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Original Research Article

Unveiling the Spectrum of Ophthalmic Lesions: A Histopathological Perspective in a Tertiary Care Hospital

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Abstract:

Ophthalmic pathology, a subspecialty within histopathology, focuses on diagnosing and characterizing a wide range of ocular diseases. It involves the examination of tissues obtained from surgical procedures such as enucleation and evisceration, as well as from minor biopsies. The lesions affecting the eye range from benign and pre-malignant to malignant, and accurate diagnosis relies on a combination of clinical and histopathological evaluation.

Keywords: Enucleation, Histopathology, Evisceration, Ocular.

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Introduction

Ophthalmic pathology plays a key role in diagnosing a broad spectrum of eye diseases, particularly tumorous lesions. Histopathological evaluation not only confirms malignancy but also provides detailed insight into the lesion's type and structure. Ocular lesions may arise from various tissues and present as inflammatory or neoplastic conditions.

Though malignant tumours of the eye are relatively uncommon, timely diagnosis is crucial to prevent serious complications such as vision loss. Management varies depending on the extent and nature of the disease—ranging from enucleation, which removes the eyeball while preserving surrounding tissues, to orbital exenteration in more advanced malignancies. Evisceration, which retains the scleral shell, allows for cosmetic rehabilitation using a motile prosthesis. This study aims to analyse ocular lesions through histopathological review of hospital-based.

Ophthalmic pathologists examine tissues obtained through procedures like enucleation, evisceration, and other ocular biopsies. The orbit consists of the globe, extra-ocular muscles, fat, nerves, blood vessels, glands, and connective tissue—primarily of neuroectodermal origin. Neoplastic lesions in this region exhibit diverse histological features, and the potential for vision loss often adds to the clinical challenge. Additionally, histological processing of ocular tissues requires specialised techniques in fixation, sectioning, and staining, differing from standard tissue protocols.

Material and Methods

This study comprised 102 ophthalmic biopsy specimens that were received in the Department of Pathology, SCB medical college, Cuttack during the period from December 2023 to June 2025. All tissue samples underwent fixation, gross examination, processing, and staining with hematoxylin and eosin. Microscopic analysis was performed in correlation with the available clinical details. The aim of the study was to document the spectrum and prevalence of various ocular and adnexal lesions encountered in a tertiary care hospital in SCB medical College, Cuttack.

Results

A total of 102 histopathological specimens were studied, with patient ages ranging from 2 to 80 years (mean age: 30.9 ±14.5 years). The maximum number of cases occurred in the 10–20 years age group (7 cases), followed by 6 cases each in the 41-50 years. The frequencies of other age groups are illustrated in Figure 1.

Table 1: Age Distribution of Cases

Sl. No.	Age group(in years)	Number of cases(n)	Percentage (%)
1	0-10	6	5.88%
2	11-20	15	14.71%
3	21-30	19	18.63%
4	31-40	9	8.83%
5	41-50	23	22.54%
6	51-60	14	13.72%
7	61-70	10	9.81%
8	71-80	6	5.88%
	Total	102	100%

The overall male-to-female ratio was 1.2:1. A slight male predominance was observed, with males comprising OF 54.9% of the cases and females accounting for 45.1%. (Table-2)

Table 2: Gender Distribution of Cases

SL. No.	Gender	Number of cases(n)	Percentage (%)
1	Male	56	54.90%
2	Female	46	45.10%
	Total	102	100%

The site-wise distribution of the 102 ophthalmic biopsies 59 cases (57.84%) originated from eye lid, 15 cases (14.70%) from the conjunctiva, 12 cases (11.76%) from the eyebrow, 8 cases (20.97%) from the canthus,4cases from orbit (3.93%) and 2 cases each from sclera and intraocular region.

