A RESULT OF THE STUDY ON CANINE TUMORS IN ULAANBAATAR CITY

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ABSTRACT

There are some studies available on the value of cytologic examination as a diagnostic method for tumors in dogs. Therefore objectives of this study were to determine whether cytologic findings in fine-needle aspirate specimens of canine tumors correlate with histopathologic results and to find out most common tumor in dog. Information was collected from dog owners and vets according to aquestionnaire, a patho-morphologicinvestigation of tumorswas done by using cytological(Fine Needle Aspirate) and histological (MNS 5451:2005)techniques, and the gathered information was analysed. In total of 33 canine (Canis Lupus familiaris) tumor cases were found in chosen vet clinics during the time between Dec 2013 and Aug 2014. The results of histopathological, cytologicaland physical examinations revealed that 27 cases (93.1%) were a benign tumor. And maximum incidence of tumors was mammary adenoma (31%), followed by skin fibroma (27.6%), peri anal adenoma (13.8%), testicular adenoma (10.3%), soft tissue sarcoma (6.9 %), and prostate tumor, lipoma and TVT (3.4% each).

KEY WORDS:tumor, histopathology, cytology, statistical analysis, dog

INTRODUCTION

Cancer is a common problem in dogs, although all dog breeds and crossbreed dogs may be affected, it is notable that some breeds of pedigree dogs appear to be at increased risk of certain types of cancer suggesting underlying genetic predisposition to cancer susceptibility(1).Neoplasms in dogs are twice more frequent in comparison to man(2).Dogs are used as a model animal for human cancer studydue to their spontaneous development and frequency; dogs live close to human environment and eat similar food and are thus exposed to similar risk factors, so the etiology and pathogenesis of canine tumors are likely to be similar to that of human tumors (3-8).Cytology often is used as a diagnostic tool in veterinary medicine and cytologic findings correlate well with histopathologic diagnoses for numerous tumor types (9-13).Cytologic examination has satisfactory sensitivity and specificity for the differentiation of malignant and benign canine mammary tumors(14).In the dog, skin and subcutis are the most common sites for neoplasms, accounting for 67.5% of the neoplasms in one survey(15).Advances in veterinary medicine, particularly diagnostics and higher expectations of the pet owning public, are likely to result in an increased rate of diagnosis(1).

MATERIALS AND METHODS

Samples

A survey of tumors in dogs collected from December 2013 to August 2014 was performed at the laboratory of Pathology, Institute of Veterinary Medicine, Mongolia. A total of 33 dogs presented to different 5 veterinary clinics with a history of neoplasm or growths at various locations formed the source for this study. Particulars like breed, age, sex, color and clinical manifestations exhibited by the animals were recorded on questionnaires.

Cytology

After complete physical examination, obvious masses on dogs were aspirated by 3-5 ml syringe and 22-25 gauge needle, sprayed it on microscope slides, air dried, fixed in methanol, and then stained with Giemsa and Diff Quick stain. In cytology specimen, nuclear size and number, N:C ratio, mitotic figure, anisocytosis and cell pleomorphism were evaluated for tumor malignancy.

Histopathology

Tissue samples werecollected either by biopsy after surgery or at a postmortem examination from cases of canine neoplasms andfixed immediately in 10% neutral buffered formalin. Samples from neoplastic growths were processed by routine paraffin embedding techniques. Sections of 2-3 µm thick were cut using microtome (Yamato Konki). These sections weredeparaffinized and then stained with routine hematoxylin and eosin (H&E) method.

Hematology and serum biochemistry

9 Blood samples were obtained by using vacuumtubes. White and red blood cells (WBC, RBC) were counted by a hemocytometer (Neubauer). Leukocyte differentials were determined in blood smear. Blood was centrifuged (Medexport, 3000 rpm for 5 minutes) and ALT (alanine aminotransferase), AST (aspartate aminotransferase), ALKP (alkaline phosphatase), total protein, glucose, inorganic phosphorus and calcium were estimated in serum by a spectrophotometer (TOMOS, V-1800).

Statistical analysis

Information was gathered by taking a questionnaire from dog owners and vets. The questionnaire included dog history and some risk factors for tumors (age, gender, spayed or neutered, diet, smoke etc.). Information and result of hematology and serum biochemistry wereanalyzed by using SPSS Statistics20.0.

