there was a case each of basal cell carcinoma, non-keratinising SCC, carcinosarcoma, malignant spindle cell tumour, retinoblastoma. Among benign tumours, there was a case of nevus, pyogenic granuloma, neurofibroma.

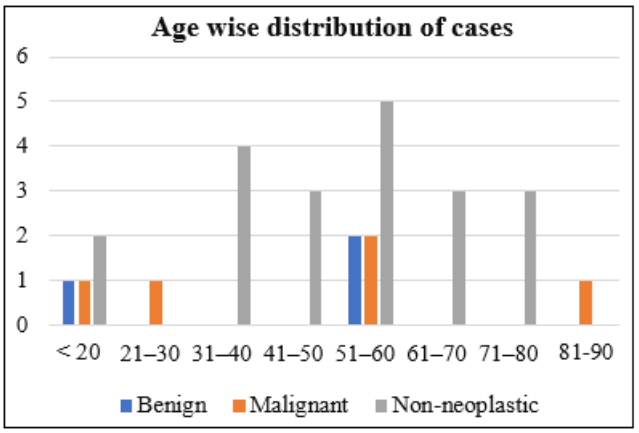

Figure 2: Age-wise distribution of cases

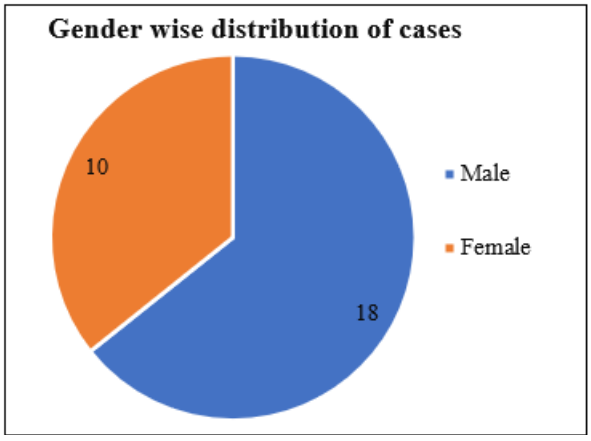

Figure 3: Gender wise distribution of cases

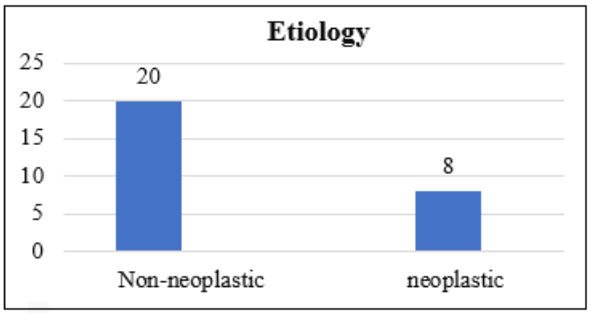

Figure 4: Etiology wise distribution of cases

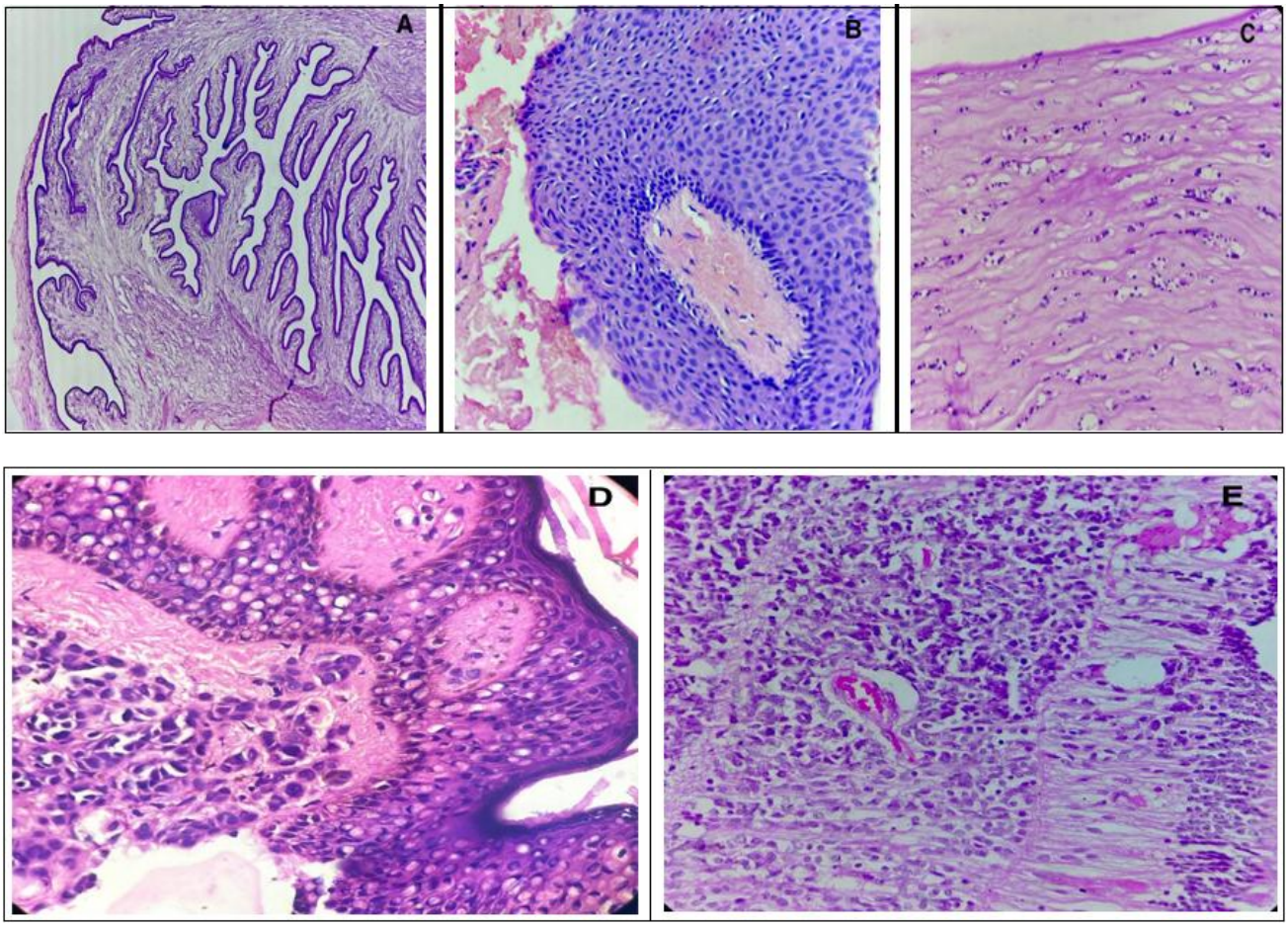

Figure 5: H&E microscopy (x40) showing Non-Neoplastic lesions: (A) Cysticercosis, (B) Canalicular cyst (C) Pan-ophthalmitis; Neoplastic lesions: (D) Nevus (E) Retinoblastoma

Table 1: Distribution of cases as per Diagnosis Discussion

Non-neoplastic	No.	Neoplastic	No.
Infectious	**4**	**Benign**	**3**
Cysticercosis	1	Nevus	1
Fungal keratitis	1	Pyogenic granuloma	1
Fungal keratitis (aspergillus)	1	Neurofibroma	1
Chronic inflammation	1		
Cystic	**4**	**Malignant**	**5**
Epidermal inclusion cyst	1	Basal Cell Carcinoma	1
Canalicular cyst	1	Non keratinising SCC	1
Conjunctival inclusion cyst	1	Carcinosarcoma	1
Leucoma with focal keratitis	1	Malignant spindle cell tumour	1
		Retinoblastoma	1
Inflammatory	**12**		
Chronic dacryocystitis	4		
Acute on Chronic dacryocystitis	1		
Chronic inflammation	1		
keratitis	3		
Acute inflammation consistent with Pan ophthalmitis	3		
Total	**20**	**Total**	**8**

The present study demonstrated a clear male predominance (64.3%) in ophthalmic lesions, consistent with findings from Tiwari et al. (2021), who reported 57.6% male cases in their study conducted at a tertiary hospital in Mumbai. [3] Similar trends were observed in the studies by Kumar et al. in Nepal[1] and Gupta et al. in Central India[2], indicating that gender-based susceptibility or differential health-seeking behaviour may influence reported case distributions.

The present study found that ophthalmic lesions were highest (17.5%) in the 40 50 years age group. However, in a study by Chauhan SC et al., the majority of the cases were reported in the 31-40 years age group.[2]

In our study,17 cases (60.7%) had left side lesions while 11 cases (39.3%) had right side lesions. Left eye was more commonly involved in studies by McKelvie PA et al (2002)[7] and Tunc M et al (1999)[8] Chaudhary MM et al (2008)[9] also

observed equal distribution of tumours over right and left sides.

