Original Article

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Pathology Section

# Histopathological Spectrum of Non Traumatic Scalp Swellings in a Tertiary Teaching Hospital of Western Uttar Pradesh, India

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## ABSTRACT

**Introduction:** Scalp is a region where pilosebaceous follicles are present in high density and a wide histopathological spectrum can be seen. Aetiology of a scalp swelling may be traumatic, inflammatory, allergic, infective or neoplastic. Malignant tumours are not uncommon in this region and the literature available is also limited. This makes the scalp an interesting site for study.

**Aim:** The present study was to highlight the histopathological spectrum of non traumatic scalp swellings.

**Materials and Methods:** The present study was a 10 year hospital-based observational ambispective study from February 2010 to January 2020, done in the department of Pathology in a tertiary teaching hospital in Western Uttar Pradesh, India. A total of 144 non traumatic scalp swellings were studied and analysed using Statistical Package for the Social Sciences (SPSS) version 19 software.

**Results:** A total of 144 cases were studied. Male to female ratio was 1.4:1. Mean age was 40.94 years. Benign cases were 139 and five cases were malignant. Keratinous cyst was the common diagnosis (n=52), followed by lipoma (n=24). Most common malignant lesion was basal cell carcinoma (n=3), followed by squamous cell carcinoma (n=2).

**Conclusion:** Scalp swellings vary from keratinous cysts to malignancies. The study of scalp swellings is a must so that a variety of histopathological manifestations can be widely understood and interdisciplinary approach can be implemented in the diagnosis and management.

**Keywords:** Basal cell carcinoma, Carcinoma, Keratinous cyst, Lipoma, Squamous cell carcinoma

## INTRODUCTION

Scalp swellings represent an elaborate and heterogenous clinical spectrum [1]. Scalp is the anatomic area lying between external occipital protuberance and the supra-orbital margin. It is a stratified structure comprising of skin, connective tissue, epicranial aponeurosis, loose areolar tissue and the periosteum of skull. There are compactly situated adenexal structures like hair follicles, sebaceous, eccrine and apocrine glands, which are surrounded by a dense network of blood vessels and lymphatics [2].

A vast variety of anatomic characteristics provide a dwelling ground for different types of pathological lesions such as different neoplasms, hamartomas, malformations, cysts etc., have been found. The aetiology may be traumatic, inflammatory, allergic, infective or neoplastic [3].

The incidences of scalp swellings are increasing in comparison to skin lesions occuring elsewhere, but luckily such lesions are mostly benign. More than half of scalp swellings are cysts including trichilemmal, epidermal and dermoid cysts. Dense concentration of sebaceous glands in this area makes it prone to development of such cysts [4]. Numerous benign swellings can commonly be seen such as lipoma, fibroma, pilomatricoma, seborrhoeic keratosis, nevi, haemangioma, warts and pseudolymphoma [5].

Only 1-2% of all scalp tumours are malignant. But they constitute around 13% of all malignant cutaneous neoplasms. Primary malignancies of skin like squamous cell carcinoma, basal carcinoma, sebaceous carcinoma etc. can be observed. Metastatic lesions from prostate or lung carcinomas can also be seen [6].

This study was done to increase the awareness about histopathological spectrum and its importance among doctors for proper evaluation and management in the institute, as there always remains a possibility of encountering a rare or unusual entity on histopathology. The above factors make scalp an interesting site for study.

## MATERIALS AND METHODS

The present study was a 10 year hospital-based observational ambispective study from February 2010 to January 2020 (retrospective for a seven year duration from February 2010 to January 2017, and prospective for three years from February 2017 to January 2020) was done in the Department of Pathology in a tertiary teaching hospital in Western Uttar Pradesh, India. Approval of the Institutional Ethical Committee (ECR/1318/Inst/UP/2019) was obtained.

**Inclusion criteria:** Non traumatic scalp swellings occurring in the the specified time period were included in the study.

**Exclusion criteria:** Cases without proper records, with history of trauma, autolysed samples, and swellings with poor preservation effects seen on microscopy were excluded.

