

Demographic features and histopathological diagnosis in primary eyelid tumors: results over 19 years from a tertiary center in Ankara, Turkey

Mehtap Arslantürk Eren, Ahmet Kaan Gündüz

Department of Ophthalmology, Ankara University Faculty of Medicine, Ankara 06620, Turkey

Correspondence to: Ahmet Kaan Gündüz. Fariya Business Center 8/50, Ufuk Universitesi Cad, Çukurambar, Ankara 06510, Turkey. drkaangunduz@gmail.com

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Abstract

• **AIM:** To evaluate the demographic features, location, and histopathologic results in primary eyelid tumors.

• **METHODS:** We retrospectively reviewed the records of patients with primary eyelid tumor diagnosed and treated between November 1997 and June 2016 on our service.

• **RESULTS:** Nine hundred and eleven lesions from 874 patients were included in this study. Four hundred and forty-six (51.0%) of the patients were females and 428 (49.0%) were males. The mean age was 51.0y (range: 3mo-94y). The lesions were located in the upper eyelid (418 cases, 45.9%), lower eyelid (378 cases, 41.5%), medial canthus (89 cases, 9.8%), and lateral canthus (26 cases, 2.8%). Four hundred and seventy (51.6%) lesions were located on the right side and 441 (48.4%) on the left. Of the eyelid lesions, 666 (73.1%) were benign, 230 (25.2%) malignant, and 15 (1.6%) premalignant. When the eyelid tumors were classified according to their tissue or cell of origin, 527 (57.8%) of the lesions were found to be epidermal, 171 (18.8%) adnexal, 131 (14.4%) inflammatory and infectious, and 65 (7.1%) stromal. The most common benign lesions were squamous cell papilloma (139 lesions, 15.2%), intradermal nevus (97 lesions, 10.6%), epidermoid inclusion cysts (78 lesions, 8.6%), seborrheic keratosis (60 lesions, 6.6%), and inflammatory masses (59 lesions, 6.5%). Basal cell carcinoma was the most common malignant tumor (191 lesions, 21.0%) followed by squamous cell carcinoma (16 lesions, 1.8%), sebaceous carcinoma (14 lesions, 1.5%), and malignant melanoma (5 lesions, 0.5%).

• **CONCLUSION:** In this study, 73.1% of eyelid lesions are benign and the remaining 26.9% are premalignant and malignant. Basal cell carcinoma is the most common tumor

among all histopathological diagnosis followed by squamous papilloma.

• **KEYWORDS:** eyelid tumors; histopathology; basal cell carcinoma; squamous papilloma

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INTRODUCTION

Eyelid tumors are the most frequent neoplasms in clinical ophthalmic practice. Ninety percent of skin cancers originate from head and neck region, and 10% of these cancers are located in eyelids^[1]. The eyelids contain different type of tissues including skin, subcutaneous tissue, muscle, fibrous tissue, sweat glands, sebaceous glands, and eyelash follicles. This structural variety increases the diversity of benign and malignant tumors arising from the eyelids. Tumors of the eyelids may be classified based on their clinical behaviour as benign or malignant and according to their tissue or cell of origin.

The frequency of eyelid tumors depends on geographical and genetic factors and the nature of the reporting institution. Sunlight and ultraviolet radiation exposure and skin pigmentation may be important factors. Therefore, different results may be expected from different geographical locations. A review of 1541 eyelid tumors from a private center in our country revealed that 1425 tumors (92.5%) were benign, 94 (6%) were premalignant, and 22 (1.5%) were malignant. Of the only 22 malignant tumors in this series, basal cell carcinoma was the most frequent (21 cases) followed by squamous cell carcinoma (1 case)^[2]. The low frequency of malignant eyelid tumors in this series attests to the general ophthalmology practice pattern of the reporting center.

In this study, we reviewed the demographic features, location, and histopathological results in primary eyelid tumors in a tertiary referral center in Ankara, Turkey.

SUBJECTS AND METHODS

Ethical Approval This study was performed in compliance with the ethical principles of the Declaration of Helsinki. Informed consent was waived due to the retrospective nature of the study.

