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Histopathological study of scalp tumors and tumor like lesions

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Abstract
Introduction: A variety of inflammatory and neoplastic scalp lesions is encountered in clinical practice, which can be attributed to trauma, infection, abscess, allergic reaction, or tumor. Though a majority of scalp involvement is by benign processes, still it can be a site of malignant neoplasm.
Aims and objectives
1. To study the morphological, histopathological types and clinico-pathological correlation of various scalp tumors.
2. To know the proportion of benign and malignant lesions in the scalp lesions.
3. To compare the data and other investigations with similar studies from other regions.

Materials and methods: The present retrospective study is conducted in the department of pathology, B.J. Medical college and civil hospital, Ahmedabad over a duration of 5 years. A total of 105 cases of scalp lesions were evaluated. Scalp biopsies with clinical suspicion of a tumor which presented with a swelling, with or without pain or with non-healing ulcer were included in the study. The spectrum of lesions that appeared in the scalp were tabulated.
Results: In our study, total 105 cases were observed during period of five years. Out of the total of 105 cases majority of them were benign accounting for 92.38% of all cases and malignant cases accounting for 7.62% of all cases. The sex distribution of scalp lesions in the present study was slightly greater in male accounting for 60% cases. Out of 105 cases majority are non-tumorous keratinous cysts accounting for 53.3% of all cases with trichilemmal cyst being most common.
Conclusion: Benign tumors and tumor like lesions are more common than malignant tumors. Although mostly benign diagnosis and treatment of these lesions pose significant challenge due to distinct histopathological features. A high index of clinical suspicion is essential to ensure early detection of malignancies and initiate treatment.

Keywords: Basal cell carcinoma, keratinous cyst, scalp lesions

Introduction

Scalp lesions are frequently seen in clinical practice. Scalp is easily accessible site and lesions of scalp can be detected earlier as compared to lesions in other part of head and neck. A variety of inflammatory and neoplastic scalp lesions are encountered in clinical practice [1]1 which can be attributed to trauma, infection, inflammation, abscess, allergic reaction, or tumor. These are common in both children and adults.

Benign lesions comprise the majority of scalp lesions such as epidermal inclusion cyst, pilar cyst, dermoid cyst, lipoma and capillary hemangioma. Although malignant lesions such as squamous cell carcinoma, sebaceous carcinoma, trichilemmal carcinoma and metastasis from the other sites are also responsible [2].

Though benign tumors and lesions are more common still we need to know the histopathological profile of various lesions affecting this region so as to keep a differential in mind clinically.

Also, malignant tumors of the scalp are special forms of tumors of the head and neck region, because of the anatomical features of the scalp itself and the proximity to the skull and brain mass. Hence there is a need therefore to study the region-specific causes for tumorous masses of scalp.

Material and Methods

The present retrospective study is conducted in the department of pathology, B.J. Medical college and civil hospital, Ahmedabad over a duration of 5 years from June 2017 to May 2022 and data were collected. A total of 105 cases of scalp lesions were evaluated. Biopsies from scalp region were evaluated histopathologically and the data regarding age, sex, clinical history, prior radiological or cytological investigation if any were collected from the aggregated institutional files. Scalp biopsies with clinical suspicion of a tumor which presented with a swelling, with or without pain or with non-healing ulcer were included in the study. Scalp biopsies with the presentation of an inflammatory lesion, discharge, plaque, crusted lesion etc. were excluded from the study. Scalp biopsies reported as repeat were also excluded.

The spectrum of lesions that appeared in the scalp were tabulated. Cystic lesions were further divided into epidermal cysts, dermoid cysts and trichilemmal cysts or pilar cysts. Neoplastic lesions were further classified as benign or malignant.

Results and Observation

In our study, total 105 cases were observed during period of five years with patient's age ranged from 4 months to 78 years with the mean age being 36.7 years. Out of the total of 105 cases majority of them were benign (97) accounting for 92.38% of all cases and 8 malignant cases accounting for 7.62% of all cases. The sex distribution of scalp lesions in the present study was slightly greater in male accounting for 63(60%) cases, and 42 cases in female accounting for 40% of all cases (table 1).