### Study Procedure

A total 144 non traumatic scalp swellings were included. As this was an institutional hospital based study, these were the cases which were received in the histopathology department. Not all patients undergo biopsy so exact prevalence cannot be calculated. In retrospective study, all the relevant material like histopathology forms duly filled with clinical details, paraffin tissue blocks, and histopathology slides, available in the archives of pathology department, were studied. For prospective study, all the excised scalp swellings sent for histopathology from the Department of Surgery and the Department of Dermatology were studied. The relevant clinical data like age of the patient, duration of swelling, any rapid progression, development of pain etc., were recorded. Gross examination of the excised swelling was properly done. Sections from the representative areas were taken and submitted for histopathological processing. Stained sections with haematoxylin and eosin (H&E) stain were subjected to histopathological examination.

## STATISTICAL ANALYSIS

Data obtained was tabulated and analysed using SPSS version 19 software and expressed as number and percentage. This software

was used to generate tabulated data. Statistical average and ratios were calculated.

## RESULTS

A total of 144 cases were studied in the present study. Ninety five cases were from previous archives of the department (retrospective) and 49 cases were from the next three years (prospective). Males were 84 while females were 60. Male:Female ratio is 1.4:1. Mean age of the cases was 40.94 years, ranging from four years to 85 years of age. Scalp swellings were classified on the basis of their nature: benign or malignant, tissue of origin and histopathological diagnosis [Table/Fig-1].

| Type of lesion n (%) | Tissue of origin n (%) | Histopathological diagnosis | Number of cases (n) | Percentage (%) |
|---|---|---|---|---|
| Benign lesions 139 (96.53%) | Cutaneous and adenexal lesions 69 (47.92%) | Epidermal cysts | 27 | 18.75 |
| | | Pilar cysts | 25 | 17.36 |
| | | Dermoid cysts | 04 | 2.78 |
| | | Seborrheic keratosis | 03 | 2.08 |
| | | Nevi | 03 | 2.08 |
| | | Proliferating trichilemmal tumour | 01 | 0.69 |
| | | Chondroid syringoma | 03 | 2.08 |
| | | Pilomatricoma | 03 | 2.08 |
| | Soft tissue lesions 42 (29.17%) | Lipoma | 24 | 16.67 |
| | | Neurilemmoma | 04 | 2.78 |
| | | Lymphangioma | 03 | 2.08 |
| | | Lobular capillary haemangioma | 06 | 4.17 |
| | | Angiolymphoid hyperplasia with eosinophilia | 05 | 3.47 |
| | Miscellaneous lesions 28 (19.44%) | Abscess | 04 | 2.78 |
| | | Granulomatous lesion | 04 | 2.78 |
| | | Parasitic | 15 | 10.42 |
| | | Verruca vulgaris | 05 | 3.47 |
| Malignant lesions 5 (3.47%) | Epithelial origin 5 (3.47%) | Squamous cell carcinoma | 02 | 1.39 |
| | | Basal cell carcinoma | 03 | 2.08 |
| Total cases of scalp swellings | | | 144 | 100.00 |

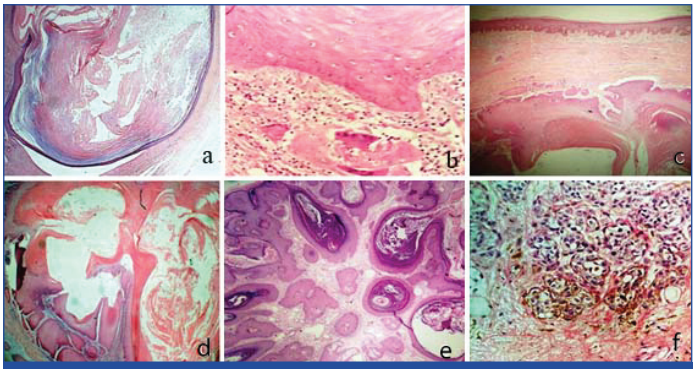
**[Table/Fig-1]:** Distribution of scalp swellings on the basis of tissue of origin and histopathological diagnosis.

Benign lesions were further classified into cutaneous and adenexal lesions, soft tissue lesions and miscellaneous lesions. Malignant lesions seen were only of epithelial origin i.e., carcinomas.

One thirty nine out of 144 cases were benign in nature i.e., 96.53% of total cases and five cases were malignant i.e., 3.47% cases. Most predominant group was of cutaneous and adenexal lesions, followed by soft tissue lesions.

