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Canine skin tumours: Occurrence and histopathology

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ABSTRACT

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The present investigation was carried out to study the histopathology of spontaneously occurring canine skin tumours. A total of 61 grossly suspected cases of spontaneously occurring canine cutaneous tumours were collected from different places. On histopathological examination, 58 cases were diagnosed as neoplasms. Among them, 30 (51.72%) were benign and 28 (47.28%) malignant. The females had higher incidence (32; 55.17%) than males (26; 44.83%). Benign tumours were recorded at an average age of 7.44 years which was higher than for malignant tumours (6.72 years). Benign tumours encountered were canine cutaneous histiocytoma (11), cavernous hemangioma (3), mast cell tumour (3), perianal gland adenoma (6), fibroma (5) and fibromyxoma (2). The malignant skin tumours were basal cell carcinoma (10), squamous cell carcinoma (5), fibrosarcoma (4), myxosarcoma (2), perianal gland adenocarcinoma (3), epidermoid carcinoma (1), liposarcoma (1), sebaceous basal cell carcinoma (1) and sebaceous gland adenocarcinoma (1).

Key words: Benign, canine, epidermoid carcinoma, epithelial, malignant, skin and tumours

INTRODUCTION

The cancer is a life threatening ailment with a reputation of being a silent killer Neoplasms have gained much importance in pet animals owing to the love and increased awareness among the people towards animal sufferings and pain. Incidence of neoplasms in pet animals is difficult to ascertain but in a major study on a defined population, the Tulsa Registry reported an incidence of 1,126 cases of neoplasms per 100,000 dogs per annum[7]. Canines develop neoplasms twice as frequently as humans[8,15]. Among all tumours in canines, the occurrence of skin and mammary tumours had been highest[13]. The present investigation was carried out to study histopathological diagnosis and occurrence of skin tumours in canines.

MATERIALS AND METHODS

Spontaneously occurring canine skin tumour samples were collected from Veterinary Polyclinic I.V.R.I, Izatnagar and Hospitals of Veterinary Colleges at Bangalore, Mathura, Pantanagar and Palampur and preserved in 10% neutral buffered formalin for histopathology. The case history including age, sex, breed and location of tumour were also collected.

Representative pieces from tumour tissues were processed routinely to obtain 5 μm thick haematoxylin and eosin stained sections for histopathological examination[6]. Duplicate sections were subjected to special stainings toluidine blue for mast cell with granules and Masson's Trichrome for connective tissues.

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RESULTS AND DISCUSSION

A total of 61 grossly suspected cases of spontaneously occurring canine cutaneous tumours were collected, along with case history. On histopathological examination 58 cases were diagnosed as neoplasms. Among them, 30 (51.72%) were benign and 28 (47.28%) malignant. The occurrence of skin tumours was high in females (32; 55.17%) than males (26; 44.83%). These observations corroborate to those of Moulton[8] and Singh *et al.*[16]. Benign tumours were recorded at an average age of 7.44 years which was higher than for malignant tumours (6.72 years), similar to observations made by Singh *et al.*[16]. Breed-wise occurrence of tumours in German shepherd (15), followed by Non-descriptive (14), Spitz (8), Great Dane (7), Labrador (5), Doberman (2), Boxer (3), Cocker spaniel (2) and Laspas (2) (Table 1). This observation differed from earlier reports probably due to difference in geographical distribution of breeds. Benign tumours encountered were canine cutaneous histiocytoma (11), cavernous hemangioma (3), mast cell tumour (3), perianal gland adenoma (6), fibroma (5) and fibromyxoma (2). The malignant skin tumours were basal cell carcinoma (10), squamous cell carcinoma (5), fibrosarcoma (4), myxosarcoma (2), perianal gland adenocarcinoma (3), epidermoid carcinoma (1), liposarcoma (1), sebaceous basal cell carcinoma (1) and sebaceous gland adenocarcinoma (1).

Benign Skin tumours

Canine cutaneous histiocytoma: The sections revealed sheets of neoplastic cells replacing the dermal and subcutaneous tissue. The cells were loosely arranged towards the periphery, compactly arranged towards the deeper dermis with delicate connective tissue stroma intersecting the solid cell sheets (Fig.1). The tumour cells

had large round or oval uniform nuclei with distinct cytoplamic borders. Numerous mitotic figures were observed (Fig. 1 inset). These features were similar to those described by earlier workers for canine cutaneous histiocytoma[9,11].

Cavernous hemangioma: The tumour tissue exhibited many blood filled vascular spaces lined by single layer of well differentiated flattened endothelium. The incompletely formed vessels were haphazardly arranged in connective tissue stroma. The endothelial cells had a round or spindle shaped nuclei and light pink elongated cytoplasm similar to that described by previous workers[3,8].