Table 1: Demographic details

Details	No of cases=105
Mean age	36.7years
Male	63(60%)
Female	42(40%)
M:F ratio	1.5:1

Most of the lesions were presented in 21-30 years age groups (Table 2).

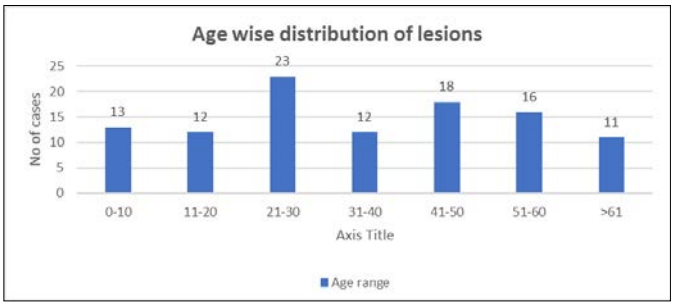

Table 2: Age wise distribution of lesions

Age	No of cases	Percentage
0-10	13	12.38
11-20	12	11.43
21-30	23	21.90
31-40	12	11.43
41-50	18	17.14
51-60	16	15.24
>61	11	10.48
Total	105	100

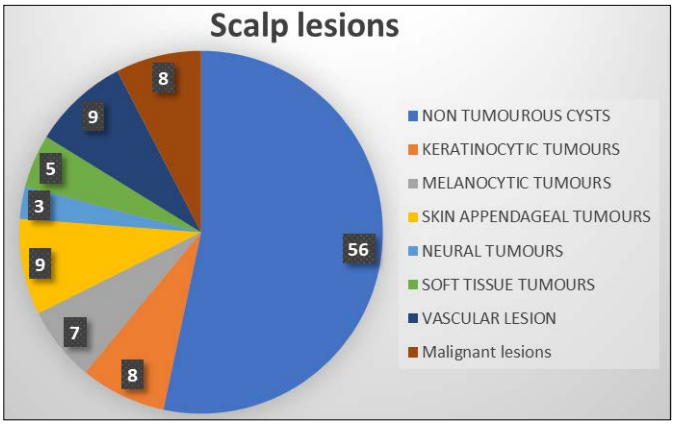

Table 3: Scalp lesions

Lesions	No. Of cases	Percentage
Non tumourous cysts	56	53.3 %
Keratinocytic tumours	8	7.6 %
Melanocytic tumours	7	6.7 %
Skin appendageal tumours	9	8.6 %
Neural tumours	3	2.8 %
Soft tissue tumours	5	4.8 %
Vascular lesion	9	8.6 %
Malignant lesions	8	7.6 %
Total	105	100 %

Out of 105 cases majority were non-tumorous keratinous cysts accounting for 56 (53.3%) of all cases with trichilemmal cyst being more common (26.67%) (table 3).

Appendageal tumors and vascular lesions were seen in nine cases in equal proportion, each accounting for 8.6% of all cases (table 3). Among vascular lesions, the most common lesion was A-V malformation found in five cases out of nine vascular lesions. Among appendageal tumors most common was nodular hidradenoma accounting for 33.3% of all appendageal lesions. Two cases of proliferating trichilemmal tumors which were benign in nature.

Among keratinocytic tumors five cases of verruca vulgaris was seen accounting for 62.5 % of all keratinocytic tumors. Two cases of seborrheic keratosis and one case of keratoacanthoma was seen among acanthotic lesions of keratinocytic tumors. There were seven cases of melanocytic tumors in the form of nevus were seen in our study. One case of Syringocystadenoma papilliferum was seen in our study. There were five cases of lipoma and three cases of neural tumors observed in our study.