Keratinous cyst forms the major group with 52 cases (36.11%), comprising of 27 cases of epidermal cysts, and 25 cases of pilar cysts. The age of the patients ranged from the first decade to the seventh decade of life (M:F=1:1). On microscopy, epidermal cysts showed lamellated keratinous material [Table/Fig-2a]. Three cases were of giant epidermal cysts and two were ruptured epidermal cysts with marked inflammation and foreign body giant cell reaction [Table/Fig-2b]. Pilar cysts showed cyst lining of squamous epithelium without a granular layer and with swelling of the cells close to the cyst cavity that is filled with homogeneous keratin [Table/Fig-2c]. Out of 25 cases of pilar cysts three cases showed calcification.

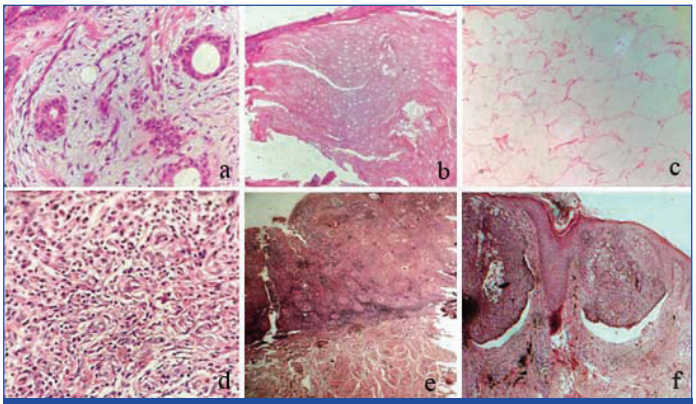
Dermoid cysts formed four cases. They were seen in children and adolescents. The microscopic view showed that the cyst is lined by stratified squamous epithelium, with adenexal structures in the wall. Cases of proliferating trichilemmal tumour [Table/Fig-2d], seborrhoeic keratosis [Table/Fig-2e], nevi [Table/Fig-2f], chondroid syringoma [Table/Fig-3a] and pilomatricoma [Table/Fig-3b] were also encountered.




**[Table/Fig-2]:** Histopathological spectrum of other non traumatic scalp swellings; a) Epidermal cyst lined by stratified squamous epithelium with granular layer; H&E stain, 40x; b) Epidermal cyst with giant cell reaction; H&E stain, 400x; c) Pilar cyst. The cyst is lined by a squamous epithelium without granular layer, cyst cavity is filled with homogenous keratin; H&E stain, 40x; d) Proliferating Trichilemmal Tumour; H&E stain, 40x; e) Seborrheic Keratosis; H&E stain, 40x; f) Nevus H&E stain, 40x.

In the soft tissue group, most common diagnosis was of lipoma (n=24; 16.67%). On microscopy, an encapsulated lesion with benign adipocytes were seen entangled with fibrocollagenous strands [Table/Fig-3c]. No specific variant was noticed. Cases of neurilemmoma, lymphangioma, capillary haemangioma and angiolymphoid hyperplasia with eosinophilia (epithelioid haemangioma) [Table/Fig-3d] were also noted.

In the malignancy group, only epithelial malignancies were seen, comprising of squamous cell carcinoma [Table/Fig-3e] and basal cell carcinoma [Table/Fig-3f]. The most common malignant lesion was basal cell carcinoma (n=3, 2.08%), pigmented variant was seen in two cases. In third case, sebaceous differentiation was noticed. Two cases of squamous cell carcinoma were seen, one case was of well differentiated carcinoma while the other was of moderately differentiated carcinoma. Notably, all malignant cases were seen in male patients and their age ranged from sixth to ninth decade of life.




**[Table/Fig-3]:** Histopathological spectrum of non traumatic scalp swellings; a) Chondroid syrigoma; H&E stain, 400x; b) Pilomatricoma; H&E stain, 400x; c) Lipoma; H&E stain, 400x; d) Angiolymphoid hyperplasia with eosinophilia; H&E stain, 400x; e) Squamous cell carcinoma, showing invasion of dermis by epidermal masses. The dermis shows a marked inflammatory reaction; H&E stain, 40x; f) Basal cell carcinoma (pigmented); H&E stain, 40x.

