Abstract

Background: Skin adnexal neoplasms are relatively rare and thus uncommonly encountered in routine pathology practice. Aims: The present study was conducted with the aim to diagnose various skin adnexal tumors on fine-needle aspiration cytology (FNAC) followed by confirmation on histopathology and immunohistochemistry of the excised tumor. Materials and Methods: A total of 11 cases of superficial nodular swellings of the skin were studied over a period of 2 years from 2015 to 2016. FNAC of the swelling was performed and slides were stained with Giemsa stain. Following FNAC, the swelling was excised and subjected to histopathological examination. Immunohistochemistry was performed in some cases for confirmation. Results: It was observed that overall incidence of adnexal tumors (ATs) encountered on FNAC was very low. Typing of ATs on cytology was possible in 82% cases (9/11 cases) with diagnostic accuracy of 88% (8/9 cases). Most common tumor encountered in the study was nodular hidradenoma followed by pilomatrixoma, trichoepithelioma, cylindroma, chondroid syringoma, and trichilemmal cyst. Majority of the cases were benign except one case, which subsequently turned malignant. Conclusion: FNAC is a simple, safe, and cost-effective tool in diagnosing skin ATs. Cytological diagnosis of these lesions is depends on clinical correlation and cytomorphological features. FNAC in lesions suspected to be malignant can guide the surgeon regarding extent of excision.

Keywords: Adnexal neoplasms, fine-needle aspiration cytology, histopathology

Introduction

Skin adnexal tumors (ATs) comprise a wide spectrum of benign and malignant tumors that exhibit morphological differentiation towards one or more types of adnexal structures found in normal skin.[1] Most clinicians prefer to diagnose suspected skin ATs by excisional biopsy as they are easily accessible, and hence, skin ATs are rarely encountered on fine-needle aspiration cytology (FNAC). However, FNAC can be of great help in differentiating these from metastatic carcinomas and sarcomas that invariably form the differential diagnosis. Recognition that the skin lesion is a skin AT on FNAC, and if possible being able to subtype it allows correct management and follow-up of the patient.

Materials and Methods

The present study was conducted retrospectively over a period of 2 years from 2015 to 2016. A total of 11 cases of ATs were studied. These patients presented to the OPD with nodular swellings at various sites. FNAC was performed with a 22 gauge needle attached to a 10 ml syringe. The material obtained was smeared on glass slides and stained with Giemsa stain. Thorough history was taken, and detailed clinical examination was performed at the time of the procedure. Following FNAC, excision of the swelling was done, and the tissue was fixed in 10% formalin, stained with hematoxylin and eosin, and subjected to histopathological examination. In one of the cases, immunohistochemistry was done for confirmation.

Results

The percentage of ATs among all the FNAC samples received in the department was very low (0.3%) i.e., 11 cases among 3600 samples. Most of these tumors presented in the age group of 20 to 40 years with females being more commonly
affected than males (Male: Female ratio was 1:1.75). The majority (7/11) of these were found in the head and neck area, two were found in the axilla, one in the upper extremity near the elbow, and one in the suprascapular area. Typing of ATs on cytology was possible in 82% cases (9/11 cases) with diagnostic accuracy of 88% (8/9 cases). [Table 1] All the cases were benign, but one case later on turned into malignant tumor within a period of 6 months.

Out of the 11 cases, the 4 cases of nodular hidradenoma presented as solitary, firm nodules with size ranging from 1 to 3 cm and oozing of some serous fluid from one of the lesions. Two of these tumors were in axilla and had thickened overlying skin, one in scalp and one in the suprascapular area. FNAC smears showed presence of both scattered and clusters of epithelial cells having high N:C ratio, bland nuclear chromatin, round to oval nuclei, and scant indistinct to moderate cytoplasm with presence of few cells showing cytoplasmic vacuolations. [Figure 1a and 1b] These cells were adhered to eosinophilic basement membrane like material at places. A diagnosis of benign adnexal lesion with features suggestive of nodular hidradenoma was rendered, and all these cases were confirmed on histopathology [Figure 1c].

