

Visual diagnosis of internal tumors of dogs and cats in Samarkand

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Abstract. In this article, is provided the importance and effectivity using visual diagnostic methods in the practice of veterinary oncology for the purpose of early diagnosis and treatment of tumors as ultrasound and X-ray and also blood morphological biochemical parameters in 15 dogs with oncological diseases of internal organs in the of canine service dogs and 2 cats belonging to the population of Samarkand region. During the research, 55 service dogs, 110 dogs under the care of the population in the regions of Samarkand and Tashkent and 123 street dogs a total of 288 dogs, as well as the clinic of the "Veterinary Surgery and Obstetrics" Department of the SamSUVM and Specialization of veterinary clinic of the National Cynology Center of Custom service in Tashkent. As a result of clinical and visual diagnosis of 56 heads of population brought to the veterinary clinic, 15 (5.3%) dogs and 2 (3.6%) cats had problems related to tumors located in various internal organs. Tumors identified were uterine and ovarian tumors in 6 (40%) dogs and 2 cats (100%), vaginal tumors in 3 (20%), liver tumors in 2 (13.3%), 1 (6.69%) tumor in stomach, 1 (6.69 %) esophagus, 2 (13.3 %) intestinal tumors were determined.

1 Introduction

Today, veterinary oncology is one of the rapidly developing branches of veterinary medicine. One of the main reasons for this is the annual increase in oncological diseases among animals, especially dogs and cats, and as a result, experts are encouraged to conduct scientific research on the diagnosis, treatment and prevention of these diseases. According to experts, there are 5 million dogs in Australia today, and 1 out of 3 of them have been found to have various types of tumors [1]. The main reason for this is the increase of carcinogenic substances in the environment, and it was noted that cancer develops in humans in 20 years, and in dogs in 5 years. In the United States of America, 1 out of every 4 dogs is affected by tumors in different age categories, especially 50% of dogs over 10 years old have various tumors [2, 10]. In Great Britain, oncological diseases were detected in 30% of dogs over 5 years of age and 15-20% of cats [3, 7]. These data show that the incidence of animal tumors has increased by 10% in the last 20 years and is continuing. 65% of the identified tumors developed in the reproductive organs, 10% in the digestive

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tract, 5% in the liver, 7% in the respiratory tract, 8% in the nervous tissue, and the remaining 5% in the endocrine glands and other organs [8].

There are several methods of diagnosing tumors in animals. The main ones are clinical examination (examination of tumors and tumors developed in the animal's body by visual and palpation methods), cytological examination (taking a sample of tumor and tumor cells by biopsy method and determining the cell type), histological examination (preparation of histopreparation from tumor tissue obtained by tissue biopsy or surgery), visual diagnostics: ultrasound diagnostics (the location of tumors, blood vessels, tissue thickness, size are determined), X-rays (X-rays determine whether the tumor has metastasized), endoscopy (mainly tumors in the esophagus, larynx, and stomach are detected), CT scan and MRI of the head and tumors of the spinal cord, bone and solid connective tissue tumors, their localization, shape and growth characteristics, have or does not have of metastases and relapses are determined) [4]. At the same time, general and local effects of tumors on the body are determined by blood analysis, immunological analysis and immunohistochemical methods. At the same time, general and local effects of tumors on the body are determined by blood analysis, immunological analysis and immunohistochemical methods [9].

2 Materials and methods

Experiments on the diagnosis of oncological diseases in domestic animals was performed on 15 dogs and 2 cats spontaneously infected with internal organ tumors in the dog during 2022-2023 in the clinic of the Department of "Veterinary Surgery and Obstetrics" of SamSUVM in the service dogs of the canine service unit of the Samarkand regional, in the service dogs of the National Cynology Center and the street dogs of Samarkand region.