RESULTS

A total of 33 cases suspected for neoplastic growths were screened by cytological and histopathological procedures and 29 cases werediagnosed as tumors.Results of histopathological, cytologicaland physical examinations revealed that 27 cases (93.1%) were benign tumors and maximum incidence of tumors was mammary adenoma (31%), followed by skin fibroma (27.6%), peri anal adenoma (13.8%), testicular adenoma (10.3%), soft tissue sarcoma (6.9 %), and prostate tumor, lipoma and TVT (3.4% each).

Cytology

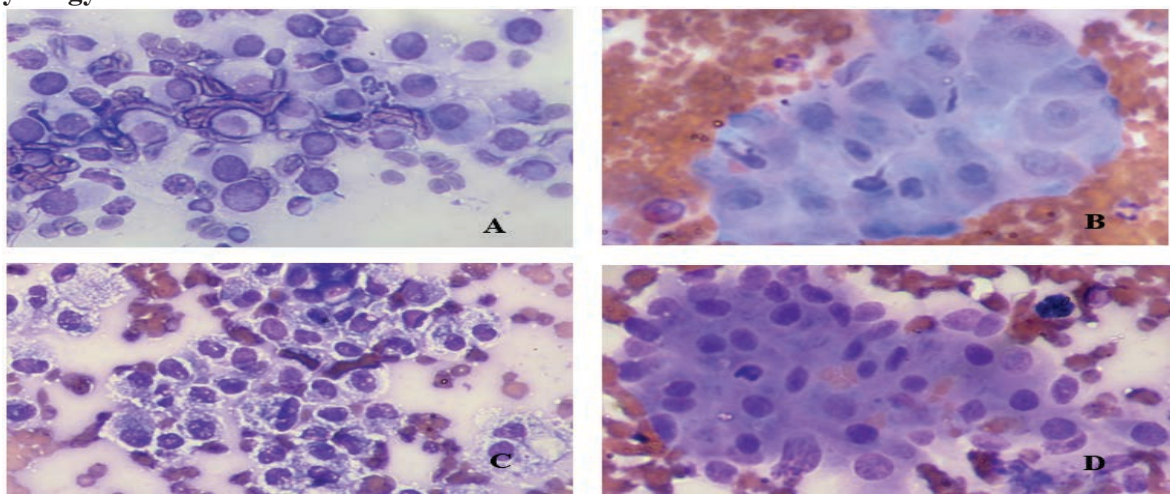

Figure 1.Fine needle aspirate specimen of dogs (Giemsa stain). Skin round cell tumor (Histiocytoma) - Oval shaped cells with eccentric nucleus and pale cytoplasm. (**A**), Testicular tumor - Cluster of epithelial cells (**B**), Anal gland adenoma - foam cells (**C**), Anal gland adenoma –Cluster of hepatoid cells (**D**).

Cells characteristic of histiocytoma were round to slightly oval and showed discrete cell pattern with distinct margins. The cell size was larger than neutrophils. Nuclei were round to oval and usually eccentric. The nuclear: cytoplasmic ratio varied but usually was slightly more than 1:1. Mitotic figures were not found. Intracellular vacuoles and granules were not seen (fig. 1. A).The monomorphic round cells had a low degree of pleomorphism and lack clear criteria of malignancy, so that indicative of benign skin histiocytoma.

Peri anal glands are modified sebaceous glands that encircle the anus of dog(16). As seenin figure 1. D, fine needle aspirate (FNA) of anal gland was very cellular. Most cells were in cluster. Cells had tan cytoplasm and uniform, round nuclei. Cells were similar to hepatocytes in the liver(fig. 1. D). Thehepatoidshaped feature confirmed that the tumor was anal gland adenoma. Beside hepatoid cells, there were also highly granular cells which could be macrophages or secretory cells (fig. 1. C).

