Original Article

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Tumors and Tumor like Conditions of Eye and Ocular Adnexae: A Comprehensive Study of 359 Cases

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ABSTRACT

Background: The eye is one of the major sensory organs. The present study aims at a comprehensive study of all the tumours and tumour like conditions of eye and ocular adnexae with their relative incidence in Indian population.

Methods: All incisional and excisional biopsies of eye and its adnexal organs received in our laboratory between April - 2010 to December - 2018 were included in this study.

Result: A total of 359 cases were studied. Among these, lesions constituted are orbital: 37.4%, Conjunctival: 32%, Eyelid: 18.2%, Intraocular: 9.4% and Lacrimal gland: 2.85% of the total cases. Among the orbital lesions, the most common benign tumor was hemangiomas [15.26 %] and malignant tumour was basal cell carcinomas [10%].

In conjunctiva, carcinoma in situ was the most common lesion [51.4%]. Retinoblastoma [66.66%] was the most common in the ocular lesions. Other tumours and tumour like conditions are discussed in the present study.

Conclusion: Early histopathological diagnosis and ancillary diagnostic tests like immunohistochemistry will help to reduce destructive surgeries and the morbidity in terms of vision loss, loss of eyeball and cosmetic factors. Present study aids in knowing the incidence and prevalence of tumor and other lesions seen with orbit, and its adnexa and eyeball.

Keywords: *Eye, Tumours, Tumour Like Lesions.*

INTRODUCTION: Orbit, an anatomical complex structure, first described by Whitnal [1], resembling pear, with the anterior wide and posterior narrow aperture, is formed by 7 bones. Normal adult orbit holds a volume of 30 ml. Orbit contains globe, extra ocular muscles, fatty tissue, vascular structures, nerves and glandular elements. This is a cavity containing structures essential for the ocular function. Since it is a small anatomical space with little wasted area, space occupying lesions that increase the volume may result in proptosis and affect the visual and extraocular muscle functions. As there are very few articles in the literature [2], which have included all the lesions and the components of the eye, the present paper is intended to study relative incidence and better understanding of the different lesions and the disease processes of eye and its adnexal structures. Aim of the present study is to know the incidences and prevalence of different lesions of eye and its adnexal structures and classify into malignant and benign lesions and compare them with other studies.

Materials and Methods

Present study is a retrospective study done in our lab set up during a period of 8.8 years between April -2010 to December -2018. A total of 359 cases referred from an ophthalmic Centre were included. Study included all incisional and excisional biopsies referred to us. Clinical details, investigations and surgical procedures of all the patients were recorded. All the specimens were properly fixed in the formalin solution for a proposed time depending upon the type, size and site. Small biopsies were completely embedded, while large specimens were properly cut and adequate bits from different sites were given.

Result

Our study being retrospective were in, all cases of eye and its adnexal structures were included from April 2010 to December 2018. It comprised of total 359 cases. We classified these as lesions of [A] Eye lids, [B] Lacrimal gland, [C] Orbit, [D] Conjunctiva, and [E] Intraocular tissues.

A] Eye lids: Eyelid tumors and tumor like lesions are shown in table 1.

Total 64 lesions of the eyelid were seen, out of which most common benign lesion was chalazion and basal cell carcinoma was the most common malignant tumor.

B] Lacrimal gland tumors and lesions are shown in table 2. Among 19 tumours, mucoepidermoid carcinoma and Adenoid Cystic carcinoma were the most common malignant tumors. Pleomorphic adenoma being common benign tumor.

C] **Orbital Lesions:** Among 131 cases, vascular lesions were most common. Most common benign tumour was nerve sheath tumours. In 7 cases, diagnosis was not possible either because of inadequate biopsy sample or crush artifacts. [Table 3]

D] **Conjunctival Lesions:** Among 112 cases, squamous cell carcinoma was the most common malignant tumour.

E] **Ocular Lesions:** Retinoblastoma was the most common intraocular neoplasia. Other lesions are shown in Table 5.

Discussion

All these tumours are discussed as lesions of [A] Eye lids, [B] Lacrimal gland, [C] Orbit, [D] Conjunctiva, [E] Intraocular tissues. Distribution of the tumours is shown in Figure 1.