The general analysis of tumors and blood samples was performed on the universal URIT-2900 Vet plus hemanizer, and the biochemical analysis was performed on the CYAN Start biochemical analyzer, X-ray examination on the Krem Ray dr-50 X-ray machine, and ultrasound diagnostics on the Mindrey ultrasound machine at the specialized veterinary clinic established under the National Cynology Center.

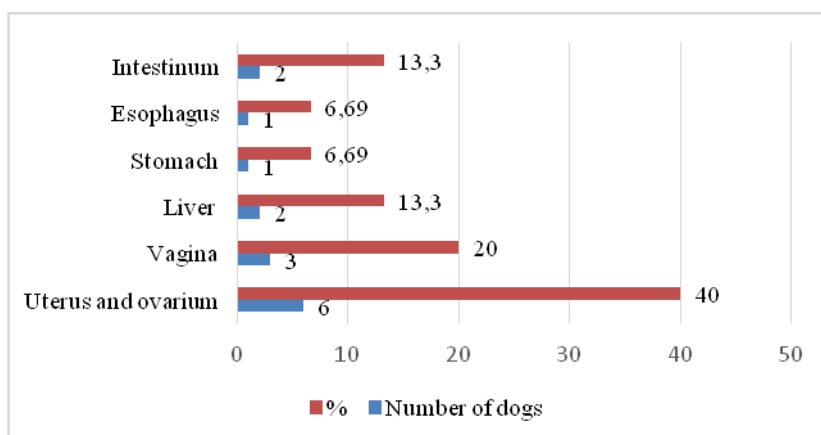


Fig. 1. The number of dogs with tumors in various internal organs, head, %.

During the research, 55 service dogs, 110 dogs under the care of the population in the regions of Samarkand and Tashkent and 123 street dogs a total of 288 dogs, as well as the clinic of the "Veterinary Surgery and Obstetrics" Department of the SamSUVM and Specialization of veterinary clinic of the National Cynology Center of Custom service in Tashkent. As a result of clinical and visual diagnosis of 56 heads of population brought to

the veterinary clinic, 15 (5.3%) dogs and 2 (3.6%) cats had problems related to tumors located in various internal organs. Tumors identified were uterine and ovarian tumors in 6 (40%) dogs and 2 cats (100%), vaginal tumors in 3 (20%), liver tumors in 2 (13.3%), 1 (6.69%) tumor in stomach, 1 (6.69 %) esophagus, 2 (13.3 %) intestinal tumors were determined.

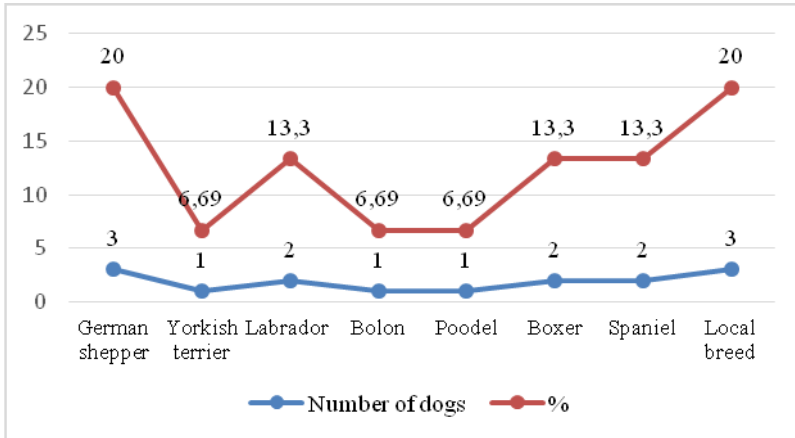


Fig. 2. The number of dogs with tumors in the internal organs of different breeds of dogs, head, %.

67% of dogs with tumors in their internal organs were female, 33% were male, and 100% of female cats had tumors.

3 (20%) of the dogs diagnosed with tumors were service dogs of the German shepherd breed, 1 (6.69%) were Yorkshire terriers, 2 (13.3%) were Labradors, 2 (13.3%) were Boxers, 2 (13.3%) Bolons, 1 head (6.69%) Poodle, 1 head (6.69%) Spaniel and 3 (20%) local breeds.

