

Incidence and management of neoplasms in dogs of Himachal Pradesh

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A neoplasm or tumour is a tissue mass which has lost control over its growth mechanism. Compared to man, dogs develop tumours twice as frequently (Moulton 1990) and metastatic tumours are one of the leading causes of deaths in dogs. The present study was undertaken to record the incidence of neoplasms in dogs of Himachal Pradesh and to analyse the current tumour management practices. The study included 75 cases of dogs with various neoplasms presented to Veterinary Clinic of the University during December 2006 to April 2008.

The dogs were routinely subjected to clinical, radiological, haematological, blood biochemical and histopathological examinations at the time of presentation and different intervals thereafter as per the requirement in particular case. TNM staging of tumours were done in a standard manner where, tumour size (T), involvement of regional lymph nodes (N) and distant metastasis (M) were factored in. Haematological examination included estimation of haemoglobin (Hb), packed cell volume (PCV), total leukocyte count (TLC), total erythrocyte count (TEC) and differential leukocyte count (DLC). The biochemical and enzymatic parameters of plasma included alkaline phosphatase (ALKP), total protein (TP), calcium, glucose (GLC), alanine aminotransferase (ALT), aspartate aminotransferase (AST), blood urea nitrogen (BUN) and creatinine (CRTN). In certain cases, where chemotherapy was adopted for treatment, above parameters were recorded at weekly intervals. The data were statistically analysed by ANOVA and unpaired “t” test at 1 and 5% level of significance. Treatment strategies adopted for management of tumours and their efficacies were recorded.

Out of 1491 cases presented to the clinics during the study period, 75 dogs were suffering from various kinds of neoplasms with the incidence rate of 5.03%. Among these,

genital tumours accounted for 33.33% cases, mammary tumours for 13.33% and the rest 53.33% cases comprised diverse types of tumours and grouped under ‘other tumours’ category. Topographically 22.66% tumours involved head and neck, 4% chest, 10.33% abdomen, 33.33% external genitalia, 10.66% perineal region, 2.66% forelimb and 13.33% involved hindlimbs. Malignant tumours were diagnosed in 66.12% cases which contradict the reports of Oron *et al.* (1968) and Moulton (1978). The high incidence of malignant tumour in the current study might be due to the widespread and high occurrence of canine transmissible venereal tumour (CTVT) in dog subjects. CTVT (n=19) showed the highest incidence of all the tumours with an incidence rate of 25.33% corresponding to the findings of Tiwari (2002).

The incidence of tumours increased with age and 8–10 years category of dogs was most affected in this study (18.28%). This finding is in agreement with Kusch (1985) who reported that the average age of dogs diagnosed with malignant neoplasm was 9 years. Similarly in accordance with Phancho *et al.* (1990), the incidence of tumours was more in females (10.2%) than males (3.04%) in the present study. It was reported that the caudal abdominal and inguinal mammary glands were involved more commonly in mammary tumours (Moulton 1990, Stratmann *et al.* 2006) and the present study also confirmed that the fourth and fifth pairs of mammary gland were commonly affected due to greater volume of breast tissue in these glands (MacEwen and Withrow 1989).

All the clinical parameters remained within the physiological range throughout the treatment period in all groups. In venereal granuloma patients, the rectal temperature increased significantly ($P < 0.05$) at fourth week of vincristine sulphate chemotherapy, which might be due to tumour produced lymphokines or reactive macrophages that release lymphokines in response to the tumour (Ogilvie 1989). The haematological findings indicated a nonsignificant increase in Hb concentration at second week and then decreased at third week in vincristine treated venereal granuloma cases. However throughout the chemotherapy, it remained lower

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than the normal concentration. The PCV and TEC reduced gradually up to fourth week from their base line value during vincristine therapy in venereal granuloma patients. Surgically treated patients during postoperative period also showed reduction in PCV and TEC value but were within the normal range. TLC increased beyond the normal range gradually from third week onward in vincristine treated venereal granuloma patients. Surgically treated patients also showed increase in TLC postoperatively, but were within the normal range. Post operative neutropenia was observed in other tumour patients after surgery. Lymphocyte count was high in venereal granuloma patients and increased during the chemotherapy. In other tumour patients too, the lymphocytic count was high and increased after surgery. Monocyte count increased significantly ($P<0.05$) postoperatively in mammary tumour patients. This may be due to the myelosuppression by cytotoxic drugs as reported by Rosenthal (1989).