Three cases of pilar tumor presented as single, firm to hard nodules with stretched overlying skin in head and neck region and on FNAC showed dual population of cells. One subset showed basaloid cells and the other population was of larger cells showing mild nuclear pleomorphism and moderate amount of basophilic cytoplasm, and at some places, these cells were adhered to the basophilic stromal matrix. The background showed areas of calcification and numerous giant cells in 2 of 3 cases. Of these, 2 cases were diagnosed as pilomatrixoma on histopathological examination and 1 case was diagnosed as trichoepithelioma.

One case was presented as smooth, mobile, firm nodule of size 1.5–2 cm on the scalp on FNAC showed the presence of numerous anucleate and nucleate squames with some showing mild nuclear atypia in a background of keratin debris, could not be typed. It was reported as adnexal lesion with atypia on cytology and wide local excision was advised. It turned out to be trichilemmal cyst on histopathology. Another case of solitary, firm, painless, rubbery nodular scalp swelling revealed presence of multiple clusters of cells having small, round to oval hyperchromatic nuclei, inconspicuous nucleoli and scant cytoplasm in a background showing basement membrane type material, and pinkish hyaline globules were seen. [Figure 2a] A diagnosis of benign AT likely cylindroma was suggested, which was confirmed on histopathology. [Figure 2b] The case presented as a freely mobile swelling near elbow yielded mucoid material on FNAC. The smears examined showed clusters of round to plasmacytoid cells with monomorphic, centrally to eccentrically located nuclei with fine chromatin and moderate to abundant cytoplasm embedded in a chondromyxoid ground substance. [Figure 3a] The combination of mesenchymal and epithelial elements suggested a diagnosis of chondroid syringoma, which was confirmed on histopathology. [Figure 3b] One case of scalp swelling that

![Figure 1](image1.png) **Figure 1:** Nodular hidradenoma (a) fine-needle aspiration smears showing cohesive clusters and sheets of epithelial cells adhered to eosinophilic basement membrane like material (Giemsa stain ×100). (b) Basaloid tumor cells with high N:C ratio, bland chromatin, round to oval nuclei, and moderate amount of cytoplasm with vacuolations at places (Giemsa stain ×400). (c) Histopathological image showing nests and sheets of cells with clear cytoplasm and presence of few cystic spaces (Hematoxylin and Eosin, × 100)

![Figure 2](image2.png) **Figure 2:** Cylindroma (a) fine-needle aspiration smears showing papillary clusters of basaloid cells with an inset showing presence of hyaline globule (Giemsa stain ×100). (b) Histopathological image showing compact nests of basaloid cells forming jigsaw puzzle (Hematoxylin and Eosin, × 400)
presented as a slow growing, firm, well circumscribed nodule, showed clusters of uniform basolaid cells on FNAC. It could not be typed and was reported as benign AT on cytology. It was later on diagnosed as Trichoepithelioma on biopsy. However, on subsequent follow-up at 6 months, the patient presented with recurrence at the same site. It showed rapid growth, ill-defined margins, and histopathological examination revealed atypia with presence of numerous atypical mitotic figures and was confirmed as malignant.

**DISCUSSION**

The skin ATs encompass a wide variety of tumors clinically presenting as asymptomatic papule or nodules. The age group most commonly affected in the present study was 20–40 years, which is in concordance with previous studies. There was a female preponderance in the present study that was similar to the study by Radhika et al. These tumors basically originate from undifferentiated pluripotent stem cells, and finally, differentiate to specific tumors influenced by genetics, local vascularity, and the microenvironment of the epidermis and dermis. Although with data obtained from electron microscopy and immunohistochemical analysis, discordant opinions exist regarding the precise cell of origin of many of the tumors.

There are very few case reports describing the cytomorphological features of skin ATs as FNAC for these lesions is not widely practiced. Bhadani et al. in their study demonstrated that FNAC can atleast help in establishing the epithelial nature of the lesion. Daskalopoulou concluded from their study that there were some constant cytomorphological features present in ATs to differentiate between clinically and grossly similar looking skin tumors and also showed that cytopathological assessment is possible in many rare skin lesions.

ATs are basically classified into four groups: tumors with differentiation toward hair follicles, sebaceous glands, eccrine glands, or apocrine glands. In the present study, we did not classify them cytomorphologically into these groups specifically but gave a possibility of the type of adnexal lesion e.g., cylindroma and pilomatrixoma wherever it was possible.