## DISCUSSION

Soft tissue masses on the scalp are commonly encountered in clinical practice. Fine needle aspiration cytology is the preliminary method in used to reach the probable diagnosis but the final diagnosis is made on the basis of histopathology [7].

In the present study, the age of the patients ranged from 4 years to 85 years, with a mean age of 40.94 years. Mane AV et al., observed age range of 6 months-60 years of age with mean age of 30.5 years [8]. Spitz DJ et al., observed age range from 29-91 years with mean age of 61 years [3]. The male to female ratio in our study was 1.4:1.

Mane AV et al., reported it as 1.3:1 and Carson HJ et al., reported it as 1.1:1 in their study [8,9]. Spitz DJ et al., observed 42 male and 28 female patients in their study on scalp lesions i.e., 1.5:1 [3].

In the present study, maximum number of lesions were non malignant i.e., 139 out of 144 cases (96.53% of total cases) and five cases were malignant (3.47% cases). In their study, Mane AV et al., studied two cases of malignant lesions out of 77 diagnosed cases (2.6%) [8]. Anrade P et al., found that only approximately 1-2% of all scalp tumours are malignant while they comprise up to 13% of all malignant cutaneous neoplasms [10].

Keratinous cysts were the most common diagnosis in present study with 52 cases (36.11%), of which, 27 cases were of epidermal cyst and 25 cases were of pilar cyst. Results of this are well in concordance with the study of Leena JB et al., where they found 15/45 cases i.e., 33.33% cases of kerationous cysts in scalp swellings [11]. Mane AV et al., also found keratinous cysts to be the most common diagnosis in 42/77; 54.5% cases [8]. Proper distinction of epidermal cysts and pilar cysts is clinically important in view of certain future complications.

On microscopy, epidermal cysts showed lamellated keratinous material. Epidermal cysts are slow growing and benign but rarely they may be associated with perforation of the skull [12].

In this study, three cases were of giant epidermal cysts, out of which two were ruptured epidermal cysts with marked inflammation and foreign body giant cell reaction. Conventional epidermal cysts are less than 5 cm in size. Giant epidermal cysts with size 5 cm or more have been reported. Three cases were of 5.5 cm, 6.0 cm and 6.2 cm respectively in maximum diameter. Such findings have been reported by many researchers [8,13].

In present study, we found 25 cases of pilar cysts or trichilemmal cysts (17.36% of total cases). Leena JB et al., observed 8/45 cases (17.78%) cases of pilar cysts on scalp in their study [11]. Mane AV et al., observed 27/77 cases (35.06%) of pilar cysts [8].

Pinkus H in 1969 told that trichilemmal cysts arise from the outer root sheath of the isthmus of the follicle. They usually occur in hair bearing areas with a predilection for scalp, neck, trunk and gluteal region. They have a female dominance and with an age preponderance of over 60 years. Pilar cysts showed cyst lining of squamous epithelium without a granular layer and with swelling of the cells close to the cyst cavity that is filled with homogeneous keratin [14-20].

In present study, we observed a single case of proliferating trichilemmal tumour. Pilar cysts may have a tendency to partially rupture and rarely may they turn into a proliferating trichilemmal tumour, which mimics squamous cell carcinoma on histopathology. Rarely, proliferating trichilemmal tumours may turn into true local malignancy or even metastasis may occur [21-25].

In present study, we found four cases of dermoid cysts (2.78%). Mane AV et al., also found four cases of dermoid cysts (5.19%). This discordance may be due to a bigger sample size in the present study [8]. Dermoid cysts are subcutaneous cysts that usually are present at birth. They occur most commonly on the head, around the eyes, and occasionally on the neck. Dermoid cysts, in contrast to epidermal cysts, are lined by an epidermis that possesses various epidermal appendages that are usually fully matured. Dermoid cysts are a result of the sequestration of skin along lines of embryonic closure [19]. In the present study, we found three cases of irritated seborrhoeic keratosis. Leena JB et al., observed three cases of seborrhoeic keratosis [11].

Seborrhoeic keratosis show a considerable variety of histologic appearances such as: irritated; adenoid or reticulated; plane; clonal; melanoacanthoma; inverted follicular keratosis; and benign squamous keratosis. Often more than one type is found in the same lesion. All types of seborrheic keratosis have in common hyperkeratosis, acanthosis, and papillomatosis. Two types of cells are usually seen in the acanthotic epidermis: squamous cells and basaloid cells [26,27].