Fibroma and Fibromyxoma: The sections revealed bundles of fibroblasts running in criss-cross directions with formation of whorl at times. Fusiform fibroblasts having elongated or ovoid shaped nuclei were found in between abundant collgen fibers. The blood vessels were generally congested and mitotic figures were absent. Collagen was confirmed with Masson's Trichrome stain. At other places, the stellate appearing neoplastic cells were distributed in bluish mucinous stroma. The feature of fibroma and fibromyxoma were identical to those described by earlier authors[4,8].

Mast cell tumour: The tissue sections comprised of cords and sheets of pleomorphic neoplastic cells which were separated by varying amount of dermal collagen fibres. The cells has distinct cytoplasmic borders with centrally placed large, vesicular, more or less round nuclei. The cytoplasm contained violet colored metachromatic granules with toluidine blue (Fig. 2) as has been described by earlier workers[10,12,17]. Infiltration of eosinophils was noticed being characteristic feature of canine mast cell tumour.

Perianal gland adenoma: Microscopically, lobules or cords of large, discrete, round to polyhedral hepatoid cells were seen with centrally placed nucleus and abundant finely granular acidophilic cytoplasm. These cells were surrounded by single layer of proliferating small reserve basiloid cells. The cells had round or oval, small to medium hyperchromatic nuclei with single prominent or sometimes multiple nucleoli and less conspicuous cytoplasm[8].

Malignant skin tumours

Basal cell carcinoma: The seven cases of basal cell carcinoma depicted various patterns of cellular arrangement such as adenoid (3), mixed (2) and solid (2). The tumour tissue revealed proliferating basal epithelial cells infiltrating the dermis. These neoplastic cells forming adenoid pattern in superficial dermis and solid pattern in deep dermis (Fig. 3). The cells were small and uniform in size, having characteristic oval vesicular nucleus with little cytoplasm. Mitotic figures were moderate in number. The histological findings are in accordance to those reported by Moulton[8] and Jones *et al.*[4].

Fibrosarcoma: The section revealed interwoven fusiform shaped immature fibroblasts with moderate amount of collagen fibers. The tumour was highly cellular compared to fibroma. Fibroblasts had round or oval nuclei with one or more prominent nucleoli. Mitotic figures were seen in fairly good number of neoplastic cells. Infiltration of mononuclear cells and neutrophils with congestion of blood vessels found towards periphery of the section are in accordance to those reported earlier [4,8].

Liposarcoma: The sections exhibited pleomorphic neoplastic cells with medium to large sized fat vacuoles replacing cytoplasm which contained hyperchromatic nuclei. Moderate amount of fibrous connective tissue septa with invasion of neoplastic cells were also observed. These features were similar to those described by Krithiga *et al.*[5].

Myxosarcoma: The neoplastic cells were distributed densely in mucinous stroma, which appeared stellate

Table 1. Breed and age wise distribution of canine mammary tumours

Breed	Sex		Benign tumours		Malignant tumours	
	Male Mo.	Female No.	No. of cases	Avg. age (years)	No. of cases	Avg. age (years)
German Shepherd	10	5	7	7.67	8	7.2
Non-Descript	7	7	8	8.0	6	9.0
Great Dane	4	3	3	7.25	4	7.0
Labrador	3	2	4	8.25	1	6.0
Spitz	5	3	5	7.88	3	6.0
Boxer	1	2	1	6.0	2	5.5
Dobermann	2	-	-	-	2	8.25
Laspas	-	2	1	7.0	1	6.0
Cocker Spaniel	-	2	1	7.5	1	5.5
Total	**32**	**26**	**30**	**-**	**28**	**-**

