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Histopathological Evaluation and Review of Cutaneous Adnexal Tumors (Cats) – A Research Study

B.V.Sai Prasad[1], Md Khader Faheem[2], B.Anuradha[3], A.Venkata Lakshmi[4], M.Sreenivasulu[5], D.Nagendra Prasad[6]

[1]*Associate Professor, Department of Pathology, S.V.Medical College, Tirupati, India*
[2,5,6] *Assistant Professor, Department of Pathology, S.V.Medical College, Tirupati, India*
[3.4]*Professor, Department of Pathology, S.V.Medical College, Tirupati, India*
Correspondance Author; B.V.Sai Prasad

Abstract
Introduction: *Tumors arising from primary adnexal structures skin are Cutaneous adnexal tumors (CATs). These are benign and malignant tumors derived from multipotential cell lines. Even though HPE can differentiate benign and malignant CATs, the classification is still a different task due to variable growth patterns and metaplastic transformations.*
Aim: *To study, classify and review various CATs and evade pitfalls in differentiating benign and malignant CATs.*
Material and Method: *A retrospective study of the diagnosed CATs was done for a period of three years. Histopathological examination (HPE) and classification of tumors was carried out.*
Results: *In the present study 32 cases of CATs were diagnosed. There were 16 (50%) of sweat gland tumors. Male predominance was observed, Male: Female ratio, 1.4:1. Maximum numbers of CATs seen in age group of 21-40 yrs, 15 (46.8%). Majority 30 (93.75%) cases were benign tumors, only 2 (6.25%) malignant tumors. Pilomatricoma was most common of CATs 6 (18.75%) cases. Head and neck region, common site 24 (75%).*
Conclusion: *There is low incidence of CATs in India. The majority of cases are benign tumors. HPE helps in diagnosis, classification, differentiation and management of CATs.*
Key words: *Cutaneous adnexal tumors, hair follicle, histopathological examination, sweat gland*

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I. Introduction

Cutaneous adnexal tumors (CATs) are a large group of benign and malignant neoplasms which exhibit morphological and histopathological differentiation towards one of the four primary adnexal structures present in the normal skin – hair follicles, sebaceous glands, apocrine glands and eccrine glands [1,2]. These tumors occur sporadically or may present as markers of rare genetic syndromes. Some of the common syndromes associated with CATs are Brit-Hogg Dube syndrome, Brooke-Spiegler syndrome, Cowden Syndrome, Muir – Torre syndrome etc., [3]

These tumors are derived from multipotential undifferentiated cells of epidermis or its appendageal structures of epidermis. The activation of molecular pathways which are responsible for the formation of mature adnexal structures plays a vital role in dedifferentiation and development of pertaining histological features of the tumors [4].

The clinical presentation of these tumors is non specific and there is high degree of overlapping of common features in different CATs. Thus, the diagnosis is principally anticipated by histopathological examination. However, the categorization of these tumors into benign and malignant lesions is very important – as, the malignant CATs happen to be more aggressive and follow a rampant course of spread and metastasis (local and distant). For benign tumors, clinical management stands the same and categorization is believed to be for academic purposes [5]. The tumors are in turn relatively uncommon and the prevalence is unknown. So, this study is undertaken to evaluate – CATs based on clinical histomorphological, microscopic features to evade prospective pitfalls in diagnosis of benign and malignant CATs.

II. Material And Method

A retrospective study was conducted over a period of three years from January 2014 to December 2017. Clinicopathological data regarding age, gender, site of tumor, clinical diagnosis etc., was obtained from the records. Histopathological examination was performed on formalin fixed tissue and paraffin embedded blocks was prepared. Hematoxylin and eosin stained sections were studied and after thorough examination,

diagnosis was established. Only CATs were included in the study and other epidermal skin tumors were excluded.

III. Results

A total of 116 cases of skin tumors were diagnosed in a three year period, out of which 32 (27.5%) of cases were diagnosed as CATs. In the series – 19 (39.38%) were males and 13 (40.62%) were females. There was considerable male predominance with Male:Female ratio of 1.4:1.