Blood biochemical and enzymatic parameters like GLC, TP, BUN, Cr, AST and ALT showed no significant variation during chemotherapy or in surgical patients. Hypocalcaemia was seen in all the surgically treated patients and in vincristine sulphate treated patients, which may be because of decreased feed intake, decreased calcium absorption from gastrointestinal tract, increased renal excretion of calcium, calcium deposition in soft tissue, and bone lysis syndrome. ALKP concentration was higher in all the patients and it gradually increased during the chemotherapy period and after surgery in other tumour patients (Tables 1 and 2).

Evidence of pulmonary metastasis was ascertained by thoracic radiography. Certain tumours like hepatoid gland adenoma (1), osteosarcoma (1), ossifying fibroma (1), mammary tumour (1) and venereal granuloma (1) revealed lung metastasis. Two biopsies were diagnosed as fibrosarcoma and out of the 13 FNAC done only 8 cases revealed tumour cells, some others were diagnosed as abscess (2) and others showed the presence of RBCs (3). Exfoliative cytology was quite effective and easy as reported by Erunal *et al.* (2000). In the present study, exfoliative cytology was helpful to diagnose venereal granuloma and to assess its treatment effectiveness. Histopathology confirmed 24 malignant tumours and 21 benign tumours. The various types of neoplasms diagnosed by histopathology were cutaneous histiocytoma (1), cutaneous plasmacytoma (1), oral extra medullary plasmacytoma (1), mastocytoma (2), meibomian adenoma (1), trichoblastoma (1), sebaceous adenoma (1), hepatoid gland adenoma(6), papilloma (2), ossifying fibroma (1), keratinizing acanthomatous ameloblastoma (1), amyloid producing odontogenic tumour (1), thecoma (1), diffuse seminoma (1), malignant mixed tumour of salivary gland (1), meibomian carcinoma (2), hemangiosarcoma (2), fibrosarcoma (5), malignant trichoepithelioma (1), squamous cell carcinoma (1), malignant melanoma (1), osteosarcoma (1), spindle cell carcinoma (3), simple solid carcinoma (2), complex carcinoma (1), carcinosarcoma (1), chondrosarcoma (1) and venereal granuloma (19). All mammary tumours diagnosed were malignant. On the contrary, Priya *et al.*

Table 1. Various biochemical and enzymatic parameters of blood in dogs with venereal granuloma during chemotherapy (mean $\pm$ SE)

Parameters	Normal range	0 day	7th day	14th day	21st day range
Glucose (mg/dl)	62–108	89.64 $\pm$ 11.99	85.99 $\pm$ 9.01	81 $\pm$ 19.04	85 $\pm$ 9.00
Calcium (mg/dl)	8.7–11.7	8.12 $\pm$ 0.40	7.6 $\pm$ 0.53	7.02 $\pm$ 0.93	7.15 $\pm$ 0.15
Total protein(g/dl)	5.6–7.4	6.8 $\pm$ 0.28	6.9 $\pm$ 0.38	6.4 $\pm$ 0.50	6.85 $\pm$ 0.05
ALKP (IU/L)	10.6–101	100.33 $\pm$ 10.55	112.6 $\pm$ 12.64	118.5 $\pm$ 17.84	118.5 $\pm$ 8.50
BUN (mg/dl)	8.8–26	21.68 $\pm$ 4.15	20.4 $\pm$ 2.71	19.68 $\pm$ 2.43	27.55 $\pm$ 14.50
CRTN (mg/dl)	0.5–1.6	1.75 $\pm$ 0.23	1.67 $\pm$ 0.21	1.78 $\pm$ 0.28	1.20 $\pm$ 0.10
AST(IU/L)	8.9–49	17.61 $\pm$ 3.97	29 $\pm$ 3.60	27.2 $\pm$ 6.82	17 $\pm$ 3.00
ALT(IU/L)	8.2–57	25.83 $\pm$ 5.22	31.22 $\pm$ 6.16	44.2 $\pm$ 5.05	52 $\pm$ 8.00