Malignant lesions consisted eight cases accounting for 7.62% of the total cases (table 3). Four cases of basal cell carcinoma were observed accounting for 50% of all malignant tumors. Among four cases of basal cell carcinoma, two were of pigmented type of BCC, one was adenoid type of BCC and another one was of keratotic type. Two cases of malignant melanoma were observed in our study. One case of poorly differentiated squamous cell carcinoma was also observed.

Table 4: Spectrum of scalp lesions

Benign lesions (92.38%)			**Male:59 (92.18%)**	**Female:38 (90.24%)**	**Total:97**
Non tumourous cysts	Dermoid cyst		2	3	5
	Epidermal cyst		16	7	23
	Trichelemmal cyst		19	9	28
Keratinocytic tumours	Verrucus lesions	Verruca vulgaris	3	2	5
	Acanthomatic lesions	Seborrheic keratosis	2	0	2
		Keratoacanthoma	1	0	1
Melanocytic tumours	Nevus		3	4	7
Appendageal tumours	Apocrine and eccrine proliferation	Syringocystadenoma papilliferum	1	0	1
		Proliferating trichilemmal tumor(benign)	2	0	2
		Poroma	0	1	1
		Cylindroma	1	0	1
		Pilomatrixoma	0	1	1
		Nodular hidradenoma	0	3	3
Neural tumours	Schwannoma		1	0	1
	Cutaneous meningioma		1	0	1
	Neurofibroma		0	1	1
Soft tissue tumours	Lipoma		4	1	5
Vascular lesion	Arteriovenous malformation		1	4	5
	Hemangioma	Capillary hemangioma	2	1	3
		Cavernous hemangioma	0	1	1
Malignant lesions (7.62%)			Male:4	Female:4	Total:8
Basal cell carcinoma			2	2	4
Malignant melanoma			2	0	2
Squamous cell carcinoma			0	1	1
Malignant proliferating trichilemmal tumor			0	1	1

In our study, total 13 pediatric age group scalp lesions were observed out of which seven cases of non-tumorous cysts are observed accounting for 53.84 % of all pediatric scalp lesions. No malignant lesion observed in pediatric age group.

Older group of presentation for malignant lesions were seen. Benign lesions affect male more commonly (Table 5).

Table 5: Age and sex wise incidence of neoplastic lesions

Parameter	**Benign lesions (97)**	**Malignant lesions (8)**	**Total (105)**
Age range	4 months -70 years	25-78 years	4 months-78 years
Mean age	35.26	54.12	36.7
Male: Female	59:38	4:4	63:42

In our study, cytological examination was done in 33 cases and histocytological correlation was present in 29 (96.6%) cases.

Discussion

Obtaining histopathologic diagnosis via biopsy is the gold standard to diagnose any suspicious pathologic lesion [3]. In our study, the patient's age ranged from 4 months to 78 years. The mean age was 36.7 years. which was in discordance with a study conducted by Spitz et al[1] in which the age group ranged from 29 to 91 years, with a mean age of 61, The male to female ratio in our study was 1.5:1 whereas 1.1:1 was reported by HJ Carson et al in their study [4].

Table 6: Comparison of demographic details with other studies

Studies	**Pk et al.** [5]	**Annapurna V et al.** [6]	**Kilitci A et al.** [7]	**Present study**
Mean age	27.5±7.5years	30.5 years	43.3years	36.7years
Male	47	44 (57.1%)	100 (57.8%)	63(60%)
Female	18	33 (42.9%)	73 (42.2%)	42(40%)
M:F ratio	1.5:1	1.3:1	1.3:1	1.5:1

Table 7: Comparison of spectrum of lesions with other study

Type of lesions	**Annapurna v et al.**	**Present study**
Non tumourous cysts	54.5%	53.3%
Melanocytic tumours	2.6%	0.95%
Appendageal tumours	6.5%	8.5%
Soft tissue tumours	11.7%	4.8%
Vacular lesions	11.7%	8.6%
Neural tumors	1.3%	2.8%
Malignant lesions	2.6%	7.62%

Trichilemmal or pilar cysts are clinically indistinguishable from epidermal cysts. It is the most common cyst after the epidermoid cyst and is usually seen in middle aged patients with multiple lesions. In our study trichilemmal cyst was most common lesion found on scalp which also correlates with study by HJ Carson et al. [4] and Annapurna V et al. [5]. A distinction between Trichilemmal and epidermal cysts is essential because of differing implications. Trichilemmal cysts are often multiple and may progress to pilar tumors. Furthermore, in contrast to epidermal cysts, trichilemmal cysts are easily enucleated and appear as firm, smooth,

white-walled cysts. They need wide excision as they produce daughter cysts that may be left behind if excision is not adequate [8].