Eccrine/Sweat gland tumors were the most common ATs found in the present study similar to the study by Nair et al. Among the eccrine tumors, nodular hidradenoma was the most common tumor as seen in a similar study by Radhika et al. Eccrine tumors of sweat gland can occur anywhere in the human body with a predilection in the head and neck region, palms and soles, extremities, and ventral surface of body. Eccrine tumors have a wide range of age distribution starting in childhood and extending into adulthood with no particular sex distribution. The complex nature of sweat gland may be responsible for this. These eccrine tumors have clinicopathological resemblance to other lesions such as basal cell carcinoma, cutaneous leiomyoma, neurofibroma, and malignant melanoma, subcutaneous metastasis from an internal malignancy, seborrheic keratosis, granuloma pyogenicum, and cutaneous endometriosis. Because of the different variants of nodular hidradenoma, there can be variability in the cell types found on cytology that can sometimes mislead to a diagnosis of metastatic renal cell carcinoma, squamous cell carcinoma, or signet cell adenocarcinoma. Dubb and Michelow reviewed cytologic features of hidradenoma in three cases and concluded that knowledge of cytologic features of hidradenoma can allow correct management of the patient and prevent misdiagnosis as a malignant tumor.

Rekhi and Agarwal reported a case of multiple eccrine spiradenomas that was initially misdiagnosed as Ewing sarcoma on cytology. Presence of small hyaline bodies reminiscent of stromal matrix and basement membrane material within cohesive clusters of basal, round to oval cells, including relatively darker, myoepithelial cells and scattered lymphocytes constituted as diagnostic clues for a skin AT, over Ewing sarcoma. Chondroid syringoma is a rare benign AT of the skin seen most commonly in head and neck region. Cytologically, it shows a biphasic tumor composed of epithelial cells embedded in fibrillary chondromyxoid matrix and has to be differentiated with other soft tissue tumors with myxoid background on FNAC.

Among the follicular ATs, the most common tumor was pilomatrixoma, mostly seen around head and neck region. FNAC showed dual population of cells including a subset of basolaid cells. Ma et al. reported that pilomatrixoma can be falsely diagnosed on cytology if basolaid cells dominate the smears and the characteristic ghost cells are not present. Variability of cellular composition of these lesions should always be considered to avoid any misdiagnosis. Apocrine lesions of the skin are rare and are found mainly in body folds including the axillary, groin, and anogenital regions, where apocrine glands are most commonly encountered. In lesions of apocrine origin, the cells have abundant eosinophilic cytoplasm and eccentric, basally located nuclei. Apocrine differentiation can be tentatively recognized by decapitation secretion, whereas eccrine differentiation is characterized by
ductal or tubular formation.[1] We did not encounter any case of apocrine or sebaceous differentiation in the current study. Cytologic diagnosis can prove to be very useful in the management of adnexal lesions. After close clinic-pathologic correlation, one should always consider skin appendageal tumors in the differential diagnosis during the cytological evaluation of cutaneous nodules. [25] ATs are usually benign, and local complete surgical excision is curative. The malignant counterparts of ATs are rare, locally aggressive, and have the potential for nodal involvement and distant metastasis, with a poor clinical outcome. Therefore, establishing a diagnosis of malignancy in AT is important for therapeutic and prognostic purposes. Malignant change in an AT is usually missed clinically but can be seen when subjected to FNAC and subsequently confirmed by histopathology.[26] Features suggestive of malignancy include asymmetry of the lesion, infiltrative margins, cytonuclear atypia, significantly increased mitotic activity, and irregular arrangement of neoplastic cells.[28]

Early recognition of ATs is also important as they may be markers of certain syndromes associated with internal malignancy, such as trichilemmomas in Cowden and sebaceous tumors in Muir–Torre syndrome, Birt-Hogg-Dubé syndrome, and Brooke-Spiegler syndrome.[29] However, we did not encounter any syndrome in the present study.

Conclusions
Skin ATs are relatively rare with benign ones being more common than the malignant tumors. FNAC is a safe, simple, quick, cost effective, and informative procedure in management of such tumors. It provides clinical correlation and helps in their early diagnosis. FNAC in lesions suspected to be malignant can guide the surgeon regarding extent of excision.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

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