We retrospectively reviewed the medical records and histopathology results of 911 eyelid lesions from 874 patients who underwent surgery at the Department of Ophthalmology, Ankara University Medical School between November 1997 and June 2016 by one surgeon (Gündüz AK). We analyzed the patients with respect to age, sex, laterality of eyelid lesion, histopathological diagnosis and location of the tumors in 4 periocular quadrants including medial canthus, lateral canthus, upper eyelid, and lower eyelid. Cases involving more than 1 quadrant was classified under the quadrant where the bulk of the tumor and its epicenter was located. The surgery for eyelid tumors was carried out for various reasons including cosmetic reasons, suspicion for malignancy, or excision of a malignant tumor. An excisional or incisional biopsy was performed by the senior author (Gündüz AK) and his associates according to the feature of the lesion. For benign looking lesions incisional/excisional biopsy was achieved under local anesthesia. For malignant lesions, the surgical excision was performed leaving 3–4 mm of intact tissue as safety margin around the tumor border and frozen section examination was performed under intravenous sedation and local anesthesia or general anesthesia. In cases where the surgical margins were involved with tumor cells on frozen section, further excision was undertaken and the procedure repeated until clear margins were obtained. Subsequently, primary closure or eyelid reconstruction with a flap/graft was performed. In all cases, the entire excised specimen was sent to the pathology laboratory for permanent section diagnosis.

The histopathological results of the eyelid lesions were categorized according to the second edition of the World Health Organization (WHO) International Histological Classification of Tumors^[3]. The eyelid tumors were classified as epidermal, adnexal, stromal, inflammatory and infectious, secondary and metastatic according to this classification system. All statistical analyses were performed with SPSS software package (V.22.0, <http://www.01.ibm.com/software/analytics/spss/products/statistics/>). For statistical comparison, Chi-square test was performed.

RESULTS

Nine hundred and eleven eyelid lesions from 874 patients were included in this study. Four hundred and forty-six (51.0%) of the patients were females and 428 (49%) were males. The mean age was 51.0y (range 3mo–94y).

Distribution of Eyelid Tumors According to Histopathological Diagnosis With respect to the tissue or cell of origin, 527 (57.8%) of eyelid lesions were epidermal, 171 (18.8%) were adnexal,

131 (14.4%) were inflammatory and infectious, and 65 (7.1%) were stromal. In 17 lesions (1.9%), histopathological results could not be included in any of these groups and these lesions were classified as miscellaneous (Table 1). Of the eyelid lesions, 666 (73.1%) were benign, 230 (25.2%) were malignant, and 15 (1.6%) were premalignant.

Among epidermal tumors, basal cell carcinoma, squamous papilloma, and intradermal nevus were the most commonly seen tumors. Epidermal inclusion cysts, eccrine hidrocystoma, and benign cystic tumors were the most common among adnexal tumors. For stromal tumors xanthelasma, capillary hemangioma, and dermoid cysts were the most frequent. Finally, in inflammatory masses category, chalazion, pyogenic granuloma, other inflammatory lesions accounted for the top 3 lesions (Table 1).

The 5 most frequently observed benign eyelid tumors were squamous papilloma (139 lesions, 15.2%), dermal nevus (97 lesions, 10.6%), epidermal inclusion cysts (78 lesions, 8.6%), seborrheic keratosis (60 lesions, 6.6%), and inflammatory masses (59 lesions, 6.5%; Figure 1). The most common malignant tumors included basal cell carcinoma (191 lesions, 21.0%) followed by squamous cell carcinoma (16 lesions, 1.8%), sebaceous gland carcinoma (14 lesions, 1.5%), and malignant melanoma (5 lesions, 0.5%; Figure 2).

Distribution of Eyelid Tumors Based on Age and Sex The distribution of eyelid tumors based on age and sex is shown in Table 2. The mean age was 46.5±19.9y in patients with benign eyelid tumors, 69.2±10y in patients with premalignant lesions, and 62.3±13.2y in patients with malignant lesions. The mean age was significantly higher in premalignant and malignant tumors compared to benign tumors ($P=0.001$).

Patients were divided into 5 groups according to the age: <20y, 20–40y, 40–60y, 60–80y and >80y (Table 2). Of 86 lesions which were seen <20y, only 2 (2.3%) were malignant and 84 lesions (97.7%) were benign. The most common lesions in this age group were dermal nevus (13 lesions, 15.1%), inflammatory masses (11 lesions, 12.8%), pyogenic granuloma (9 lesions, 10.5%), squamous papilloma (8 lesions, 9.3%), and chalazion (8 lesions, 9.3%). The only malignant tumor in this age group was basal cell carcinoma (2 lesions) which accounted for 2.3% of all lesions in this age group.