Epidermal cysts usually comprise epidermal elements that are implanted into the dermal layers. It should be differentiated from trichilemmal cysts by histopathological features. Trichilemmal cysts show trichilemmal keratinization without a granular layer (Fig.1). In our study, with an incidence rate of 21.9%, epidermal cysts were found to be the second most frequently observed scalp lesion after trichilemmal cysts (Fig.2).

In our study three cases of proliferating trichilemmal tumor were seen. Out of which two cases shows excessive epithelial proliferation and no atypia. Hence, we categorized the lesion as benign (Fig.4). In malignant lesions cells acquire atypical features. One case malignant case of proliferating trichilemmal tumor was seen showing rapid growth, invasion of surrounding tissues, prominent atypia, high mitosis, and severe dysplasia (Fig.4).

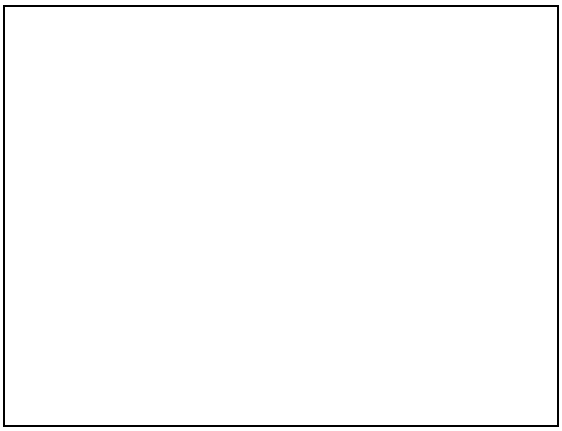

Fig 1: Trichilemmal cyst lined by mature squamous epithelium and lacks of granular layer

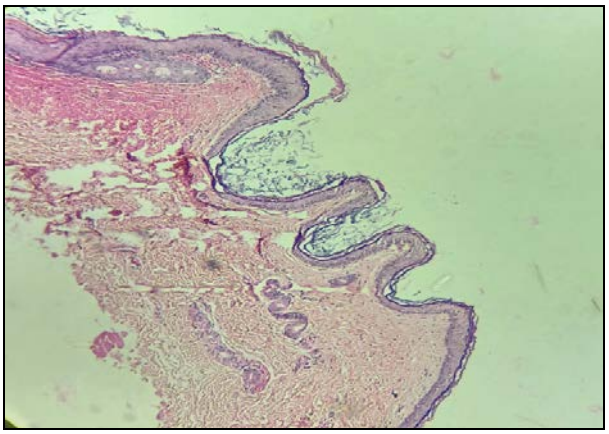

Fig 2: Epidermal cysts lined by loose keratin flakes

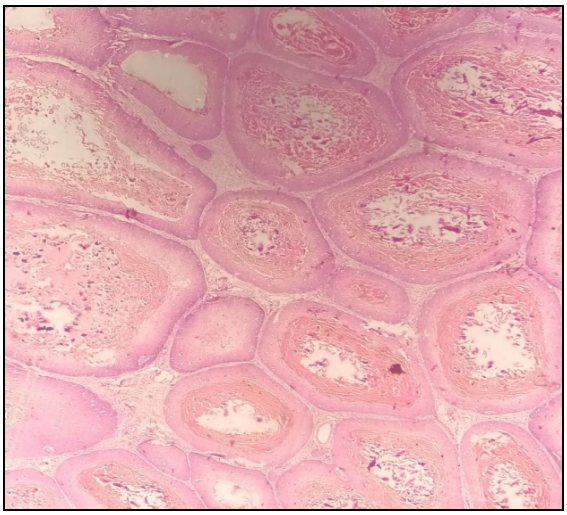

Fig 3: Benign proliferating trichilemmal tumor showing Interlacing bands of squamous epithelium exhibiting trichilemmal-type keratinization

