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## Hair follicle tumours in dogs

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### Abstract

Neoplasia is an important concern for all researchers because of its increasing prevalence throughout the country and is a major cause of animal death. A study was conducted to assess the incidence of various types of tumours in dogs among which hair follicle tumours attributed to around 10.33% of all the cases. Histopathologically, the tumours were identified as trichoblastoma (ribbon type and medusa type) (n=4), trichofolliculoma (n=1) and tricholemmoma (n=1). Primarily an involvement of hair matrix cells, infundibulum along with isthmus is found in trichoblastoma, tricholemmoma and trichofolliculoma respectively. All are uncommon benign dermal tumours with breed, hair coat and unknown etiologies.

**Keywords:** Neoplasia, trichoblastoma, trichofolliculoma and tricholemmoma, hair follicle, dog

### Introduction

Hair follicle tumours represent approximately 5-10 percent of cutaneous tumours in canines and are rarely encountered in other species (Campos *et al.* 2014) [1]. Most commonly trichoblastoma and trichoepithelioma are often encountered hair follicle tumours in canines. Less commonly observed tumours include tricholemmoma and trichofolliculoma (Raval *et al.* 2015) [4]. All these hair follicle tumours often benign in nature and are formed from primitive hair germ of embryonic follicular development. The diagnosis of hair follicle tumour can be challenging given that some of these tumors have histologic features in common. To diagnose hair follicle tumours, a thorough knowledge of follicular anatomy is important because these lesions are further classified according to the differentiation pattern seen in the corresponding part of the normal hair follicle. Recently world health organization has reclassified the basal cell tumours in dogs as trichoblastoma (Goldschmidt and Goldschmidt. 2000) [2]. Many times, hair follicle tumours are reported in dog breeds with unhygienic skin coat. Therefore, proper managemental practices including proper cleaning of skin coat in heavy fur breeds is very necessary.

### Materials and Method

A total of 58 tumours were studied during the research at Department of Veterinary Pathology, Veterinary College Mhow out of which 6 were found to be hair follicle tumour. Representative tissue pieces (approximately 0.5 cm each) were collected from multiple (at least 3) sites from excised tumour masses and immediately fixed in 10% neutral buffered formalin (NBF) for 48-72 hours with 2-3 changes of formalin.

After fixation in 10% NBF, tissue samples were trimmed to 1.5mm thickness and given overnight washing under running tap water. The tissue samples were then dehydrated by passing through ascending grades of ethyl alcohol, cleared in xylene and embedded with paraffin wax (melting point 58 °C) for block making. The sections were cut at 4-5µm thickness and stained by Haematoxylin & Eosin (H&E) stain as per standard procedure (Luna, 1968) [3].

### Results and Discussion

Six cases of hair follicle tumors were observed during the study of which four were trichoblastoma and one case each of trichofolliculoma and tricholemmoma.

#### Trichoblastoma (n=4)

4 cases of trichoblastoma ranging from 2 cm × 2 cm to 4 cm × 2 cm in size and 15gm to 30gm in weight. All four tumour masses were excised from the facial area of different dogs. Grossly the tumour masses were small and single round masses covered by hairy skin. In one of the case, the tumour mass was nodular and ulcerated.

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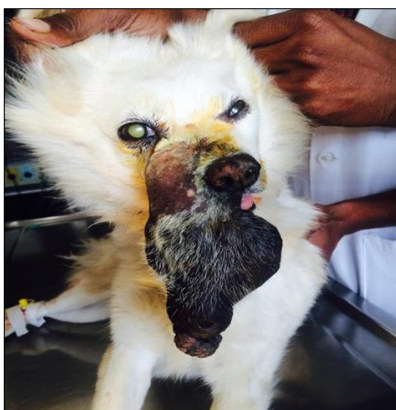
Histopathological examination revealed trichoblastoma ribbon type pattern in three cases and trichoblastoma medusa type pattern in one of the case. In ribbon type, there was presence of long chords of two cells thick cords with nuclei arranged in a palisaded fashion. Nuclei were hyperchromatic and individual neoplastic cells had scanty cytoplasm with indistinct cell borders. Connective tissue separating the neoplastic cells was hyalinized. Mitotic index was variable and ranged from 15 to 20 per 10 hpf (Fig 2). In trichoblastoma medusa type, there were cords of cells radiating from a central island of densely packed cells. The cords of epithelial cells had abundant eosinophilic cytoplasm and connective tissue matrix was hyalinized. Mitotic index was 14 per 10 hpf (Fig 3).

**Trichofolliculoma (n=1)**

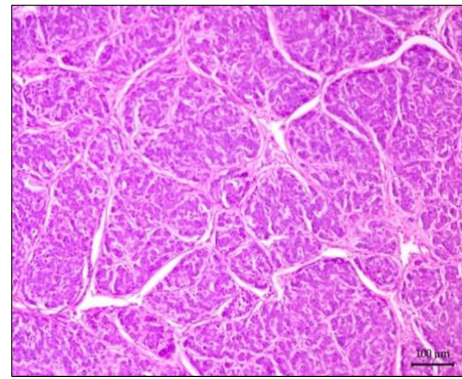
One tumorous mass hanging from the muzzle region of a dog measuring 8 cm × 5 cm and weighing 100 gm was surgically excised. The gross surface of the mass was blackish in colour and covered with hair. There was also presence of some nodular growth on the apex of the mass. Upon histopathological examination of tissue, cysts lined by squamous epithelium resembling infundibular epithelium and containing keratin and hair fragments were seen. Hair follicles were found attached to the wall of cyst and presence of infiltrated fibrous connective tissue was also noticed. Mitotic activity index was very less (3 per 10 hpf) (Fig 4).