A] **Eyelids:** Eyelid is divided into a cutaneous and conjunctival portion. The former is composed of stratified squamous epithelium and the latter of much thinner conjunctival epithelium. Skin appendages of

Table 1: Eyelid lesions

S No	Lesion	No of cases	Age range[yrs]	M: F
1	Basa cell carcinoma	16	75-95	0:6
2	Sebaceous carcinoma	13	36-80	1 :5
3	Epidermal cyst	3	1.1 -18	1;2
3	Suderiferous cyst	3	6-65	1:2
4	Chondroid syringoma	1	40	M
5	Epidermal nevus	3	8-52	1:2
6	Neurofibromatosis	1	7	F
7	Meibomian gland carcinoma	4	36-74	M
8	Lipogranuloma[chalazion]	12	4-72	1:1
9	Sebaceous Hyperplasia	2	22-54	1:2
10	Squamous Papilloma	3	24-45	1.2
11	Capillary Hemangioma	2	28-45	1:1
12	A V Malformation	1	20	M
	Total Number of Cases	**64**		**18.2%**

Table 2: Lacrimal gland lesions:

S No	Lesion	No of cases	Age range[yrs]	M: F
1	Chronic sialadenitis	6	24-36	2:0
2	Pleomorphic adenoma	11	18-56	2:1
3	Mucoepidermoid carcinoma	1	21	M
4	Adenoid cystic carcinoma	1	55	F
	Total No of cases	**19**		

Table 3: Orbital lesions:

S No	Lesion	No of cases	Age range[yrs]	M: F
1	Cavernous [12]/Capillary [8] hemangioma;	20	11-58	1:1
2	Neurofibroma [9]/neurilemmoma [6]/ Neurofibromatosis [1]	16	1-50	1:5
3	Non –Hodgkin's lymphoma	12	6-81	2:1
4	Fibro lipoma [3]/ angiolipoma [1]	4	13-28	1:2
5	Inflammatory pseudotumour	4	45-54	0:2

S No	Lesion	No of cases	Age range[yrs]	M: F
6	Adenocarcinoma deposits	5	40-60	0:2
7	Granulomatous Inflammation	10	13-64	2:1
8	Meningioma	2	32-40	1:1
9	Fungal infection	6	32-55	1:1
10	Hamartoma	1	4	M
11	Non –Hodgkin's lymphoma/ rhabdomyosarcoma	4	2-5	1:1
12	Infantile Fibrosarcoma	1lo	11 months	M
13	Hydatid Cyst	2	22-55	M
14	Chronic Inflammatory Lesion	10	6-69	2:1
15	Epidermal Cyst with Granulomatous Inflammation	7	31-66	2:1
16	Histiocytosis	1	2	F
17	Pleomorphic Sarcoma	1	45	M
18	Reactive Lymphoid Hyperplasia	8	13-56	1:2
19	Malignant Melanoma	1	36	M
20	Inconclusive	7	14-85	1:2.5
	Total No of cases	**131**		

Table 4: Conjunctival lesions.

S No	Lesion	No of cases	Age range[yrs]	M:F
1	Carcinoma in situ	36	25-84	2:1
2	Squamous cell carcinoma	17	40-74	1:1
3	Moderate dysplasia	17	39-76	3:0
4	Lipogranuloma	1	30	F
5	Hyperplastic lesion	5	37	M
6	Chronic inflammation	9	24-39	1:1
7	Dermatolipoma	1	8 mn	M
8	Capillary Hemangioma	3	33-54	1:2
9	Fibrolipoma	3	11-74	2:1
10	Pterygium	11	21-42	1:2
	Total number of cases	**112**		

Table 5: Ocular lesions.