The cases were studied after classifying into four different age groups, i.e., 0-20 years; 21-40 years; 41-60 years; more than 60 years of age. Maximum number of cases were diagnosed in 21-40 years of age group – 15 (9 males + 6 females) with 46.87% of all CATs. Minimal number of cases were reported in more than 60 years of age group – 2 (1 male + 1 female) with 6.2% of all CATs. The youngest case diagnosed was 16 years female individual with Pilomatricoma. The oldest individual was 65 years old male, diagnosed with Cylindroma. Distribution of CATs based on morphological subtypes in relation with gender and age groups is summarized in Table 1.

Morphological categorization was done and analyzed with respect to histological type – nature of tumor and site of involvement. Clinical aspects of presentation and duration were also taken into consideration. Based on site – the tumors were divided into head and neck region, trunk and over the extremities, which accounted for 24 (75%); 6 (18.75%) and 2 (6.25%) cases respectively. Based on site of location, the anatomical distribution of tumors with respect to its morphological type and sub-types are tabulated in Table 2 and clinicopathological aspects studied are summarized in Table 3.

Sweat gland tumors were most common tumors with 16 (50%) of CATs followed by tumors of hair follicle – 13 (40.5%) and 3 (9.5%) cases of tumors of sebaceous glands. Pilomatricoma – a benign tumor of hair follicle was commonest tumor amongst all CATs. There were 6 (18.75%) cases with 2 male and 4 female individuals. Amongst the entire CATs, 30 (93.75%) were benign and only 2 (6.25%) were found to be malignant.

IV. Discussion

There is still a plausible dilemma regarding overall incidence of CATs due to overlapping clinical features and painless or vague presentation of these tumors [5]. Another factor which leads to missing the diagnosis of CATs is their absolute benign nature, which causes very small impact or goes unnoticed by self. However, CAT are relatively uncommon tumors with only 32 (0.1%) of all the biopsies - 25992 received in a three year study period.

The incidence of benign tumors is more as compared to malignant CATs. In present study 93.75% (30/32) were benign and only 6.25% (2/32) were found out to be malignant lesions. There were similar reports in studies carried out by Reddy et al., [6] Samaila et al., [7] Radhika et al., [8] Kaur et al., [9] Sharma et al [10] and Gandhi et al [5].

Sweat gland tumors were the commonest ones in the present work – 50% (16/32) with Eccrine acrospiroma (5/16) being the commonest one amongst sweat gland tumors. Researches performed by Nair et al., [11] Sharma et al [10] and Gandhi et al [5] also revealed similar findings. The studies performed by El Ochi et al [12] and Kaur et al [9] showed contrast findings, where tumors of hair follicle were common. The next common tumors in present study were tumors of hair follicle – 40.5% (13/32) followed by tumors of sebaceous gland – 9.5% (3/32), which appears to be a similar finding as noted in studies conducted by Nair et al [11] and Sharma et al [10]. Of all the CATs Pilomatricoma was found out to be the commonest tumor – 18.75% (6/32) in present scrutiny, which was also observed by Song et al., [13] Kaur et al., [9] Rajalakshmi et al., [14] Sharma et al., [10] El Ochi et al [12].

Head and Neck region happens to be an anatomical site which lodges maximum number of CATs – 75% (24/32). This finding correlates with other studies performed by Samaila et al [7] and Sharma et al [10].

TABLE 1: Classification of CATs and age wise distribution of tumors

Sl.no	**Cutaneous Adnexal Tumor (CAT)**	**Age wise distribution of the tumors**								
		0 – 20 yrs		21-40 yrs		41-60 yrs		> 60 yrs		Total
		Male	Female	Male	Female	Male	Female	Male	Female	
	BENIGN									
I.	***Sweat gland tumors***									
1.	Eccrine acrospiroma	-	-	1	1	2	1	-	-	3+2 = 5 (15.6%)