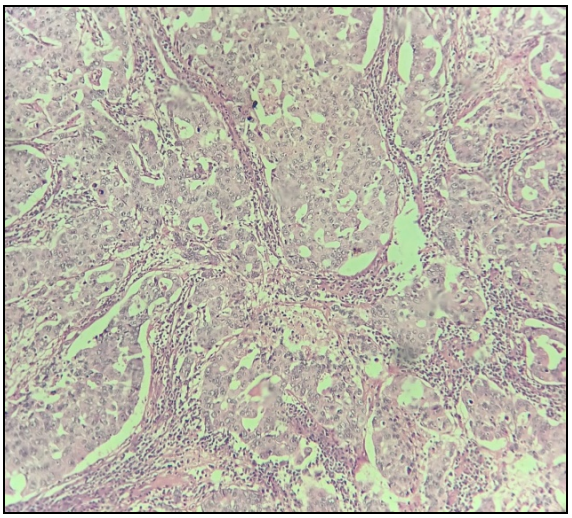

Fig 4: Malignant proliferating trichilemmal tumor with tumor cells showing nuclear atypia and pleomorphism

In our study, with an incidence rate of 6.67%, Nevus sebaceus was the third common scalp lesion. Nevus sebaceus of Jadassohn is a distinct clinicopathologic type of epithelial nevus. It is composed of a hamartomatous conglomerate of large sebaceous glands associated with heterotopic apocrine glands, defective hair follicles, acanthosis, and papillomatosis (Fig.5). The lesions occur on the scalp and face, are present from infancy, and gradually enlarge. Basal cell carcinomas, a variety of adnexal tumors (particularly trichoblastomas) and, very rarely, squamous cell carcinomas can arise within this lesion [9].

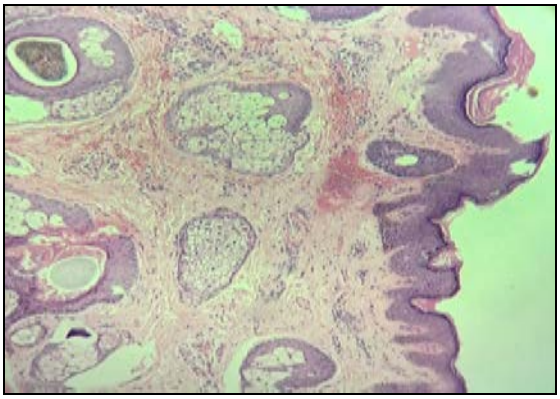

Fig 5: Nevus sebaceus: microscopic appearance, showing epidermal papillomatous hyperplasia and increased number of sebaceous glands.

In keratinocytic tumors, Verruca vulgaris is commonly encountered lesion, which is benign, squamous papillomatous lesion caused by infection with the human papilloma virus (HPV). Verruca vulgaris occurs predominantly in children and adolescents, although adults are also frequently infected. Common warts may be solitary or multiple, and they are usually found on exposed parts, particularly the fingers and on the dorsum of the hands. The histologic characteristics of these lesions are those of focal epidermal hyperplasia manifested by hyperkeratosis and parakeratosis, varying degrees of acanthosis, and papillomatosis [9] (Fig.6).