S No	Lesion	No of cases	Age range[yrs]	M:F
1	Retinoblastoma	22	3m -10 yrs	2:1
2	Endopthalmitis	1	84	M
3	Malignant melanoma	1	50	M
4	Coats disease	1	1	M
5	Iris nevus	2	1-65	M
6	Meningothelial Meningioma-Optic Nerve.	2	11-38	F
7	Eales Disease	1	18	M
8	Optic Nerve Sheath Cyst	1	8 mn	M
9	Arachnoid Cyst	1	2	F
	Total no of cases	**33**		

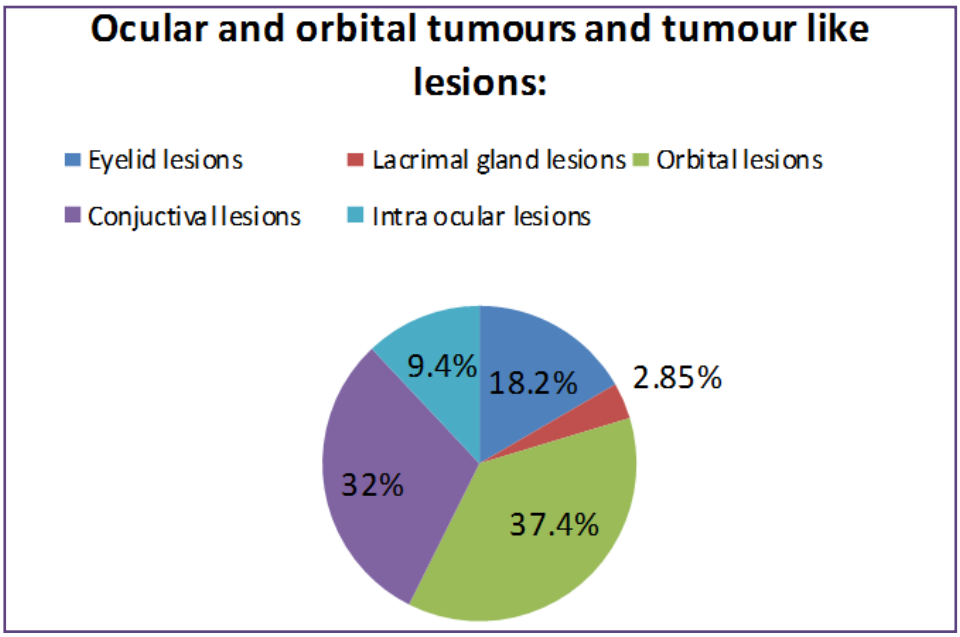

Fig. 1: Distribution of the tumors.