Histopathology

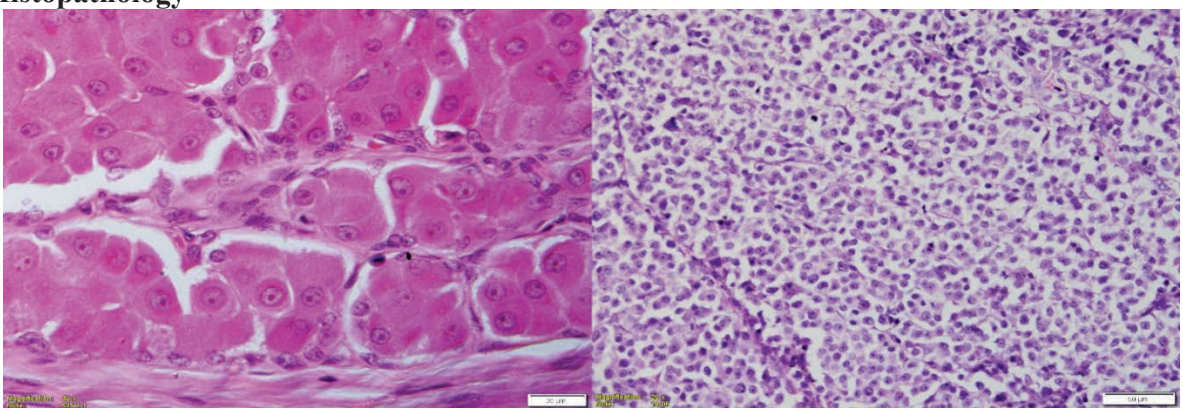

Figure 2. Well differentiated anal gland adenoma – hepatoid cells (**A**) (HE x400), Degenerating anal gland adenoma – hepatoid cells with large volume of pale cytoplasm (**B**) (HE x200).

In figure 2. A, histological characteristic of this anal gland adenoma corresponded to a normal structure of the anal gland. Cells did not indicate any malignancy characteristics (mitotic figure, poor differentiation of cell etc.) so that it was benign adenoma. But in figure 2. B, tissue architecture was lost and there were no tubular structure. Most cells were degenerating.

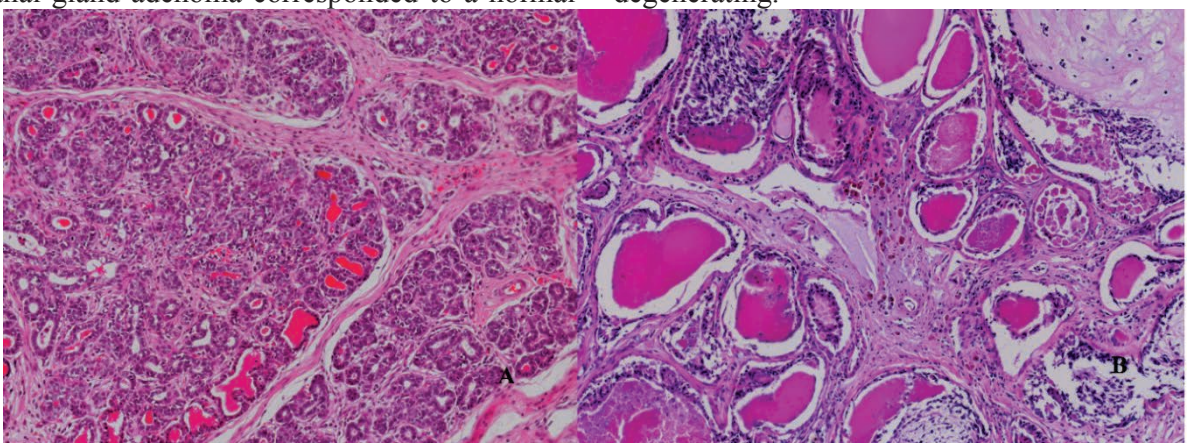

Figure 3. Mammary gland adenoma – glandular cells proliferate excessive amount (**A**) (HE x100), Mammary gland fibroma and some inflammation with exudate (pink materials) in the duct (**B**) (HE x100).

In figure 3. A, the number of mammary glands was increased, thus ducts were compressed. The size and shape of most glandular cells were similar to each other and there was no sign of malignancy. So that it was mammary gland adenoma. In figure 3. B, the amount of fibrocytes was increased, and the size of ducts expanded due to ducts were filled with an exudate. These features revealed that it was fibroma with inflammation.

Hematology and serum biochemistry

Hematological and serum biochemical examinations were performed in blood and serum samples of diseased (tumor) dogs. The result of our study was compared with dog's hematological and serum biochemical normal value taken from Vet merck manual (2012). WBC, RBC, lymphocyte, monocyte, eosinophil, neutrophil, ALT, ALKP, phosphorus were ranged in normal level. Basophil, AST, glucose and total protein were slightly higher than the normal value. The details are summarized in Table 1, 2.