Table 3: Site Distribution of Cases

SL. No.	Site of lesions	Number of cases(n)	Percentage (%)
1	Eye lid	59	57.84%
2	Conjunctiva	15	14.70%
3	Orbit	4	3.93%
4	Eyebrow	12	11.76%
5	Canthus	8	7.845
6	Sclera	2	1.96%
7	Intraocular	2	1.96%
	Total	102	100%

Table 4: Type of lesions

Type of Lesions	Number (N)	Percentage (%)
Non-Neoplastic	55	53.92
Neoplastic	47	46.08
Total	102	100

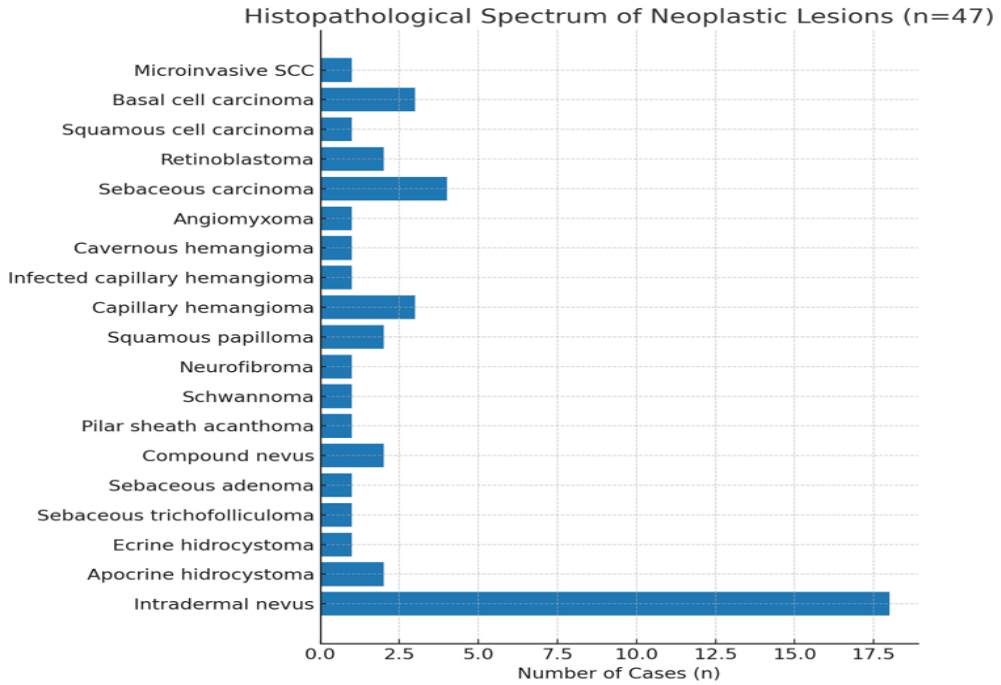
Non-neoplastic lesions dominated over neoplastic lesions with a total number of 55cases (53.92%). Table-4

Among the non-neoplastic lesions, epidermoid cyst was the most common comprising of 21 cases (38.18%) as listed in Table 5. Sebaceous carcinoma emerged as the predominant ocular malignancy, accounting for 4 cases (8.51%). This observation highlights sebaceous carcinoma (Fig.1) as the leading malignant tumour in the present study. The second most common malignancy was of basal cell carcinoma comprising of 3 cases, followed by retinoblastoma comprising of two cases (Fig.2), one case squamous cell carcinoma and one micro-invasive squamous cell carcinoma. Sebaceous carcinoma was the predominant eyelid malignancy, often mimicking recurrent chalazion.

Conjunctival lesions were predominantly inflammatory, with some cystic lesions such as epidermoid cyst. Among infectious conditions, one conjunctival, mass was due to Rhinosporidium infection, while one case showed granulomatous inflammation with Langhans-type giant cells, suggestive of tuberculosis. Eyelid lesions were mainly cystic, including two epidermal inclusion cysts and one case each of sebaceous cyst and dermoid cyst. Chalazion was identified in four cases, with sebaceous carcinoma being the closest differential diagnosis. Additionally, one eyelid mass revealed oculosporidiosis.