There were 140 lesions in the 20–40 age group of which 129 lesions (92.1%) were benign and 11 lesions (7.9%) malignant. The most common 5 tumors in this age group included squamous papilloma (25 lesions, 17.9%), dermal nevus (25 lesions, 17.9%), epidermal inclusion cysts (19 lesions, 13.6%), chalazion (13 lesions, 9.3%), and inflammatory lesions (12 lesions, 8.6%). Among the malignant lesions, basal cell carcinoma accounted for 10 lesions (7.1%) and sebaceous carcinoma in 1 lesion (0.7%).

Table 1 Distribution of eyelid tumors according to cell or tissue of origin

Parameters	n	%
Epidermal tumors	527	57.8
Non-melanocytic tumors	424	46.5
Squamous cell papilloma	139	15.2
Seborrheic keratosis	60	6.6
Reactive hyperplasia	5	0.54
Milia	1	0.1
Actinic keratosis	12	1.3
Basal cell carcinoma	191	21.0
Squamous cell carcinoma	16	1.8
Melanocytic tumors	103	11.3
Intradermal nevus	97	10.6
Solar lentigo	1	0.1
Malignant melanoma	5	0.54
Adnexal tumors	171	18.8
Sebaceous gland tumor	19	2.1
Sebaceous gland hyperplasia	4	0.4
Sebaceous gland adenoma	1	0.1
Sebaceous gland carcinoma	14	1.5
Sweat gland tumors	5	0.5
Syringoma	1	0.1
Syringoadenoma	1	0.1
Pleomorphic adenoma	2	0.2
Other benign tumors	1	0.1
Hair follicle tumors	7	0.7
Pilomatrixoma	7	0.7
Cystic tumors	140	15.4
Epidermal inclusion cyst	78	8.6
Eccrine hidrocystoma	39	4.3
Sebaceous cyst	4	0.4
Other benign cystic lesion	19	2.1
Stromal tumors	65	7.1
Fibrous tissue tumors	1	0.1
Fibroma	1	0.1
Fibrohistiocytic tumors	33	3.6
Xanthelasma	31	3.4
Fibrous histiocytoma	2	0.2
Lipomatous tumors	1	0.1
Lipoma	1	0.1
Vascular tumors	21	2.3
Capillary hemangioma	15	1.6
Lymphangioma	4	0.4
Arteriovenous malformation	2	0.2
Neural tumors	4	0.4
Neurofibroma	1	0.1
Schwannoma	3	0.3
Choristomatous tumors	5	0.5
Dermoid cyst	5	0.5
Inflammatory and infectious tumors	131	14.4
Inflammatory masses	114	12.5
Chalazion	44	4.8
Pyogenic granuloma	11	1.2
Other inflammatory lesions	59	6.5
Infectious lesions	17	1.9
Molluscum contagiosum	6	0.6
Demodex infestation	1	0.1
Verruca vulgaris	10	1.1
Miscellaneous	17	1.9

Of 356 lesions which were seen in the 40-60 years age group, 269 cases (75.5%) were benign, 81 (22.8%) malignant, and 6 (1.7%) premalignant. The most common 5 tumors in this age group included basal cell carcinoma (66 lesions, 18.5%), squamous papilloma (58 lesions, 16.3%), dermal nevus (40 lesions, 11.2%), epidermal inclusion cysts (32 lesions, 9.0%), and inflammatory masses (26 lesions, 7.3%). Sebaceous carcinoma was the second most common malignant tumor accounting for 8 lesions (2.2%) and 57% of all sebaceous gland carcinomas were observed in this age group.

There were 288 lesions in 60-80 years age group of which 162 (56.2%) were benign, 120 (41.7%) were malignant, and 6 (2.1%) were premalignant. Basal cell carcinoma (101 lesions, 35.1%), squamous papilloma (47 lesions, 16.3%), seborrheic keratosis (28 lesions, 9.7%), dermal nevus (19 lesions, 6.6%), and epidermal inclusion cyst (19 lesions, 6.6%) were the most common lesions in this age group. Squamous cell carcinoma was the second most common malignant tumor in this age group accounting for 13 lesions (4.5%). Nearly 53% of all basal cell carcinomas and 81% of all squamous cell carcinomas were seen in this age group.