2.	Eccrine spiradenoma	1	-	1	1	-	-	-	-	2+1 = 3 (9.3%)
3.	Chondroid syringoma	-	-	1	-	1	-	-	-	2+0 = 2 (6.25%)
4.	Cylindroma	-	-	1	-	-	-	1	-	2+0 = 2 (6.25%)
5.	Papillary hidradenoma	-	-	1	-	-	-	-	-	1+0=1 (3.12%)
6.	Papillary Syringo adenoma	-	-	-	1	-	-	-	-	0+1 = 1 (3.12%)
7.	Papillary eccrine adenoma	-	-	-	-	1	-	-	-	1+0=1 (3.12%)
II.	***Hair follicle tumors***									
8.	Pilomatricoma	-	2	1	2	1	-	-	-	2+4 = 6 **(18.75%)**
9.	Trichilemmoma	-	-	1	-	1	2	-	-	2+2 = 4 (12.5%)
10.	Trichofolliculoma	-	-	2	1	-	-	-	-	2+1 = 3 (9.37%)
III.	***Sebaceous gland tumors***									
11.	Sebaceous adenoma	-	-	-	-	2	-	-	-	2+0 = 2 (6.25%)
	MALIGNANT									
A.	***Sweat gland carcinoma***									
i.	Apocrine adenocarcinoma	-	-	-	-	-	1	-	-	0+1 = 1 (3.12%)
B.	***Sebaceous gland carcinoma***									
ii.	Sebaceous carcinoma	-	-	-	-	-	-	-	1	0+1 = 1 (3.12%)
	Total	**1+2 = 3 (9.3%)**		**9+6 = 15 (46.87%)**		**8+4 = 12 (37.5%)**		**1+1 = 2 (6.25%)**		**32 (100%)**

TABLE 2: Distribution of CATs based on anatomical site

Sl.no	Cutaneous Adnexal Tumor (CAT)	Location / Site of the tumor		
		Head and Neck	**Trunk**	**Extremeties**
	BENIGN			
I.	***Sweat gland tumors***			
1.	Eccrine acrospiroma	2	-	3
2.	Eccrine spiradenoma	2	-	1
3.	Chondroid syringoma	2	-	-
4.	Cylindroma	2	-	-
5.	Papillary hidradenoma	1	-	-
6.	Papillary syringo adenoma	1	-	-
7.	Papillary eccrine adenoma	1	-	-
II.	***Hair follicle tumors***			
8.	Pilomatricoma	3	1	2
9.	Trichilemmoma	4	-	-
10	Trichofolliculoma	3	-	-

III.	***Sebaceous gland tumors***			
11.	Sebaceous adenoma	2	-	-
	MALIGNANT			
A.	***Sweat gland carcinoma***			
i.	Apocrine adenocarcinoma	-	1	-
B.	***Sebaceous gland carcinoma***			
ii.	Sebaceous carcinoma	1	-	-
	Total	**24 (75%)**	**2 (6.25%)**	**6 (18.75%)**

Malignant CATs are rare worldwide and in India. In present study there were only 6.25% (2/32) of malignant tumors, one case of Apocrine adenocarcinoma and one Sebaceous carcinoma. In studies carried out by Adeyi O and Banjo A [15], malignant CATs were least common.

TABLE 3: Clinicopathological features of CATs

Sl.no	Feature / Detail studied	Observation
1.	Peak age of presentation of CATs	
	Benign tumors	21 – 40 yrs of age 15 (50%) cases (9 male + 6 female)
	Malignant tumors	41 – 60 yrs – one case > 60 yrs – one case
2.	Age range	16 yrs – 65 yrs
3.	Common location of CATs	Head and Neck : 24 (75%) cases
4.	Gross appearance	Majority of benign lesions showed nodular and cystic external and cut section appearance respectively. Malignant lesions showed ulceration and crusting.
5.	Onset and duration	Gradually increasing in size – majority of cases. Some – found accidentally Majority of lesions – persisting for more than one year duration
6.	Pain / Tenderness	Benign tumors – painless (majority) Malignant tumors – painful due to secondary infection / inflammation.

The malignant tumors are to be always differentiated with cutaneous metastases of other malignancies. Most of the malignant CATs share some common features like – solitary nature, mostly are ulcerated and microscopically show lobular arrangement of cells [5]. Commonly found in head and neck regions as reported by Daina Ivan [16], Jindal U et al [17] and Tirumalae R et al [18]. In present study once case – Sebaceous carcinoma was identified in scalp region (head and neck) and another case Apocrine adenocarcinoma was found in loin, genital regions (trunk). The sample size which is comparatively smaller is a limitation of this research.

V. Conclusion

In the present era, there are quite a large number of reported cases of skin tumors. But, particularly in India the incidence of CATs is very less. However, a very small number of malignant CATs are over taken by numerous cases of benign CATs. Due to the non specific and overlapping clinical features, the exact diagnosis of CAT is always a challenging task. Histopathological examination of the tumors acts as a gold standard appraisal which gives key evidences to distinguish benign and malignant CAT and helps in appropriate management of the lesion.

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