Table 5: Histopathological Spectrum of Non-Neoplastic Lesions

SL. No.	Non neoplastic lesions	Number of cases(n)	Percentage (%)
1	Epidermoid cyst	21	38.18%
2	Infected epidermoid cyst	12	21.81%
3	Dermoid cyst	3	5.45%
4	Infected dermoid cyst with giant cell reaction	1	1.81%
5	Vascular malformation	2	3.63%
6	Fibroeoithelial polyp	2	3.63%
8	Oculosporidiosis	1	1.81%
10	Nonspecific inflammatory lesion	4	7.27%
11	Granulomatous lesion	1	1.81%
12	Histiocytic lesion	1	1.81%
13	Chalazion	4	7.27%
14	Follicular keratosis	1	1.81%
15	Sebaceous keratosis	2	3.63%
	Total	55	100%



Graph 1: Histopathological spectrum of neoplastic lesions

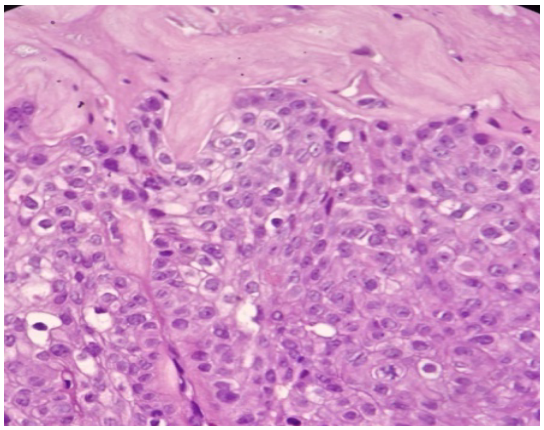


Figure 1a: Sebaceous carcinoma (well differentiated) (H&E,400x)

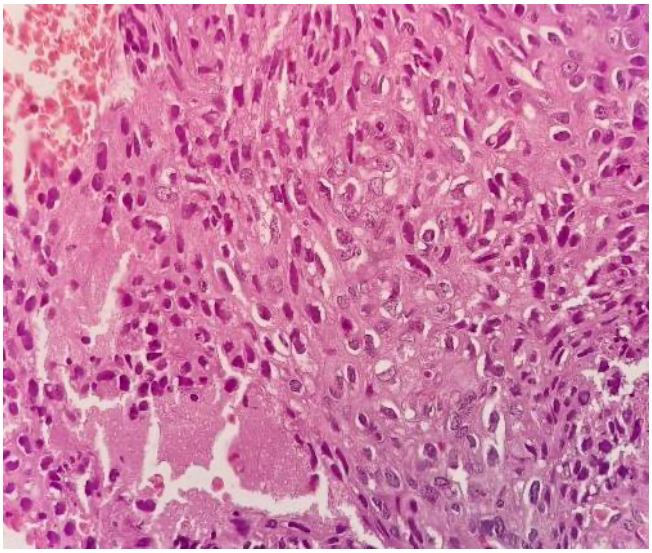


Figure 1b: Sebaceous carcinoma (moderately to poorly differentiated) (H&E,400x)

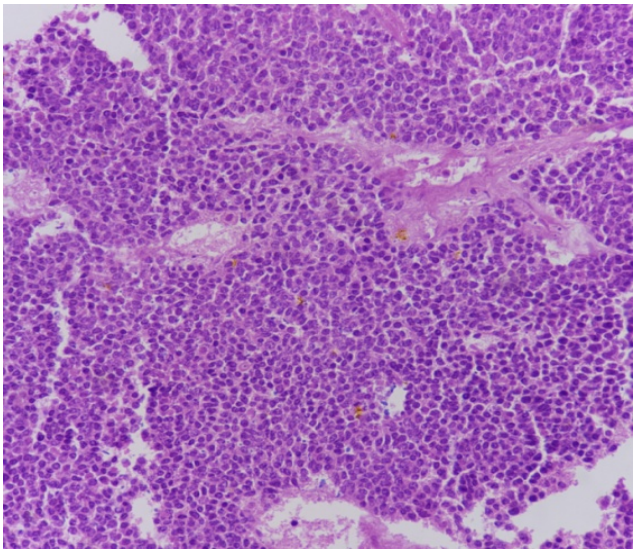


Figure 2: Retinoblastoma with small round blue cell tumours arranged in sheets, nests and rosettes (H&E,400x)