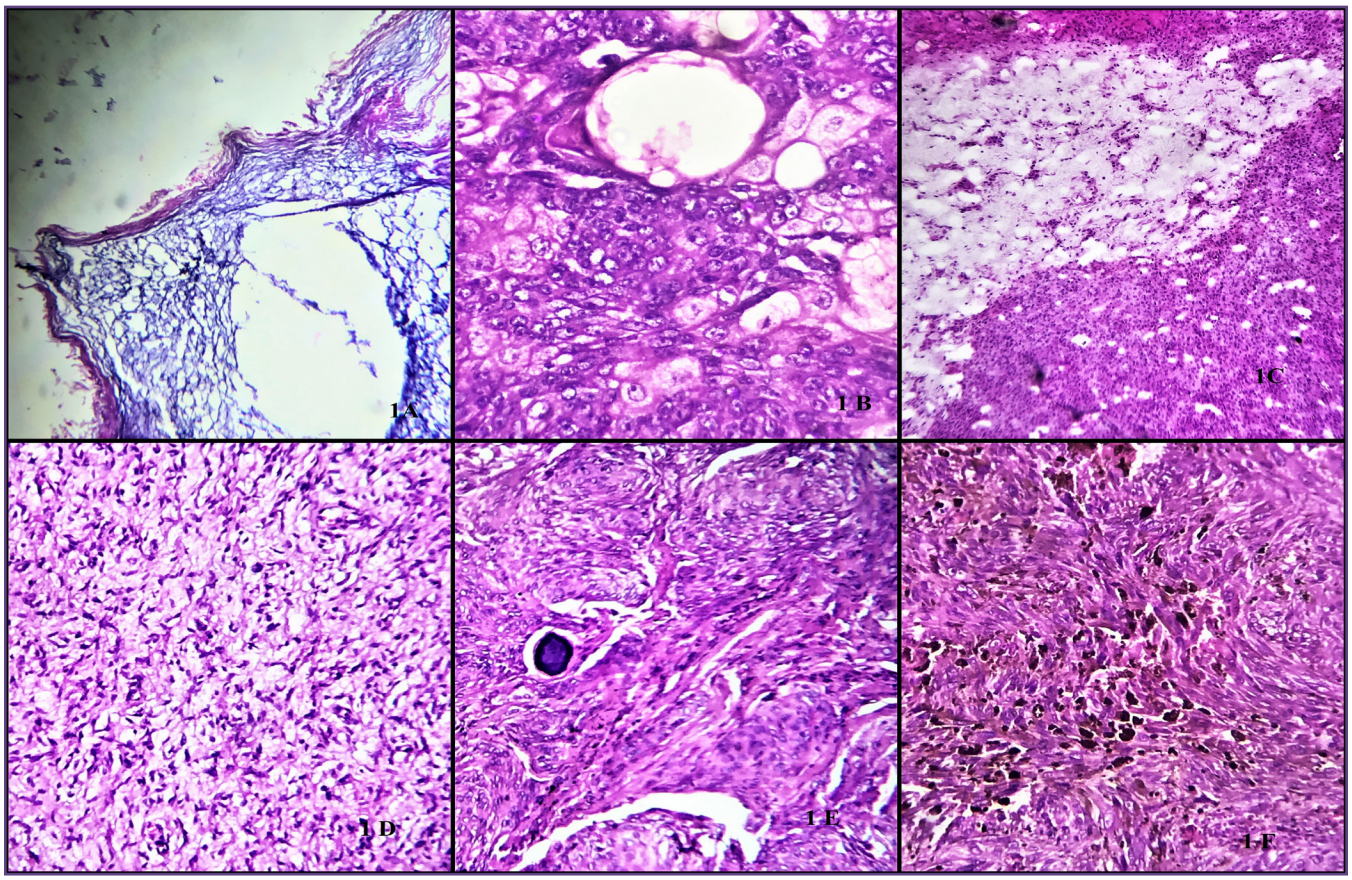

Fig. 2A: Section showing epidermal cyst (H & E 10X); 2 B- Sebaceous Carcinoma Showing malignant cells with Sebaceous differentiation (H & E 40X); 2 C- Pleomorphic Adenoma (H & E 10X); 2 D- Neurofibroma (H & E 40X); 2 E- Meningioma with Psammoma body (H& E 10X); 2 F – Malignant Melanoma with abundant intracytoplasmic melanin (H & E 40 X)

Fig. 3: Gray white granular mass of retinoblastoma occupying most of the globe. [H & E x10].

the eyelids include sebaceous glands (glands of Zeiss and Meibomian glands), apocrine glands (Glands of Moll) and eccrine glands. [3] In the present study we had three dermoid cysts in the age range of 1.1 to 18 years and M:F ratio 1:2. In the study done by Deshpande R B et al, there were 6 dermoid cysts and 2 epidermoid cysts. [2]. [Figure 2 A].

ii. There were three Sudoriferous cysts, also referred to as cyst of Moll glands or simple ductal cyst. Microscopy showed cyst wall lined by atrophic cuboidal cells with an empty lumen.

iii. Sixteen basal cell carcinoma cases were seen in the age of 45- 95 years with the male to female ratio of 0:6. This is the most frequent neoplasm in the palpebral tissue. [4, 5]

iv. Three cases of sebaceous carcinomas were noted in the age group of 36-50 years with male to female ratio of 0:3[Figure 2 B]. These tumours can arise from the cutaneous sebaceous glands, the glands of Zeiss or the Meibomian glands. They are more common in Asian countries. [6]

v. An eight-year-old boy had epidermal nevus on the lid margin. Melanocytic nevi may be observed in either cutaneous or the conjunctival surface. The lid margin is the common site.

vi. One case of chondroid syringoma of eyelid skin, which is a counterpart of pleomorphic adenoma of salivary glands were seen in a 40-year-old male.

B] Lacrimal glands: There were six chronic sialadenitis cases with the age range of 24-36 years and male to female ratio of 2:0. One case of pleomorphic adenoma in an 18-year-old female [figure 2 C] and one mucoepidermoid carcinoma in 21-year-old male were encountered in the present study.