Of 24 eyelid lesions diagnosed in patients >80y, 14 (58.3%) were malignant and 10 (41.7%) benign. The most common lesions in this age group were basal cell carcinoma (12 lesions, 50.0%) and inflammatory masses (5 lesions, 20.8%).

Histopathological distribution of 459 eyelid tumors in females showed that 348 (75.8%) of the lesions were benign, 103 (22.4%) malignant, and 8 (1.7%) premalignant. In females, the 5 most common eyelid tumors were basal cell carcinoma (87 lesions, 18.9%), dermal nevus (70 lesions, 15.2%), squamous papilloma (65 lesions, 14.1%), epidermal inclusion cysts (33 lesions, 7.1%), and seborrheic keratosis (32 lesions, 6.9%).

Histopathological distribution of 435 eyelid tumors in males showed that 308 (70.8%) of the lesions were benign, 123 (28.2%) malignant, and 4 (1%) premalignant. The 5 most common five tumors in males were basal cell carcinoma (104 lesions, 23.9 %), squamous papilloma (74 lesions, 17.0%), epidermal inclusion cysts (45 lesions, 10.3%), inflammatory masses (28 lesions, 6.4%), and dermal nevus (27 lesions, 6.2%). Although malignant tumors accounted for a higher proportion of all eyelid tumors in males compared to females, there was no statistically significant difference between the 2 groups ($P>0.05$).

Distribution of eyelid tumors according to location The most common site of involvement was the upper eyelid (418 lesions, 45.9%) followed by the lower eyelid (378 lesions, 41.5%), medial canthus (89 lesions, 9.8%), and lateral canthus (26 lesions, 2.8%). Four hundred and seventy (51.6%) of the lesions were located on the right side whereas 441 (48.4%) were on the left side. Upper eyelid was the most common

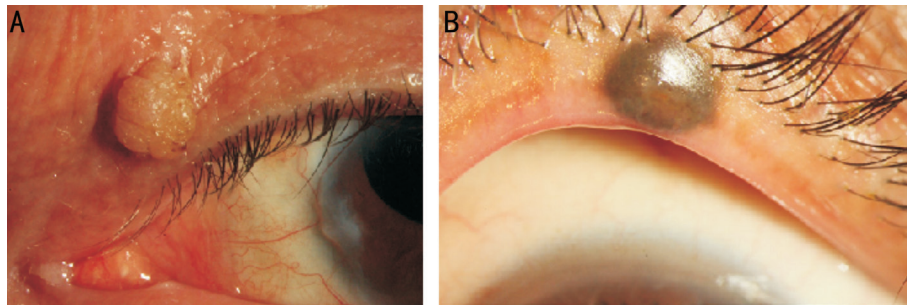


Figure 1 Common types of benign eyelid tumors A: Squamous papilloma; B: Dermal nevus.

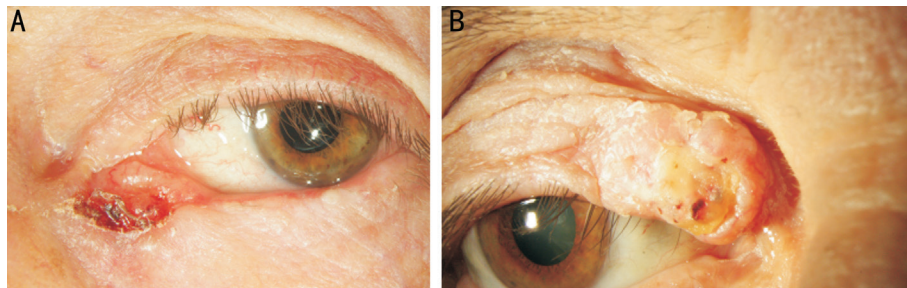


Figure 2 Common types of malignant eyelid tumors A: Basal cell carcinoma near the medial canthus; B: Squamous cell carcinoma of the upper eyelid presenting with an ulcerated surface.

site for benign tumors and lower eyelid for malignant tumors ($P=0.001$; Table 3).

The most common tumors seen in the upper eyelid included squamous papilloma (92 lesions, 66.2% of all squamous papillomas), nevus (51 lesions, 52.6% of all nevi), epidermal inclusion cyst (46 lesions, 59.0% of all epidermal inclusion cysts), seborrheic keratosis (31 lesions, 51.7% of all seborrheic keratosis), and xanthelasma (30 lesions, 96.8% of all xanthelasmas). The most common tumors seen in the lower eyelid included basal cell carcinoma (118 lesions, 61.8% of all basal cell carcinomas), squamous papilloma (45 lesions, 32.4% of all squamous papillomas), nevus (35 lesions, 36.1% of all dermal nevi), inflammatory masses (33 lesions, 55.9% of all inflammatory masses), and seborrheic keratosis (28 lesions, 46.7% of all seborrheic keratosis).