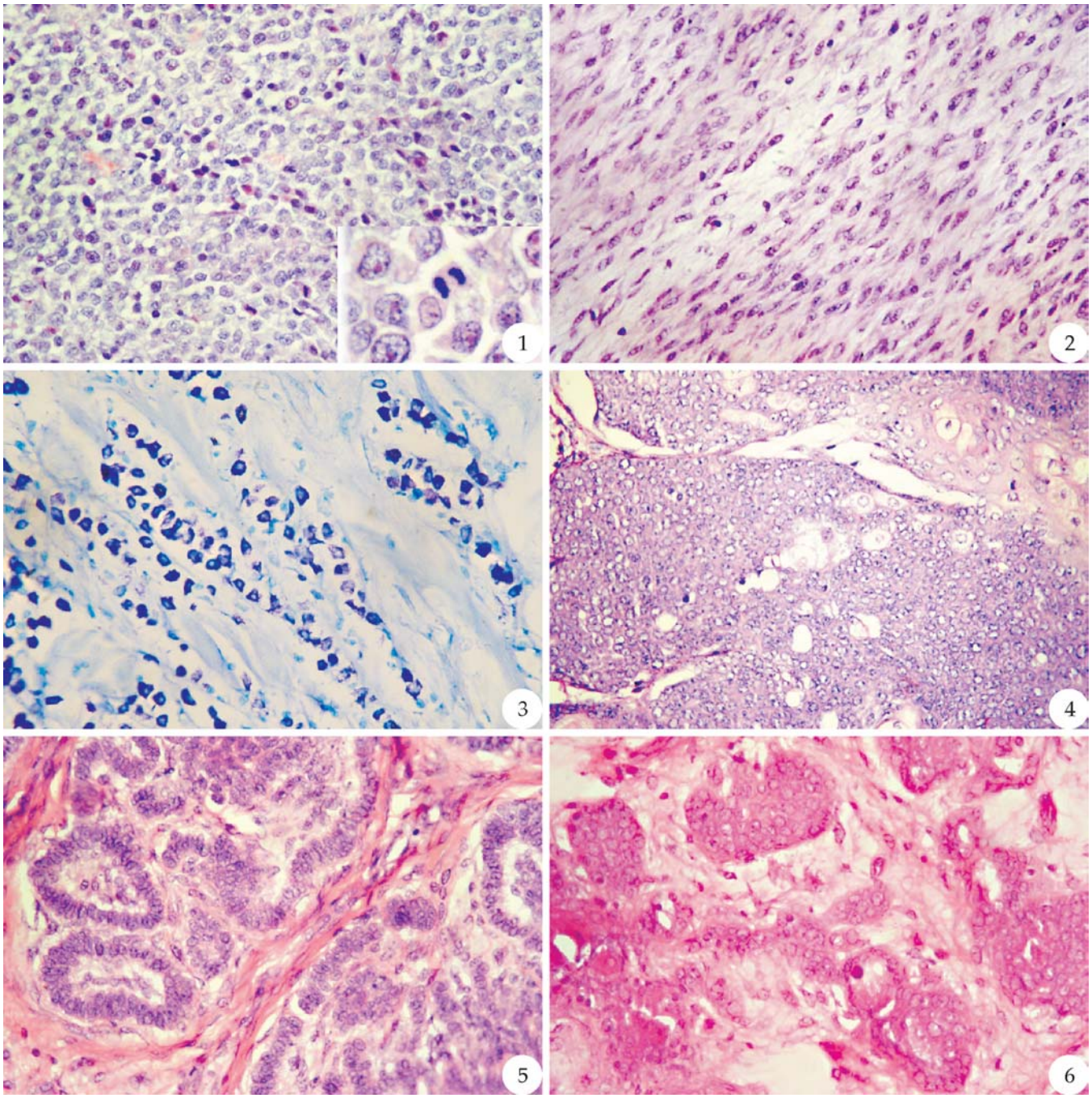

Fig. 1. Cutaneous histiocytoma : Proliferating neoplastic cells showing many mitotic figures. HE x400. **Fig. 2.** Mast cell tumour: Mast cells showing positive metachromatic granules. Toludine blue x250. **Fig. 3.** Basal cell carcinoma: Neoplastic cells forming adenoid pattern. HE x250. **Fig. 4.** Myxosarcoma: Tumour cells in myxomatous stroma with hyperchromatic nuclei and mitotic figures. HE x400. **Fig. 5.** Sebaceous basal cell carcinoma: Lobules of proliferating basal cells. HE x400. **Fig. 6.** Perianal gland adenocarcinoma: Proliferating basiloid cells invading the connective tissue stroma with few hepatoid cells. HE x400.

in shape and arranged in wavy pattern. The cells had vesicular oval or elongated hyperchromatic nuclei. Mitotic figures were numerous (Fig. 4). Areas of necrosis and infiltration of neutrophils and monocytes were also noticed.

Sebaceous basal cell carcinoma: The tumour tissue showed many solid lobules separated by thin connective tissue septae containing densely packed proliferating basal epithelial cells and in some lobules sebaceous basal epithelial cells were also noticed with either partially or fully differentiated sebaceous cells (Fig. 5). The proliferating basal cells had uniform, spherical or oval

shaped nuclei, some of the cells were having hyperchromatic nuclei with one or more prominent nucleoli. The less differentiated sebaceous cells had abundant light stained cytoplasm and faint disintegrated nuclei. Mitotic figures were frequently encountered. This kind of tumour have been rarely described in canine in the literature so far and appears to be the first case report in canine[13]. However, the occurrence of this tumour had been reported in skin of experimental rats[12].

Squamous cell carcinoma: The neoplastic squamous epithelial cells invaded deep dermis in the form of thick cellular islands and irregular cords composed of concentric layers of squamous cells with keratinization towards the centres forming keratin pearl and cell nests which are characteristic feature of squamous cell carcinoma. Intercellular bridges were conspicuously present between spinous epithelial cells. Mitotic figures were encountered frequently[4,8].