Three cases of nevi were also found. Mane AV et al., observed two cases while Leena JB et al., found a single case of nevi. Nevus cells are round to oval in shape with round, oval or spindle-shaped nuclei based on the type. They group in clusters and rarely show mitosis. Benign lesions are usually well-circumscribed, monotonous throughout, and symmetric, with features of maturation and absent cytologic atypia [8,11].

Three cases each of chondroid syringoma on scalp were also found. These tumours were histologically similar or identical to salivary gland mixed tumours that may occasionally rise from closely related glands of skin. The complex and highly variable histologic patterns seen in mixed tumours are a result of the interplay of the epithelial and stromal elements. The epithelial components may form trabeculae, tubules or ductules. The ductules typically include both epithelial and myoepithelial components [28,29].

Three cases of pilomatricoma were found. Pilomatricoma is a nodular, benign tumour arising from the hair matrix. It occurs predominantly in children and young adults, and most of the cases are located on the head, neck, and upper extremities. Microscopically, it is composed of solid nests of small basaloid cells. The key feature is the fact that these basaloid cells undergo abrupt keratinisation leading to the formation of “ghost” and “shadow “cells. Foreign body reaction, calcification, and ossification are common secondary events [30].

Most common soft tissue lesion in the present study was lipoma (n=24 cases; 16.67%). Mane AV et al., reported 11.7% cases while Leena JB et al., reported it in 11.11% cases [8,11].

In the present study, other reported soft tissue lesions were neurilemmoma (n=04) and vascular lesions (n=14). Other researchers have also reported neurilemmomas, capillary haemangioma, pyogenic granulomas and arteriovenous malformations [8,11]. Neurilemmoma in the present case was encapsulated characterised by cellular Antoni A and hypocellular myxoid Antoni B areas. Mane AV et al., Ramani KWH et al., and Al-Adani M et al., reported vascular lesions. Haemangiomas, pyogenic granulomas and lymphangiomas were also reported [8,31,32].

Malignant lesions in the study were 3.47%. Mane AV et al., observed malignancy in 2.59% cases [8]. Andrade R and Steigleder GK, observed that 1-2% of all scalp tumours were malignant [27]. Chiu CS et al., observed basal cell carcinoma in 41.2% followed by squamous cell carcinoma 16.6% of malignant tumours of scalp. Peak age incidence was between 60-79 years [6]. In current study, all the cases were also of old age. Manchanda Y et al., also observed that malignant lesions were common in older age group. These findings were similar to the present study [33].

Malignant lesions included in this study were squamous cell carcinoma (n=2) and basal cell carcinoma (n=3). Leena JB et al., also observed basal cell carcinoma as most common malignant lesion followed by squamous cell carcinoma [11]. Manchanda Y et al., also showed that basal cell carcinoma was more common than squamous cell carcinoma [33]. These scalp tumours have a greater tendency for ulceration. They frequently present as chronic non healing ulcer [34]. Two of our cases of squamous cell carcinomas also presented with a history of non healing ulceration.

Basal cell carcinomas of the scalp are more often nodular and pigmented. Recurrence is common after excision. Rarely, infiltration into the cranium and dura (approximately in 0.03% cases) especially in advanced or neglected cases has been reported [2,35]. All three cases of basal cell carcinoma in this study were pigmented. The characteristics of scalp skin are different from those of other parts of the body and that’s why scalp swellings need a proper evaluation [36].

## Limitation(s)

As this is an institutional study, results cannot be generalised to the population. Moreover, study can be further continued with more number of patients to draw better conclusion.

## CONCLUSION(S)

Scalp swellings may vary from the benign epidermal inclusion cyst to the various malignancies. They may present with local extension to dura or as a part of some systemic pathology or metastasis. The study of scalp swellings is must so that a variety of clinical and histomorphological manifestations can be vastly understood. Thus, an interdisciplinary approach is desirable in diagnosis and management of scalp swellings. More of such studies are needed for understanding the vast spectrum of scalp swellings.

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- iThenticate Software: Aug 20, 2021 (12%)

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