The most common tumors seen in medial canthus area were basal cell carcinoma (34 lesions, 17.8% of all basal cell carcinomas), epidermal inclusion cyst (11 lesions, 14.1% of all epidermal inclusion cysts), nevus (10 lesions, 10.3% of all dermal nevi), inflammatory masses (7 lesions, 11.9% of all inflammatory masses), and eccrine hidrocystoma (6 lesions, 15.3% of all eccrine hidrocystomas).

The most common tumors seen in the lateral canthus area included basal cell carcinoma (9 lesions, 4.7% of all basal cell carcinomas), benign cystic lesion (4 lesions, 21.1% of all other benign cystic lesions), epidermal inclusion cyst (3 lesions, 3.9% of all epidermal inclusion cysts), eccrine hidrocystoma (3 lesions, 7.7% of all eccrine hidrocystomas), and capillary hemangioma (2 lesions, 13.3% of all capillary hemangiomas).

Malignant Eyelid Tumors Basal cell carcinoma was the most

commonly diagnosed tumor and accounted for 21% of all lesions and 83% of all malignant lesions. The most common location of basal cell carcinoma was lower eyelid ($P=0.001$) with a predominance in male gender; however, there was no statistically significant difference in terms of gender ($P>0.05$). The second most common malignant tumor was squamous cell carcinoma accounting for 1.8% of all lesions and 6.9% of malignant lesions. Squamous cell carcinoma was more common in upper eyelid ($P=0.04$) and there was no significant difference between females and males. Sebaceous carcinoma was the third most common malignant tumor and accounted for 1.5% of all lesions and 6% of malignant lesions. Sebaceous carcinoma was more common in upper eyelid ($P=0.03$) and there was no significant difference in terms of gender. Other malignant eyelid lesions, included malignant melanoma (5 lesions, 0.5%), apocrine tumor (2 lesions, 0.2%), and trichilemmal carcinoma (2 lesions, 0.2%).

DISCUSSION

Eyelid tumors are the most commonly reported neoplasms in clinical ophthalmology practice and they are estimated to represent more than 90% of all ophthalmic tumors^[4]. They usually occur in patients over 60 years old and tend to be more common in the lower eyelid^[5]. Our study showed that 73.3% (668 out of 911) of the eyelid lesions were seen in patients aged >40 years old. The majority of eyelid tumors were benign, similar to previous studies showing that benign tumors constitute 73-86% of all eyelid tumors^[6-10]. Only one study reported that 54.2% of all eyelid tumors were malignant^[7]. In our series, 73.1% of the eyelid lesions were benign, 25.2% were malignant, and 1.6% were premalignant.