Table 1

Mean (M) and standard error of mean (m) of hematology value (diseased dog)

	WBC $10^3/\mu l$	RBC $10^6/\mu l$	Lymphocyte %	Basophil %	Monocyte %	Eosinophil %	Neutrophil %
Normal value (Vet Merck manual reference)	**5-14.1**	**5-7.9**	**8.0-21**	**0-1**	**2.0-10**	**0-9**	**58-85**
M± m	7.8±1.1	5.8±0.5	10.3±2.5	2.7±0.3	3.0±0.7	5.3±1.04	78.7±2.8

Table 2

Mean (M) and standard error of mean (m) of serum biochemistry value (diseased dog)

	ALT U/l	AST U/l	Alkaline phosphatase U/l	Inorganic phosphorus mmol/l	Calcium mmol/l	Glucose mmol/l	Total protein g/l
Normal value (Vet Merck manual reference)	**10-109**	**13-15**	**1-114**	**0.9-1.7**	**2.3-2.9**	**4.2-6.6**	**54-75**
M± m	25.02±17.67	41.6±26.5	25.6±11.44	1.20±0.3	0.9±0.4	3.5±0.7	81.7±6.7

Statistical analysis

In the present investigation, it was observed that tumor occurred in all age groups, ranging from 2 to 16 years with an average of 9.14±0.67 years and the maximum incidence of 55.2 per cent of tumors was observed in 6to 10year aged group of dogs. Weight of tumors ranged between 4.18gram and 749.39gram. Among 29 cases, 9(31%) were recorded in male and 20(69%) in female dogs. Maximum incidence of tumors occurred in Spaniel (7), followed by Mini poodle (5), crossbreed dog (3), German shepherd (2), Toypoodle (2) and Bankhar, Spitz, Labrador Retriever, Central Asian shepherd dog, Doberman pinscher, Terrier and Schnauzer (one each). In the present study the most frequently affected site for tumor was skin and mammary gland. The details are summarized in Table 3.

Table 3

Risks for canine tumor in percent

Risks	Dog breed	Cases n	%
Breed	Mini poodle	5	18.5
	Toy poodle	2	7.4
	Mongolian Bankhar	1	3.7
	Spaniel	7	25.9
	Central Asian shepherd dog	1	3.7
	Doberman pinscher	1	3.7
	German shepherd	2	7.4
	blonka	1	3.7
	Terrier	1	3.7
	Spitz	1	3.7
	Schnauzer	1	3.7
	Crossbreed	3	11.1
	Labrador retriever	1	3.7
Sex	Female	20	69
	Male	9	31
Age (years)	1-5 age	4	13.8
	6-10 age	16	55.2
	Above 10 age	9	31
Body weight (kg)	1-10 kg	8	38.1
	10-20 kg	8	38.1
	Above 20 kg	5	23.8
Diet	Home food	14	63.64
	Dog food (Brand)	8	36.36

Risks		Cases n	%
Spayed or neutered	Yes	2	9.1
	No	20	90.9
Give birth	Yes	0	0
	No	14	100
Does owner smoke?	Yes	7	35
	No	13	65
Body condition score (1-9)	1-3	1	4.3
	4-6	18	78.3
	7-9	4	17.4
Surgery	Yes	17	73.9
	No	6	26.1
Euthanasia	Yes	3	13
	No	20	87
Site of tumor	Peri anal gland	4	15.4
	Mammary gland	9	34.6
	Skin	7	26.9
	Mouth area	2	7.7
	Testis	2	7.7
	Prostate gland	1	3.8
	Vagina	1	3.8

DISCUSSION

A total of 25 cases suspected for neoplastic growths were screened by cytological and histopathological procedures to diagnose tumors. The cytological and histopathological results were correlated to each other, and it is required to do further studies on accuracy of cytologic examination. Canine skin (27.6%) and mammary gland tumor (31%) were the most common types.A total of 33cases wasasked and analyzed for risk factor to tumor development. We agree with the result of Weeth LP et al.'s study (2007) (17)that percent of obese dogs is lower (17.4%) among dogs with tumors. So that obesity is not risk factor for developing tumors in dog. Age could be a risk factor, because 55.2 percent of tumors was observed in 6to 10year aged group of dogs.In our study, percent of spayed or neutered dogs was 9.1 %. Spaying and neutering could decrease the risk of developing tumors in dog.

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