In terms of anatomical distribution, the present study identified the lacrimal sac (25%) as the most frequently affected site, followed by the cornea, eyeball, and conjunctiva. This contrasts with findings from Tiwari et al., where conjunctiva and eyelid were the predominant sites (35.29% and 31.8%, respectively).[3] Natekar et al. also observed a more even distribution, with frequent involvement of the eyelid and conjunctiva.[6] These discrepancies may be attributed to geographical variations, patient demographics, and differences in case referral pathways.

Our study revealed that non-neoplastic lesions (71.4%) significantly outnumbered neoplastic ones (28.6%), with chronic dacryocystitis emerging as the most prevalent diagnosis. This aligns closely with the findings of Gupta et al., who reported a high incidence of chronic inflammatory conditions involving the lacrimal sac.[2] In contrast, Tiwari et al. noted a comparatively lower frequency of non-neoplastic lesions (31.8%), possibly reflecting differences in institutional referral patterns and patient population characteristics.[3]

Among neoplastic lesions, malignant tumours accounted for 62.5% of neoplastic cases in our cohort. This finding is in line with the study by Thakur et al., who documented a high incidence of primary malignant ocular tumours in Eastern Nepal.[5] Tiwari et al. similarly reported retinoblastoma (24%) and squamous cell carcinoma (20%) as the most frequent malignancies, supporting the assertion that ocular malignancies—though less common—carry significant clinical importance and require prompt diagnosis and intervention.[3] Nevus was most common benign eyelid lesion seen in the study conducted by Chi MJ et al (2006) while Reddy SC et al (1996) shows dermoid cyst as the most common.[10,11]

Our study also highlighted rare neoplasms, including carcinosarcoma and malignant spindle cell tumours, reflecting the diverse histopathological spectrum of ocular lesions. Such findings underscore the need for thorough histological assessment and a multidisciplinary approach for accurate diagnosis.

Infectious conditions, including fungal keratitis and ocular cysticercosis, were also recorded in our series, which is consistent with studies conducted in endemic regions such as India and Nepal.[2,6] The presence of these infections highlights the continuing burden of preventable or treatable ocular conditions in developing regions and the importance of early histopathological evaluation.

4. Conclusion

Our findings reinforce the value of histopathology in diagnosing both common and rare ophthalmic lesions. The demographic and anatomical differences observed across various studies reflect the need for regional data to tailor diagnostic and management strategies more effectively.

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