Table 2 Distribution of eyelid tumors by age and gender

Histopathological diagnosis	<20y			20-40y			40-60y			60-80y			>80y		
	Total No.	F	M	Total No.	F	M	Total No.	F	M	Total No.	F	M	Total No.	F	M
Squamous cell papilloma	8	4	4	25	7	18	58	37	21	47	17	30	1	-	1
Seborrheic keratosis	2	-	2	5	3	2	25	14	11	28	15	13	-	-	-
Reactive hyperplasia	1	-	1	-	-	-	1	-	1	3	1	2	-	-	-
Milia	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
Actinic keratosis	-	-	-	-	-	-	6	5	1	6	3	3	-	-	-
Basal cell carcinoma	2	1	1	10	10	-	66	28	38	101	40	61	12	8	4
Squamous cell carcinoma	-	-	-	-	-	-	2	-	2	13	5	8	1	-	1
Intradermal nevus	13	6	7	25	22	3	40	32	8	19	10	9	-	-	-
Solar lentigo	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
Malignant melanoma	-	-	-	-	-	-	3	1	2	2	2	-	-	-	-
Sebaceous gland hyperplasia	-	-	-	-	-	-	4	2	2	-	-	-	-	-	-
Sebaceous gland adenoma	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Sebaceous gland carcinoma	-	-	-	1	1	-	8	4	4	4	3	1	1	-	1
Syringoma	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Syringoadenoma	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Pleomorphic adenoma	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-
Other benign tumors	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Pilomatrixoma	6	2	4	-	-	-	-	-	-	1	1	-	-	-	-
Epidermal inclusion cyst	7	4	3	19	10	9	32	11	21	19	8	11	1	-	1
Eccrine hidrocystoma	-	-	-	10	5	5	19	8	11	10	5	5	-	-	-
Sebaceous cyst	-	-	-	-	-	-	3	1	2	1	1	-	-	-	-
Other benign cystic lesion	-	-	-	4	4	-	12	10	2	3	-	3	-	-	-
Fibroma	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
Xanthelasma	-	-	-	8	8	-	19	14	5	4	3	1	-	-	-
Fibrous histiocytoma	-	-	-	-	-	-	1	-	1	-	-	-	1	1	-
Lipoma	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-
Capillary hemangioma	1	-	1	1	-	1	7	2	5	6	1	5	-	-	-
Lymphangioma	1	-	1	3	2	1	-	-	-	-	-	-	-	-	-
Arteriovenous malformation	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Neurofibroma	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
Schwannoma	-	-	-	-	-	-	3	2	1	-	-	-	-	-	-
Dermoid cyst	5	1	4	-	-	-	-	-	-	-	-	-	-	-	-
Chalazion	8	7	1	13	6	7	13	6	7	10	5	5	-	-	-
Pyogenic granuloma	9	1	8	-	-	-	-	-	-	1	1	-	1	1	-
Other inflammatory lesions	11	6	5	12	7	5	26	14	12	5	2	3	5	2	3
Molluscum contagiosum	5	2	3	1	1	-	-	-	-	-	-	-	-	-	-
Demodex infestation	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-
Verruca vulgaris	5	2	3	2	1	1	1	-	1	2	2	-	-	-	-
Total	86	36	50	140	88	52	356	195	161	288	128	160	24	12	12

F: Female; M: Male.

Our study shows that malignant eyelid lesions occur preferentially in patients >60 years of age. The frequency of malignant tumors increases to >50% in patients aged >80y. Therefore, any suspicious eyelid lesion seen especially in patients >60 years of age should be evaluated with caution. Although benign eyelid tumors can clinically be identified in most cases, previous studies reported that lesions thought to be clinically benign were found to be malignant in 1.9%-4.9% of cases at

histopathological examination^[11-12]. Therefore, an incisional or excisional biopsy should be considered in cases with suspicious eyelid tumors. The most common location for eyelid tumors was the upper eyelid and the 5 most common tumors seen in this location were all benign lesions. Lower eyelid was the second common location and basal cell carcinoma was the most frequent tumor seen in this location. The next 4 most common lower eyelid lesions were all benign lesions

Primary eyelid tumors

Table 3 Clinical localization of eyelid tumors n (%)

Location	Benign tumors	Premalignant tumors	Malignant tumors
Upper eyelid	360 (86.1)	5 (1.2)	53 (12.7)
Lower eyelid	237 (62.7)	8 (2.1)	133 (35.2)
Medial canthus	52 (58.4)	2 (2.2)	35 (39.3)
Lateral canthus	17 (65.4)	0	9 (34.6)
Total	666 (73.1)	15 (1.6)	230 (25.2)

similar to the upper eyelid. The top tumors in the medial and lateral canthus areas were also basal cell carcinoma followed by benign lesions similar to the situation in the lower eyelid. This distribution pattern attests to the fact that upper eyelid is relatively spared from the damaging effects of UV radiation, a well-known factor in the development of basal cell carcinoma. Despite malignant lesions were seen more commonly in males, there was no statistically significant difference in the occurrence of benign and malignant eyelid tumors between males and females in our study. Therefore, both sexes appear to be equally prone to the development of eyelid malignancies. In our study, squamous papilloma was the most common benign eyelid tumor accounting for 20.8% of benign eyelid tumors followed by nevus (14.5%), and epidermal inclusion cyst (11.7%). In a study by Deprez and Uffer^[6] from Switzerland, the 3 most common benign eyelid lesions were squamous papilloma (26%), seborrheic keratosis (21%), and melanocytic nevus (20%). On the other hand, Bagheri *et al*^[13] reporting from Iran pointed out that nevus (35%), papilloma (19.5%), and cysts (11%) were the 3 top benign eyelid lesions. Xu *et al*^[9] found that inflammatory lesions are the most common benign tumors followed by seborrheic keratosis, dermal nevus, and squamous papilloma in their series from China. Hung *et al*^[14] reported that the most common benign tumors were intradermal nevus (21.1%), seborrheic keratosis (12.6%), and xanthelasma (11.2%) in Taiwan, China. In many chalazion cases, the specimen is not sent to the pathology laboratory. Therefore, the real incidence of chalazion may be higher than expected.