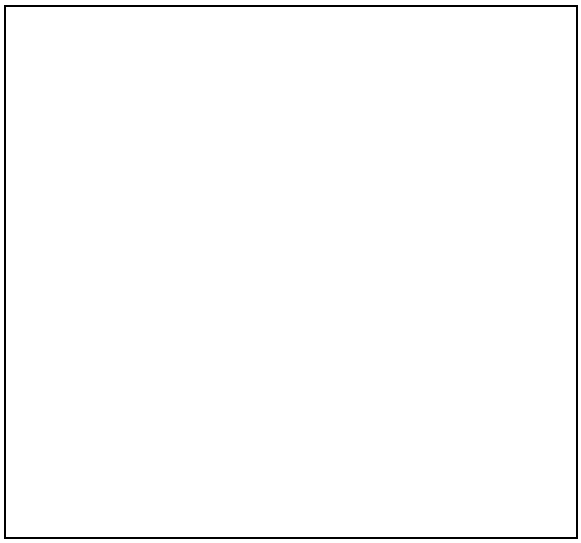

Fig 6: Verruca vulgaris Hyperkeratosis, papillomatosis, hypergranulosis, Columns of parakeratosis, especially over projecting dermal papillae

Seborrheic keratoses are benign hyperplastic tumors of epidermis which are more common in older individuals. Seborrheic keratoses are slightly raised, tan to brown or black papules. While most seborrheic keratoses are uniform in color, speckled examples are common. Pigmented seborrheic keratoses may be mistaken clinically for malignant melanoma. In present study out of two cases of seborrheic keratosis one case of pigmented seborrheic keratosis was seen. Microscopically it shows acanthosis and marked pigmentation in melanocyte and increased melanophages (Fig.7).

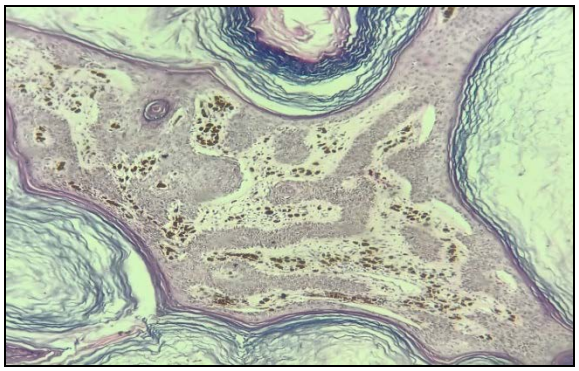

Fig 7: Pigmented seborrheic keratosis showing acanthosis and pigmented melanophages

Among vascular lesions A-V malformation is commonly observed in our study. Arteriovenous hemangioma (malformations) is a benign acquired cutaneous vascular lesion and is characterized by a complex network of intercommunicating arterial and venous structures. Arteriovenous hemangioma is divided into superficial and deep types according to the depth of involvement. Clinically present as Small reddish blue papule. Symptoms are mild and include pain and intermittent bleeding.

In both forms there are thick and thin-walled sized arteries and veins in close association with one another. Focally, some tumors resemble capillary and cavernous hemangioma. There may be focal thrombosis, secondary dystrophic calcification and mild inflammation. Serial sections are helpful in demonstrating continuities or shunts between arteries and veins (Fig.8).

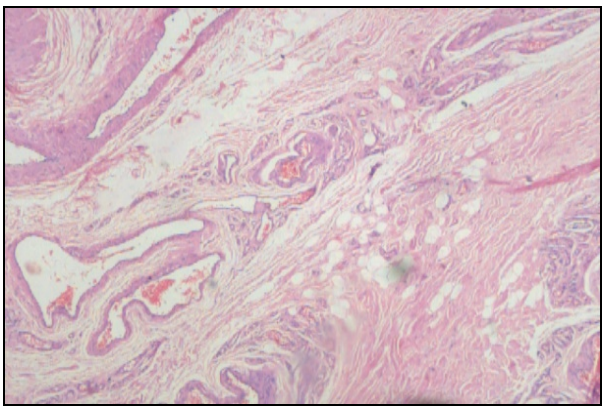

Fig 8: A-V malformation showing arteries and blood vessels in close relation with each other

In skin appendageal tumors of scalp, nodular hidradenoma is commonly encountered lesion in our study. It arises from the distal excretory duct. It forms nodules with occasional cystic foci high in the dermis (Fig.9). Some of the proliferating cells are cytologically similar to those of the poroma. Poroma is well circumscribed and tumor cells replaces the epidermis and extends into the dermis in broad anastomosing bands (Fig.10). Poroma cells are monomorphic, small, cuboidal with basophilic round nuclei, inconspicuous nucleoli and compact eosinophilic cytoplasm Sharp demarcation present between the normal keratinocytes and poroma cells seen [9].