**Tricholemmoma (n=1)**

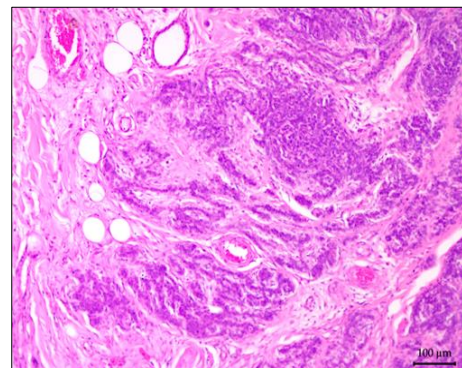
One tumour mass measuring 2 cm × 2 cm and weighing 15gm was surgically excised from the lumbar region of a dog. Grossly, the tumour mass was hard in consistency and bleeding. Histopathology revealed presence of islands of neoplastic cells involving the hair follicle isthmus. There was a central lumen filled with keratin and lined by large squamous cells with pale eosinophilic cytoplasm. Some cysts were also present in between the keratinized islands of epithelial cells. A granulomatous inflammatory response was seen in surrounding tissue due to release of keratin. Mitotic activity index was 12 per 10 hpf (Fig 5). Primarily an involvement of hair matrix cells, infundibulum along with isthmus is found in trichoblastoma, tricholemmoma and trichofolliculoma respectively. All are uncommon benign dermal tumours with breed, hair coat and infectious etiologies as published by Davis-Thompson DVM foundation, (2008) [5].



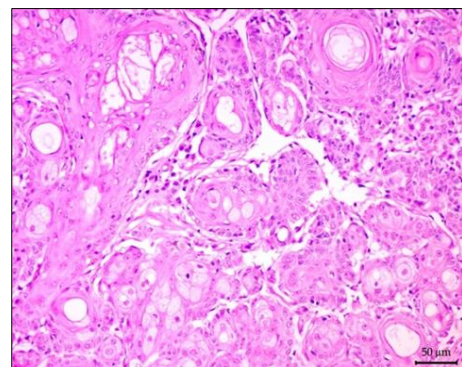
**Fig 1:** Gross photograph showing black tumorous mass covered with hair and having apical nodular growth, hanging from muzzle region of a dog later found to be trichoblastoma



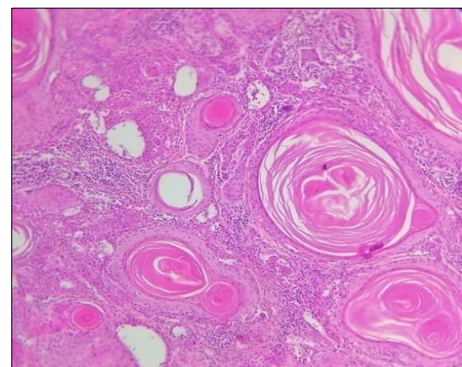
**Fig 2:** Trichoblastoma (Ribbon type): Double layers of long epithelial chords arranged in a palisaded ribbon like fashion with hyalinized connective tissue (H&E x 100)



**Fig 3:** Trichoblastoma (Medusa type): Epithelial cells with abundant eosinophilic cytoplasm and hyalinized connective tissue matrix



**Fig 4:** Trichofolliculoma: Hair follicle cysts lined by squamous epithelium with keratin (asterisk), hair fragments and presence of fibrous connective tissue infiltrated by mononuclear cells (arrow) (H&E X 100)



**Fig 5:** Tricholemmoma: Islands of neoplastic cells having a central lumen filled with keratin (arrow), peripheral cysts and inflammatory response (H&E X 100)

## Conclusion

Hair follicle tumours have complex histological appearance and have no significant follicular and sebaceous differentiation. The head and neck are the primary sites of occurrence of trichoblastomas in dog and cat but can arise from any anatomical sites including forelimb, hindlimb, abdomen, thorax, back and tail. Similarly trichilemmomas and trichilemmomas can arise from any part of the body. No sex predilection has been noted for these tumours (Raval *et al.*, 2015) <sup>[4]</sup>. Etiology of hair follicle tumours is still unclear. However Wong and Reiter (2011) <sup>[6]</sup> revealed that wounding can recruit oncogene-expressing stem cells from a hair follicle niche into sites of injury, where they subsequently gave rise to tumours resembling basal cell carcinomas in transgenic mice. Proper management of hair coats of animals should also be done as sometimes poor and unhygienic hair coats triggers allergic reactions which can further produce lesions and thus wounds on skin.

## Conflict of interest

The author declare that there is no conflict of interest.

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