Perianal gland adenocarcinoma: Tumour tissue showed large round to polyhedral cells that contained centrally located large vesicular nuclei and abundant finely granular pinkish cytoplasm and were arranged in clusters or cords with occasional lobular pattern (Fig. 6). These cells were surrounded by multiple layers of proliferating basiliod cells. The basiloid cells had small to medium round vesicular nuclei. Mitotic figures were moderate in number. The proliferating cells invaded the fibrous stroma individually or in clusters. Squamous metaplasia with keratin formation was also noticed. Our findings in above tumours corroborates with findings of earlier workers[1,12].

Epidermoid carcinoma: The sections showed solid masses of tumour cells surrounded by connective tissue stroma and central area of necrosis. The tumour cells were more or less differentiated squamous cells with large round or oval shaped vesicular nuclei having prominent nucleoli. Some of the cells had more than one nuclei. There was no keratin formation and mitotic figures were encountered frequently. The cutaneous epidermoid carcinoma among canine is very rare[14]. However, in nature this condition is reported to arise from hair follicle among human[2].

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REFERENCES

1. Anilkumar CS,Vijayasarathi SK, Sreenivas Gowda RN and Vasanth MS (1997). Pathology of perianal gland tumors in dogs. *Indian J. Vet. Pathol.,* **21**: 135-137
2. Boyd W (1961). *Skin In: Text Book of Pathology, Structure and function in disease,* 7th ed. skin chapter, Leex & Febriger, Philadelphia, pp.1327
3. Hargis AM, Ihrke PJ, Spangler WL and Stannard AA (1992). A Retrospective clinocopathologic study of 212 dogs with cutaneous hemangiomas and hemangiosarcoomas, *Vet. Pathol.,* **29:** 316-328.
4. Jones TC, Hunt RD and King NW (1997). *Veterinary Pathololgy,* 6th edn. Williams and Wilkins, Baltimore, pp. 345-871.
5. Krithiga K, Murali Manohar B and Balachandran C (2005). Cytological and histopathological diagnosis. II Canine mesenchymal tumours. *Indian J. Vet. Pathol.,* **29**: 118-120.
6. Luna LG (1972). *Manual of histologic staining methods of the armed forces institute of pathology,* 3rd ed. W.B. Saunders, Philadelphia.
7. MacVean DW, Monlux AW, Anderson PS, Silberg SL and Roszel JF (1978). Frequency of canine and feline tumors in a defied population. *Vet. Pathol.,* **15**: 700-715.
8. Moulton JE (1990). *Tumors in Domestic Animals*. 2nd edn. University of California Press, Berkeley.
9. Nair BC, Saikumar G, Ram Kumar and Paliwal OP (2006). Differential diagnosis of canine cutaneous histiocytoma and canine transmissible venereal tumour by AgNOR and PCNA. *Indian J. Vet. Pathol.,* **30**: 66-67.
10. Northrup NC, Howerth EW, Harmon BG, Brown CA, Carmicheal KP, Garcia AP, Latimer KS, Munday JS, Rakich PM, Richey LJ, Stedman NL and Gieger TL (2005). Variation among pathologists in the histologic grading of canine cutaneous mast cell tumors with uniform use of a single grading reference. *J. Vet. Diag. Invest.,* **17**: 561-564
11. Pawaiya RVS, Ram Kumar, Paliwal OP, Pawde AM and Ravindran R (2006). Evaluation of cell proliferation markers in canine cutaneous histiocytoma and transmissible venereal tumour. *Indian J. Vet. Pathol.,* **30**: 49-52.
12. Pawaiya RVS (2004). Pathology of chemically induced neoplasms and evaluation of molecular markers in diagnosis of animal tumors. PhD thesis submitted to Indian Veterinary Research Institute. Izatnagar, India.
13. Reddy Manjunatha GB, Ram Kumar, Pawaiya RVS and Ravindran R (2007). Canine dermal neoplasms: Evaluation of tumour proliferative fraction. *Indian J. Vet. Pathol.,* **31**: 108-112.
14. Reddy Manjunatha GB, Ram Kumar, Sharma AK and Maiti SK (2007). Canine cutaneous epidermoid carcinoma: A case report. *Indian J. Vet. Pathol.,* **31**: 172-174.
15. Rungsipipat A, Suryasootcharee B, Ousawaphlangchi L, Sailasuta A, Thanawongnuwech R, Teankum K and Lek O (2003). Neoplasms in dogs in Bangkok. *Thai J. Vet. Med.,* **33**: 59-66.
16. Singh R, Mihindroo J, Bangam HS, Singh SS and Kanal SK (2004). Occurrence of neoplasms in canines. *Indian J. Vet. Pathol.,* **28**: 54-57.
17. Tiwari SK (2002). Neoplasma in canines of Chhattisgarh State-an overview. *Intas Polyvet*, **3:** 318-321.