Of the cats diagnosed with a tumor, 1 was a Scottish fold cat, and 1 was a domestic cat.

Analyzing the age of dogs and cats with tumors, 3 (20%) dogs were 10-12 years old, 8 dogs (53.4%) were 5-9 years old, and 4 dogs (26.6%) were 1-4 years old, 2 heads (100 %) of cats are 6-10 years old.

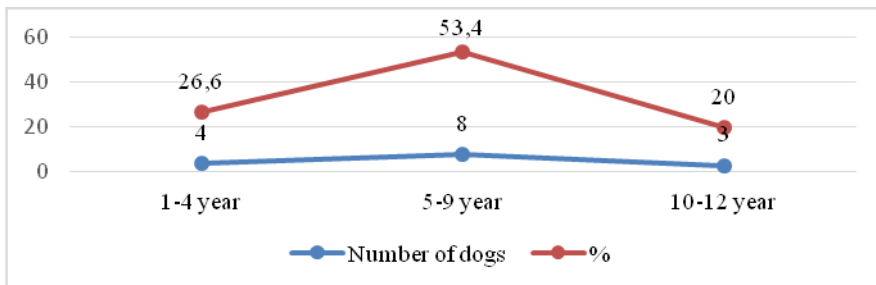


Fig. 3. Age indicators of dogs with tumors.

3 Results and Discussion

Diagnosing tumors that appear in the internal organs of animals is a very complicated process. It is appropriate to use visual diagnostic equipment as the main diagnostic tools. Biopsy is the main method for diagnosing tumors to determine the presence or extent of a pathological process in tumor tissue. Samples for analysis are obtained by fine-needle

sampling using various tissue biopsy methods for interpretation of the histological specimen [4]. Fine needle sampling can be safely performed for most external tumors without any sedation or anesthesia. Samples of internal tumors can be taken under ultrasound guidance depending on their location, appearance and size. Cytology can often provide a definitive diagnosis of round cell tumors and can help classify other tumors as mesenchymal or epithelial. [9]. Tests such as immunohistochemistry, proliferation markers, special tissue stains, polymerase chain reaction, antigen receptor rearrangement polymerase chain reaction, and flow cytometry may provide additional prognostic information or identify potential therapeutic targets.

Radiography. It is used when the following neoplasms are suspected: tumors of skeletal bones. Due to the peculiarity of metabolic processes in the bone, its response to injury or disease is limited to two phenomena - loss (osteolysis) or growth (osteogenesis) of bone tissue. In many cases there is a combination of them. In this regard, bone tumors of various etiologies may have a radiographic picture similar to each other or to osteomyelitis, which must be kept in mind when making a diagnosis [4].

Assessing clinical examination and history greatly facilitates diagnosis.

Lung tumors can be either primary or secondary. The latter are much more common in small animals. Radiographs show both the neoplasms themselves and the changes caused by them (consolidation, bleeding).



Fig. 4. A-dog, German shepherd, 8 years old, female, liver tumor; B-dog, Yorkish terrier, 9 years old, female, ovarian tumor.

Accompanied by pleural fluid, tumors of the chest organs, such as the lungs, are practically inaccessible for x-ray examination, because they are hidden by the fluid. In such cases, ultrasound is often used for diagnosis.

Tumors of the digestive tract, such as the organs of the esophagus, stomach and its wall, small and large intestines, are most often found in small animals. Pathological changes may not be visible on standard photographs. Contrast radiography may reveal rough or smooth filling defects that distort the normal outlines of the mucous membranes, as well as barium depots in the area of ulcerated neoplasms.

Liver tumors. Primary and secondary neoplasia are among causes of hepatomegaly in small animals. On an x-ray you can see changes in the shape and size of the liver, areas of compaction, and ascites effusion.