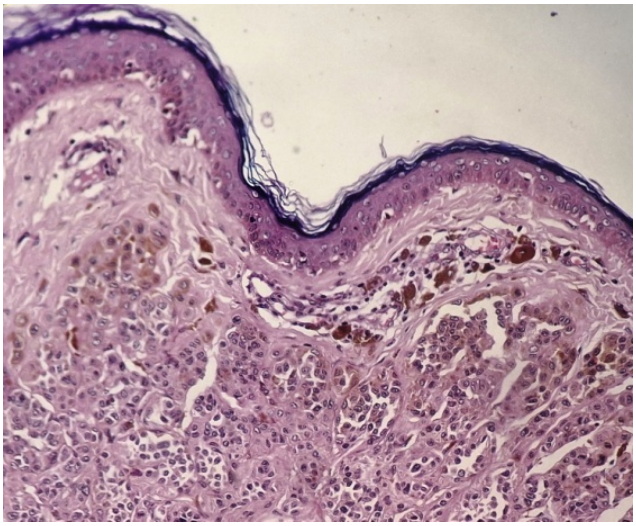


Figure 3: Intradermal nevus: Nests of proliferating melanocytes Confined to dermoepidermal junction ((H&E,400x)

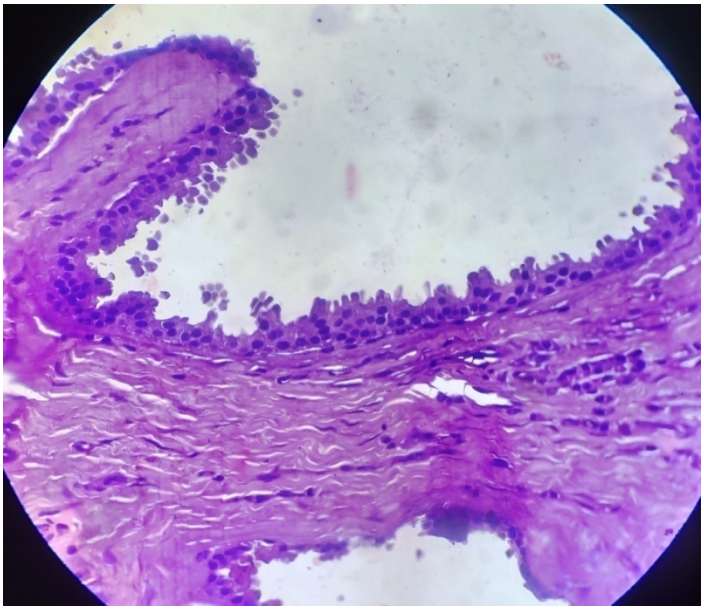


Figure 4: Apocrine hidrocystoma: Cystic lesion lined by outer cuboidal to flattened cells and inner columnar cells, luminal cells often showing decapitation secretion.

Discussion

Histopathology aided in diagnosis of ophthalmic lesions and offered a reliable reflection of the distribution pattern of ophthalmic lesions in eastern part of the country. In the present study, highest number of cases (23 cases, 22.54%) were observed in age group of 41-50years. (Table-1) In contrast, Chauhan SC et al. reported maximum cases in 31–40 years age group [2]. This variation maybe attributed to relatively higher occurrence of epidermoid cyst and sebaceous carcinoma in present study population.

Males constituted 57.90% of cases, while females accounted for 45.10%(Table-2). A similar trend was observed in the paediatric age group, where males comprised 66.6% of the cases.

Clinical diagnosis correlated with histopathological findings in 82.5% of cases in the present study. Chauhan SC et al. reported a lower concordance rate of 49% [2], whereas other studies have documented higher diagnostic accuracy, ranging from 84% to 96% [5–7].

Clinicopathological correlation was highest in eyelid lesions (58%) and highest in enucleation specimens (82%) as listed in Table-3. These findings are comparable to those reported in previous studies [8].

The high clinicopathological correlation observed in enucleation specimens was primarily due to retinoblastoma being the most common diagnosis. In contrast, a few cases that were clinically suspected as malignant masses were later identified as inflammatory pseudotumors on histopathological examination. This underscores the diagnostic challenge posed by such lesions, which can closely mimic malignancy on clinical grounds. Accurate management of ophthalmic lesions relies fundamentally on thorough histopathological evaluation and diagnosis. Hence, clinicopathological correlation remains essential and can be achieved only through effective communication between clinicians and pathologists. Malignant lesions constituted the majority of cases (57.89%), a finding consistent with the observations of Shaikh IY et al. and other studies [2,10–14].