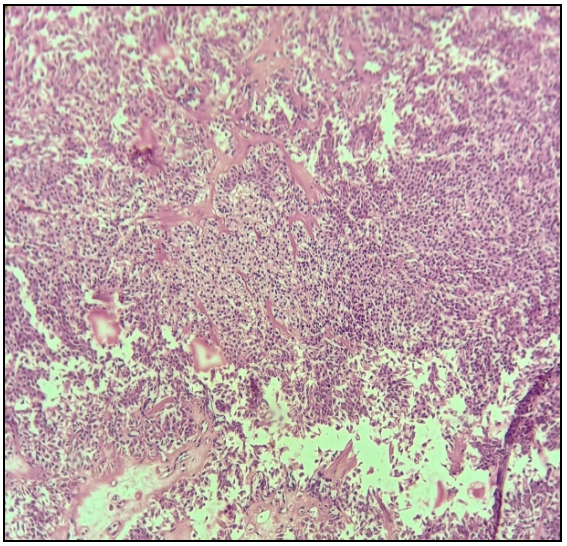

Fig 9: Nodular Hidradenoma Two types of cells-polyhedral cells with basophilic cytoplasm and glycogen containing clear cells with eccentric round nucleus

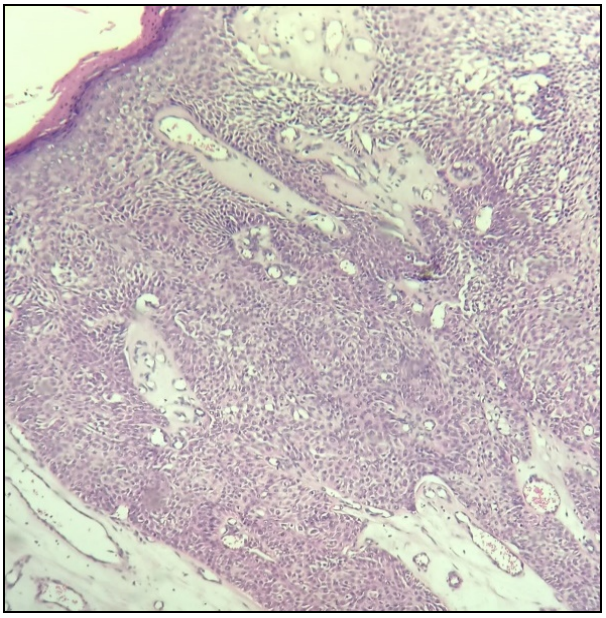

Fig 10: Poroma Anastomosing cord of basaloid cells extending into dermis with multiple connections into epidermis

Among malignant tumors in our study, basal cell carcinoma accounted for most of the malignant cases (3.82%), which is in concordance with study conducted by Kilitci and Asan et al. [7]. Although exposure to ultraviolet light is the major causative agent in the etiology of BCC, non-exposed sites such as the scalp, may demonstrate a different pathogenesis in the development of BCC [7]. In some patients, a history of previous radiation to the scalp for treatment is a risk factor for BCC. In our study, 4 cases of BCC were seen having no history of radiation and recurrence of these tumors were not identified (Fig.11).