Ultrasound examinations. When diagnosing tumors, ultrasound provides very valuable information, because allows us to identify the following pathological changes as areas inside the soft tissue structures of tumors filled with fluid, cavities, areas of necrosis and bleeding of tissue near tumor tissues, soft tissue masses, areas and localization of abnormal tissue inside an organ that usually has a uniform echotexture such as the liver, spleen, prostate and even large blood vessels inside tumor formations [6].

Ultrasound of the abdominal cavity is used to diagnose changes in the liver, spleen, kidneys, adrenal glands, bladder, prostate gland and other internal organs. Allows you to

control targeted biopsy from tissues suspected of being involved in a neoplastic process, however, when performing ultrasound, it is important to remember an integrated approach to making a diagnosis.

Using chest ultrasound, it is possible to diagnose lung tumors adjacent to the chest wall, cardiac tumors and mediastinal tumors. Rib tumors with large intrathoracic growth can be diagnosed by the growth of their attachment to the diaphragm in order to accurately decide on the appropriate surgical intervention after diagnosis.

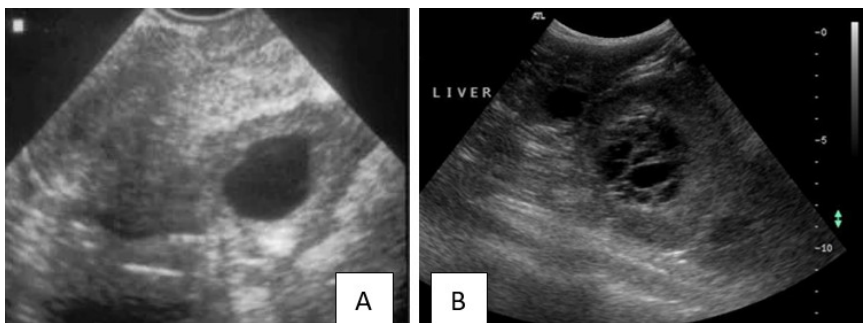


Fig. 5. A-dog, Labrador retriever, 6 years old, female, ovarian tumor; B-dog, Boxer, 8 years old, male, liver tumor.

Table 1. Morphological and biochemistry changes of blood of oncological sick animals.

Blood parameters	Units	Liver tumor, n=2	Ovarian and uterus tumor, n=6	Intestinal tumor, n=2	Stomach tumor, n=1	Esophageal tumor, n=1	Vaginal tumor, n=3
WBC	1012 /l	19.5±0.86	12±0.39	13.3±0.16	13.8	14.5	13.3±0.65
HGB	g/l	96±0.70	106.8±2.16	107±2.08	109.2	110.8	110± 2.73
RBC	109 /l	4.5±0.54	5.01±0.07	4.8±0.05	5.2	6.1	5.9±0.70
ALT	units/l	58±0.70	54.3±0.05	53.5±0.12	51.8	50.2	45±1.70
AST	units/l	46±1.41	45.5±0.08	41.5±0.03	40.3	39.8	36.6±0.55
Bilirubin	mcmol/L	50.6±0.2	15.6±0.03	16.5±0.35	14.8	13.6	14.1±0.28
Creatinine	mcmol/L	139.5±1.12	129.2±0.46	122±1.42	123	118.9	112.1±1.8
Total protein	g/l	73±1.22	49.8±0.08	46.9±1.87	60.6	65.2	66.2±1.05

One of the main factors to know the general and local effects of tumor cells on the body of animals with tumors is to determine the morphological and biochemical parameters of their blood. In this regard, it is possible to assess the impact of the tumor depending on the changes in the main morphological and biochemical parameters of the blood of oncologic sick animals. In our experiments, we checked the number of leukocytes and erythrocytes in the blood of all tumor-infected dogs, the amount of hemoglobin, the amount of ALT and AST from the biochemical parameters of the blood, the amount of total protein, bilirubin and creatinine at the beginning of the experiment and during the experiment. As can be seen from the table, a sharp increase in the number of leukocytes (leukocytosis), a decrease in the amount of erythrocytes and hemoglobin (erythropenia and anemia) was observed in the blood of all tumor-infected dogs. From the biochemical indicators of blood, it was found that the amount of ALT and AST increased in all of them, the amount of total bilirubin and creatinine in the blood increased, only the amount of total protein decreased in some tumors.