Table 2. Various biochemical and enzymatic parameters of blood in dogs with various kinds of tumours (mean $\pm$ SE)

Parameters	Normal	Mammary tumours		Other tumours range	
		0 day	7 th day	0 day	7 th day
GLUC (mg/dl)	62–108	76.93 $\pm$ 8.90	67.2 $\pm$ 7.59	84.5 $\pm$ 4.31	81.43 $\pm$ 6.10
CAL (mg/dl)	8.7–11.7	7.45 $\pm$ 0.56	7.32 $\pm$ 0.50	7.19 $\pm$ 0.15	7.29 $\pm$ 0.29
TPR (g/dl)	5.6–7.4	5.97 $\pm$ 0.43	6.1 $\pm$ 0.57	7.85 $\pm$ 0.70	6.72 $\pm$ 0.50
ALKP (IU/L)	10.6–101	216.17 $\pm$ 68.4	196.75 $\pm$ 88.23	87.75 $\pm$ 10.38	115 $\pm$ 12.77
BUN (mg/dl)	8.8–26	25.92 $\pm$ 7.49	17.34 $\pm$ 6.20	15.80 $\pm$ 3.176	24.96 $\pm$ 5.45
CRTN (mg/dl)	0.5–1.6	1.66 $\pm$ 0.18	1.50 $\pm$ 0.19	1.48 $\pm$ 0.16	1.45 $\pm$ 0.19
AST (IU/L)	8.9–49	25.14 $\pm$ 5.39	31.4 $\pm$ 7.10	21.66 $\pm$ 4.29	19.42 $\pm$ 4.197
ALT (IU/L)	8.2–57	22.86 $\pm$ 5.87	31.6 $\pm$ 11.53	19.47 $\pm$ 4.81	18.66 $\pm$ 3.76

(2006) observed 32% malignant and 38% benign mammary tumours out of 115 neoplastic tumours. This variation may be due to the fact that in this study only 10 such tumour cases were recorded and any report on such incidence should involve a large number of sample sizes. TNM staging helped in evaluating prognosis and subsequent treatment. Those patients with a low TNM stage were treated either with surgery (34) or chemotherapy (20); while combination of surgery and chemotherapy was used in cases with high TNM stage (6). Recurrence was observed in 6 patients out of 34 cases within 2 to 9 months in surgically treated patients. Recurrence was not observed in dogs treated with both surgery and chemotherapy. None of the patients treated with vincristine sulphate for venereal granuloma showed recurrence. Vincristine therapy for venereal granuloma resulted in marked reduction in the size of the growth within a week but complete regression required 3–4 doses at weekly intervals.

SUMMARY

A study was carried out in 75 canine patients having neoplastic growth presented to Veterinary Clinic at the university during the period from December 2006 to April 2008. The overall tumour incidence noted was 5.03%. The different tumour incidence among dogs was mammary tumour (13.33%), genital tumours (33.33%) and other tumours comprising skin and bone tumours at 53.33%. The incidence of tumour as per the location on the body was head and neck (22.66%), chest (4%), abdomen (10.33%), external genitalia (33.33%), perineal region (10.66%), forelimb (2.66%) and hindlimb (13.33%). Malignant tumours diagnosed were 66.12% and benign tumours diagnosed in the study were 33.87%. Tumour management was depended upon the case as well as the stage of the tumour. Wide margin surgical resection in benign tumours, vincristine sulphate chemotherapy in venereal granuloma and combination of surgery and chemotherapy in metastatic mammary tumours prove to be effective in controlling the disease. As the stage of tumour increases, the treatment protocol should include chemotherapy or combination of surgery and chemotherapy. When the indicated therapy is not provided, there is recurrence or death of the patient. If the tumor resection is incomplete or if surgical treatment is provided

as a sole measure for metastatic tumour, recurrence is inevitable.

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