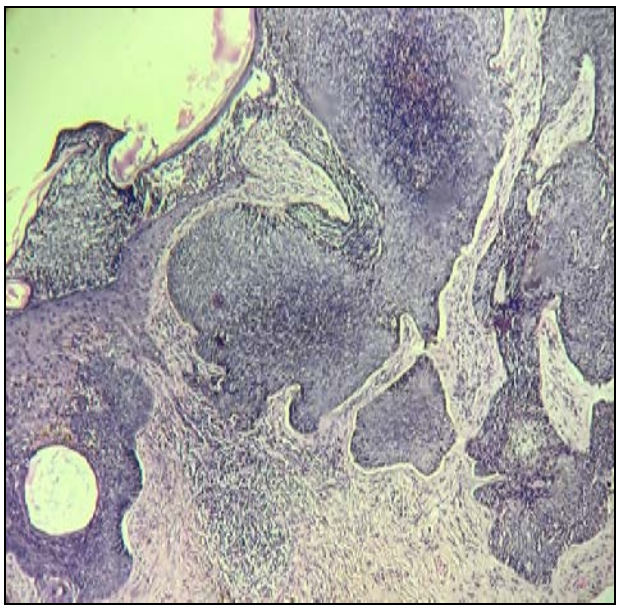

Fig 11: Basal cell carcinoma. Typical nodular appearance with peripheral palisading of tumor cells

One case of malignant melanoma was seen in present study. The large majority of melanomas are associated with sunlight exposure and thought to be due to ultraviolet radiation. Therefore, most are found in the head and neck area and on the lower extremities, the latter location being particularly more common in women [9]. The major histologic forms of melanoma include superficial spreading melanoma, nodular melanoma, acral lentiginous melanoma, and lentigo maligna melanoma. Each of these displays characteristic clinical, epidemiologic, and histologic features. Superficial spreading, acral lentiginous, and lentigo maligna melanoma may evolve initially from a slowly growing, plaque like radial growth phase to a rapidly growing, expansile vertical growth phase (Fig.12).

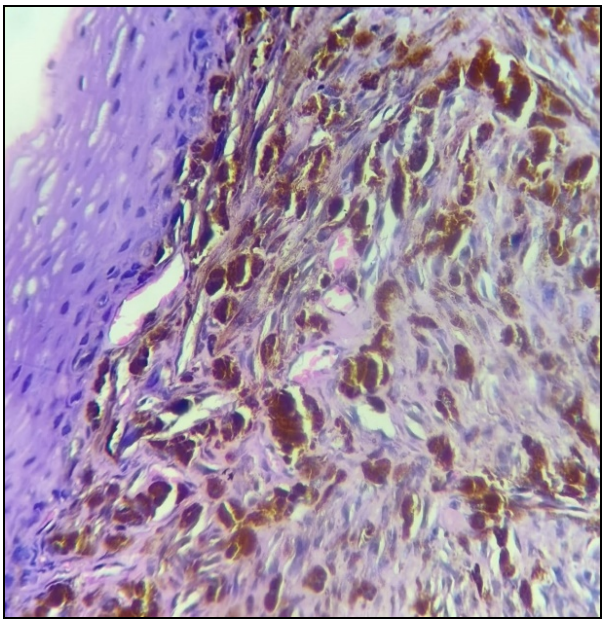

Fig 12: Malignant melanoma Pagetoid appearance of melanocytes having prominent nucleoli.

Among the rare cases found in the present study were the scalp extracranial meningioma, scalp schwannoma and scalp neurofibroma. There are case reports on these lesions describing scalp as a rare site of occurrence [10, 11].
In pediatric scalp lesions, dermoid and epidermal cysts were common among our study which was also common in study conducted by Soo Han Yoon et al. [12]. No malignant lesion was found pediatric age group in our study. Though malignant lesions are rare in pediatric age group, neuroblastoma and lymphoma commonly encountered lesions [13, 14].

Conclusion

From above study we conclude that scalp is the most neglected system and not an uncommon site for tumors. Benign tumors and tumor like lesions are more common than malignant tumors. Although mostly benign diagnosis and treatment of these lesions pose significant challenge due to distinct histopathological features. This is even more true for malignant tumor of the scalp which are uncommon but associated with poor prognosis.

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Ethical Clearance: All procedures performed were in accordance with the ethical standards of the institution.

Conflicts of Interest: Nil

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Not available

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