In the study done by Deshpande R B et al, there was one mixed tumour of lacrimal gland. [2]

Benign mixed tumours [pleomorphic adenoma] accounted for 50-60%, Carcinoma ex-pleomorphic adenoma accounted for 5-10%, adenoid cystic carcinoma accounted for 20-30% and other carcinomas 5-10%. [7, 8]

C] Orbital Lesions: Inflammation of the orbit can occur secondary to lesions arising in the face, nose, sinuses, orbital bones, blood vessels, brain and meninges. [9]

Inflammatory pseudotumor are more frequent than the specific infections. These present an etiologically and pathologically heterogenous group. [10, 11] Orbital pseudotumor are usually seen in 3rd to 5th decade and in good health. There were four cases of inflammatory pseudotumor in age of 45 years and 54 years, both in males. In the study done by Deshpande R B et al, there were 6 cases of inflammatory pseudotumor. [2]

Angiomas are relatively common orbital tumours. Hemangiomas are more common than lymphangiomas. [12, 13] We encountered twenty cases of hemangiomas, cavernous -12 and capillary -8. Age range was 11-

58 years. With male to female ratio-1:1. In the study done by Deshpande R B et al, there were 9 cases of hemangiomas. Average age was 20 years. Capillary hemangiomas -2 cases and cavernous hemangiomas -7 cases. [2]

Schwannomas and neurofibromas represent small percentage of orbital tumours. Almost all schwannomas are well encapsulated. [14] Orbital neurofibromas are usually but not always an expression of Recklinghausen's disease. [15] In the present study there were 6 schwannomas and 9 neurofibromas and 1 neurofibromatosis. Age range was 1- 50 years, M:F ratio-1:5. [Figure 2 D]

Meningiomas of the orbit arising from the meninges of the optic nerve are thought to be more aggressive than the meningiomas of the sphenoidal ridges. [16] We had two orbital meningioma with male to female ratio of 1:1, in the age of 32 and 40 years. Both were meningothelial meningiomas [Figure 2 E]In the study done by Deshpande RB et al , there were 7 meningiomas. Here 4 were psammomatous, 2 syncytial and 1 fibroblastic meningioma. [2]

Lymphoid tumours and tumour like lesions: Lymphoid lesions of the orbit and ocular sites may present difficulties in the histopathologic diagnosis. Some develop in the course a previously recognized malignant lymphoma or leukemia. [16] Usually there will be systemic involvement. [18,19]

In our study there were 4 Non-Hodgkin's lymphomas. Age range- 6 to 75 years and male to female ratio-2:1. In the study done by Deshpande R B et al, there were 8 cases of non-Hodgkin's lymphomas. [2]

Metastatic tumours: In case of adults an orbital metastasis may, on rare occasions be the initial manifestation of the carcinoma of the breast, bronchus, kidney or prostate. [20, 21]

We had five cases of adenocarcinoma deposits both in female patients in age range of 40- 60 years. There was review of past history showed that both the cases were adenocarcinoma of stomach. One case operated 2 years back and other one 3.4 years back.

Other lesions were three fibro lipomas, one angiolipoma, six fungal infections, one hamartoma case. There was a case in which morphology was difficult to differentiate between non-Hodgkin's lymphoma and Rhabdomyosarcoma. Hence differential diagnosis was given. Immunohistochemistry proved this case as rhabdomyosarcoma showing positivity for Desmin and Myosin but negative for LCA, CD10, CD3 and CD20.

In 7 cases diagnosis was not possible either because of inadequate biopsy sample or crush artifacts.

C] Conjunctival lesions: Developmental anomalies: Epidermal cyst – in some of these lesions, skin appendages are few and adipose tissue is abundant. These are known as dermolipoma, which are usually situated in the upper outer quadrant.

We had one dermolipoma in a 12-year-old female.

Inflammation: Inflammatory lesions of the conjunctiva seldom give rise to the type of diagnostic or therapeutic problem that requires excision and histopathology study.

In the present study there were two cases which showed non-specific inflammation. Ages were 24 and 39 years with male to female ratio of 1:1.