4 Conclusion

- As a result of the research, among the dogs examined in the cities of Samarkand and Tashkent, tumors were detected in a total of 15 dogs, of which 6 (40%) dogs and 2 cats (100%) had uterine and ovarian tumors, 3 (20%) had vaginal tumors, 2 (13.3%) liver tumors, 1 (6.69%) gastric tumors, 1 (6.69%) esophagus, 2 (13.3%) intestinal tumors were detected.
- 67% of dogs with tumors in their internal organs were female, 33% were male, and 100% of female cats had tumors.
- Analyzing the age of dogs and cats with tumors, 3 (20%) dogs were 10-12 years old, 8 dogs (53.4%) were 5-9 years old, and 4 dogs (26.6%) were 1-4 years old, 2 heads (100%) of cats are 6-10 years old.

References

1. K. Pinello, I. Amorim, I. Pires, A. Canadas-Sousa, J. Catarino, P. Faisca, S. Branco, M.C. Peleteiro, D. Silva, M. Severo, Vet-OncoNet: Malignancy Analysis of Neoplasms in Dogs and Cats, *Veterinary Sciences*, **9**, **10**, 535 (2022) <https://doi.org/10.3390/vetsci9100535>
2. M. Cray, L.E. Selmic, A. Ruple, Demographics of dogs and cats with oral tumors presenting to teaching hospitals: 1996-2017, *J Vet Sci.*, **21**, **5**, e70 (2020) doi: 10.4142/jvs.2020.21.e70
3. J. Rodríguez, D.R. Killick, L. Ressel, A text-mining based analysis of 100,000 tumours affecting dogs and cats in the United Kingdom, *Sci Data*, **8**, 266 (2021) <https://doi.org/10.1038/s41597-021-01039-x>
4. James P. Farese, Stephen J. Withrow, *Small Animal Clinical Oncology (Sixth Edition)*, 164-173 (2020)
5. K. Wu, L. Rodrigues, G. Post, Analyses of canine cancer mutations and treatment outcomes using real-world clinico-genomics data of 2119 dogs. *npj Precis. Onc.*, **7**, 8 (2023) <https://doi.org/10.1038/s41698-023-00346-3>, *npj Precision Oncology* (2023) 7:8; <https://doi.org/10.1038/s41698-023-00346-3>
6. Barb Biller, John Berg, Laura Garrett, David Ruslander, Richard Wearing, Bonnie Abbott, Mithun Patel, Diana Smith, Christine Bryan, AAHA Oncology Guidelines for Dogs and Cats, *J Am Anim Hosp Assoc*, **52**, 181–204 (2016) DOI 10.5326/JAAHA-MS-6570
7. M. Vascellari, E. Baioni, G. Ru, Animal tumour registry of two provinces in northern Italy: incidence of spontaneous tumours in dogs and cats, *BMC Vet Res*, **5**, 39 (2009) <https://doi.org/10.1186/1746-6148-5-39>
8. N. Baxtiyor, Y. Jasurbek, The diagnosis and effect of breast tumors treatment in dogs. *Journal of Microbiology, Biotechnology and Food Sciences*, 475-477 (2021)
9. Science.uq.edu, <https://science.uq.edu.au/article/2021/08/first-national-dog-and-cat-cancer-database-making-0>
10. Avma, <https://www.avma.org/resources/pet-owners/petcare/cancer-pets>
11. D.T. Muhamediyeva, L.U. Safarova, R.F. Ruzikulov, *Expert systems for diagnostics of infectious diseases in cattle*, *BIO Web of Conferences*, **71**, 01073 (2023)