Among malignant ophthalmic lesions, the most common tumours were sebaceous carcinoma (8.51%) followed by basal cell carcinoma (6.38%) and retinoblastoma (4.25%) –Table 6. In a study from Pakistan, Ud-Din N et al. reported retinoblastoma as the predominant malignancy (24.5%), followed by conjunctival SCC (21.5%) and basal cell carcinoma (15.8%) [12].

A considerable proportion of malignant ophthalmic lesions was observed in the paediatric age group, predominantly due to retinoblastoma, which accounted for 28.5% of all malignant cases. This finding is in close agreement with other studies that reported incidences of 31.7% and 32%, respectively [17,18]. Consistent with these observations, retinoblastoma emerged as the most common childhood malignancy in the present study.

In contrast, certain studies have documented lower proportions of retinoblastoma, reporting 20.8% and 19.8%, respectively [16,20], while a series from Nepal noted an even lower incidence of 6.7% [1]. In the present study, the mean age at diagnosis was 4 years, with no gender predilection. Similar age distribution has been reported in studies from

Pakistan and India, although a male predominance was noted in those populations. Conversely, reports from Western countries describe an earlier age of presentation. This earlier detection in developed nations is likely attributable to superior diagnostic infrastructure and greater public awareness, factors that remain relatively limited in this region.

In the present study, the most frequent lesion was epidermoid cyst (38%), followed by intradermal nevus (37%) [2]. In contrast, Obata H et al. reported intradermal nevus (21.3%) as the most common lesion, while Abdi U et al. found vascular lesions (21.3%) to be the predominant type [15,21]. Similarly, Akpe BA et al. observed chalazion (10.8%) to be the leading eyelid mass in their series [8].

In the present study, sebaceous carcinoma was the most common malignant eyelid tumour (8.51%), which is comparable to findings from other series (8.7% and 15%) [2,15]. The majority of sebaceous carcinomas (86.2%) arose in the eyelid, all occurring in patients above 40 years of age [Table/Fig-13a,b]. The mean age of presentation was 58.5 years, with a female predominance. Studies from Korea, Nepal, and India reported slightly higher frequencies of 21.2%, 28.6%, and 33%, respectively [1,18,22]. By contrast, Kass LG et al. observed a much lower incidence in the United States, where sebaceous carcinoma accounts for only 1–5.5% of all eyelid malignancies [23]. In several other series from Nepal, Sudan, and Papua New Guinea, basal cell carcinoma was identified as the predominant eyelid malignancy [1,16,24]. Similarly, in Western countries such as the United States and the United Kingdom, basal cell carcinoma is the most frequently encountered malignant eyelid tumour, typically affecting the lower eyelid and medial canthus in elderly individuals [25,26]. In contrast, Akpe BP et al. reported squamous cell carcinoma (16.9%) as the most common malignant eyelid lesion in their study [8]. A higher prevalence of basal cell carcinoma and squamous cell carcinoma has been documented in fair-skinned populations, attributed to increased susceptibility to ultraviolet light exposure [27].

Among corneal–conjunctival lesions, 72.73% were benign and 27.27% were malignant, which is consistent with observations from previous studies [2,15]. Obata H et al. reported intradermal nevus (13%) as the most frequent benign lesion [15], whereas Chauhan SC et al. documented granuloma pyogenicum (22.5%) followed by intradermal nevus (4.5%) as the commonest [2]. In contrast, a series from West Bengal identified squamous papilloma as the most prevalent benign tumour [28].

Conclusion

Our study highlights that retinoblastoma remains the most common ocular malignancy in children, with leukocoria and blindness being the usual presenting features. Sebaceous carcinoma continues to pose a diagnostic challenge due to its close resemblance to chalazion, a benign lesion. Among non-neoplastic conditions, intradermal nevus was most frequently observed followed by capillary hemangioma. These findings underscore the importance of subjecting all surgically excised ophthalmic lesions to histopathological evaluation, as accurate diagnosis is essential for appropriate patient management and therapeutic planning.

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