Ocular squamous surface neoplasia: These are spectrum of lesions from mild, moderate and severe [carcinoma in situ] dysplasia. [22]

Carcinoma in situ of the bulbar conjunctiva varies in its appearance. It may present as leukoplakia, papilloma or complication of pterygium or pinguecula. Histologically lesion may resemble Bowen's disease of Paget's disease of skin. [23]

Invasive squamous cell carcinoma of conjunctiva is rare but is still more common than the basal cell carcinoma at this site. [24]

Other lesions were solitary cases of lipogranuloma and a hyperplastic lesion.

D] Ocular lesions: Ocular melanomas are the most common primary neoplasms in adults. It has been suggested that most of these arise on the basis of preexisting benign nevi. [25, 26, 27]

Microscopically melanomas have been traditionally divided into three types: Spindle A, Spindle B and epithelioid, which may occur singly or in combination. [28]

The microscopic differential diagnosis of primary uveal melanoma includes benign pigmented nevi. [29, 30]

In this study there were two iris nevus and one malignant melanoma. [Figure 2 F]

In the study done by Deshpande R B et al, there was a single case of malignant melanoma of uveal tract in a 60-year-old female. [2]

Retinoblastoma: is the most common intra ocular neoplasm of the children, usually diagnosed between 16 months to 2 years. It is generally believed to be congenital and derived from primitive neuroectodermal cells exhibiting retinal differentiation. [31]

Microscopically retinoblastomas are composed of dense masses of small round cells with hyperchromatic nuclei and scant cytoplasm. [32] Trabecular and nesting patterns are common [33]

A sign of differentiation towards retinal structures is provided by the presence of so called "Flexner-Wintersteiner rosettes and Fleurettes".

In the present study we had 22 cases, all were unilateral. Age range was 3 months to 10 years. Male to female ratio was 2:1. [Figure 8, 9]

In the study done by Deshpande RB et al, there were 12 cases in the age group of 2 -5 years. In two cases the tumour was bilateral. [2] Solitary cases of endophthalmitis and coat's disease were also noted.

Present study has shown the following features:

i. Among the eyelid lesions, even though studies have shown that basal cell carcinoma is most common malignant lesion [4,5] and Asian studies [6] have shown sebaceous carcinoma is more common. In this study incidence was similar for both the lesions.

ii. Sebaceous carcinoma occurring in young 36 years female, suggests that the benign conditions like chalazion seen in young age will be the differential diagnosis.

iii. A rare skin tumour chondroid syringoma will be an example that any skin lesion can occur in eyelid skin also.

iv. Lacrimal gland tumors could show features of any tumour of salivary gland. In our study a rare case mucoepidermoid carcinoma was seen.

v. In the orbital lesions decreasing frequency of lesions were a] vascular [12, 13] b] neural, c] lymphoid as seen in other studies. We had encountered two metastatic adenocarcinoma deposits of orbit in this study which is quite unusual. Both were from female patients with known operated cases of adenocarcinoma of stomach and also there were no other secondary focus in these cases. [CT scan, MRI scan and PET scan-Negative for any other focus of metastasis].

vi. In small round cell tumours like Non -Hodgkin's lymphoma and Rhabdomyosarcoma, immunohistochemistry plays important role, as it has been seen in one our case discussed.

vii. Even though common age for retinoblastoma is 16 months to 2 years, we had a case as early as 5 months. One case which was diagnosed clinically as retinoblastoma turned out to be coat's disease histopathologically. So, histopathology is mandatory in all cases for the final diagnosis.

viii. Other tumours and tumour like condition are very similar to the incidences that are seen in other studies.

Conclusion

Eye is a complex anatomical structure containing diverse histological tissues. Different etiological factors cause the lesions ranging from non- specific inflammation to the highly aggressive tumours. These can cause proptosis/displacement, visible/palpable mass, bleeding, visual disturbances, loss of vision. Early histopathological diagnosis will help to prevent the morbidity. Present study aims at studying benign and malignant conditions pertaining to eyeball and orbit, especially in Indian population. We have tried to assess the incidence and prevalence of all conditions related to eye. However, availability of ancillary diagnostic tests like immunohistochemistry will help in early diagnosis to reduce the morbidity in terms of vision loss, loss of eyeball, cosmetic factors with destructive surgeries. The value of an accurate and concise history cannot be underestimated in in timely diagnosis. Finally, good collaboration will be rewarding to both clinicians and laboratory specialists.

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Competing Interests

Nil

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