Basal cell carcinoma is the most common skin cancer of the eyelid. Previous studies have shown that it accounts for 84%-86% of malignant tumors^[4,6,15]. In our study, the frequency of basal cell carcinoma was 83% among malignant eyelid tumors, in line with the previously reported literature data. Some studies found a male preponderance while others revealed a female preponderance^[16-20]. Of basal cell carcinoma cases, 53% were seen in the 60-80 age group and 34.5% were seen in the 40-60 years age group. In both age groups, males were affected approximately 1.5 times more than females although not statistically significant. We found that most periocular basal cell carcinomas arise on the lower eyelid. In our study, squamous cell carcinoma was the second common malignant tumor with a frequency of 6.9% and there was no

significant difference in terms of gender. Of squamous cell carcinomas, 81% were seen between 60-80 years of age and males were affected 1.6 times more often than females in this age group. Wawrzynski *et al*^[21] reported that the relative risk developing eyelid squamous cell carcinoma was 1.9 times higher in males compared to females. Contrary to what was reported before, squamous cell carcinoma was more commonly located on upper eyelid in our series^[22].

Sebaceous carcinoma was the third most frequent malignant tumor with a rate of 6% in our series. It is more common in females and occurs preferentially in the upper eyelid. In the USA, it accounts for 0.5%-5% of all malignant eyelid tumors. On the other hand, sebaceous carcinoma is more common in Asian countries and accounts for 28% of all malignant eyelid tumors in China^[23-24]. Sebaceous carcinoma is an aggressive tumor with a propensity for metastasis. Perineural infiltration, lymphatic invasion, and local lymph node metastasis may occur in sebaceous carcinoma with poor differentiation. The 5-year tumor-associated death rate was estimated to be as high as 30%; however early diagnosis and treatment improved this rate to less than 10%^[25-26]. In our study, sebaceous carcinoma was more common in the upper eyelid and affected females and males at a similar rate. The mean age at diagnosis for sebaceous carcinoma was 59y in our series and 57% of sebaceous carcinoma cases were seen in the 40-60 years age group. In a study by Shields *et al*^[27], the mean age at diagnosis of sebaceous carcinoma was 68y with a predominance of upper eyelid involvement. Eyelid tumour excision under intra-operative frozen section is important to minimize the residual tumor and subsequent recurrence. Previous studies have shown a recurrence rate of 32% in sebaceous carcinoma when excisional biopsy is done without intra-operative margin clearance^[28-29]. On the other hand, despite the inaccuracy of detecting intra-epithelial pagetoid spread on frozen sections, the recurrence rate was reported at 22% when frozen section margin control was applied^[30]. Also, frozen sections are not adequate in the evaluation of malignant melanoma tumors. Therefore, it is important to send the entire excised specimen was sent to the pathology laboratory for permanent section diagnosis in all cases.

This study aims to highlight the histopathologic types, frequency, and demographic characteristics of eyelid tumors in our geographical location. Determination of the distribution of eyelid tumors based on age and gender can help in the clinical assessment of these lesions. There are several shortcomings of our study. Because of the retrospective nature of our study, it was not possible to analyze the proportion of lesions that were initially thought to be benign and turned out to be premalignant or malignant lesions. Second, histopathological examinations were performed by a variety of different physicians over

this 19y period. Third, some patients with benign eyelid tumors may have chosen not to be operated. Therefore, the real incidence of benign eyelid tumors may be higher than represented in this study. This type of bias may be inherent in many series on similar topics. Despite these shortcomings, we believe our results represent a reasonable portfolio of eyelid tumors seen at our center. Malignant eyelid tumors were more common in males compared to females in this series, however, the difference was not statistically significant. In our study, 73.1% of eyelid lesions were benign. Basal cell carcinoma was the most common eyelid tumor among all histopathological diagnoses followed by squamous cell papilloma. The fact that our clinic is a tertiary reference center may have affected results of tumor distribution and malignant tumors may have been referred to us more.

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