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Characterization of the most common skin tumors in dogs at veterinary clinics in southern Guayaquil

Carácterización de los tumores cutaneos mas frecuentes en perros, en veterinarias del Sur de Guayaquil

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Abstract: This research was carried out in four different veterinary clinics in southern Guayaquil. A total of 87 histopathological reports of skin tumors in dogs from the previous three years were reviewed, and within the two months of the study, it was found that the analysis used to determine neoplasms was biopsy, of which 65 cases (75%) corresponded to neoplastic processes. The skin tumors with the highest incidence were mammary carcinoma and mastocytoma. Among these, a predominance of malignant neoplasms was identified, represented by 43 cases (65%). The topographical areas where these masses were most prevalent were the mammary glands, which accounted for 17 cases (26%), followed by other relevant topographical areas such as the extremities and the back, with 9 cases. The relationship between these neoplasms and factors such as age and race was not significant, but there was a significant relationship with regard to sex, with females being the most affected in this case.

Keywords: Biopsy, Cutaneous, Incidence, Mastocytoma, Mammary carcinoma.

Resumen: El presente trabajo de investigación se lo llevo a cabo en cuatro distintas Veterinarias del Sur de Guayaquil, se lograron revisar 87 informes histopatológicos de tumores cutáneos en caninos de tres años anteriores y dentro de los dos meses de estudio, se pudo constatar que el análisis utilizado, para determinar las neoplasias fue la biopsia, de los cuales 65 casos (75%)

correspondieron a procesos neoplásicos. Los tumores cutáneos con mayor incidencia fueron el carcinoma mamario y el mastocitoma, entre estos, se identificó un predominio de neoplasias malignas, representado por 43 casos (65%). Las áreas topográficas donde hubo mayor presencia de estas masas fueron las glándulas mamarias la cual represento 17 casos (26%), seguido de otras áreas topografías relevantes como las extremidades y el lomo, con 9 casos. La relación de estas neoplasias con factores como edad y raza no tuvieron una relación significativa, pero si existió una relación significativa con relación al sexo de en este caso las hembras fueron las más afectadas.

Palabras clave: Biopsia, Cutáneo, Incidencia, Mastocitoma, Carcinoma mamario.

Introduction

Neoplasia is defined as any mass or protuberance of tissue that may or may not be of neoplastic origin (Zapata Castro, 2020) . These are characterized by abnormal and uncontrolled cell proliferation, occurring due to various genetic alterations and phenotypic changes, either inherited or acquired (Alves et al., 2022).

Tumors or neoplasms are characterized by uncontrollable cell division and can invasively affect other healthy organs and tissues. When discussing neoplasms, it should be noted that there are two types: benign and malignant.

Skin tumors mainly occur in dogs. According to histological type, the most common skin tumors are mast cell tumors, adenocarcinomas, and squamous cell carcinomas. In terms of the frequency of sex-related neoplasms, it is noteworthy that, except for the mammary gland, cardiovascular system, liver, and pancreas, the frequency of cases in males is significantly higher than in females, especially in the skin and appendages (Vinueza et al., 2016).

When these neoplasms are present, a cytology should be performed to highlight tumors, followed by a histopathology, as these neoplasms have different grades and can be confused with benign tumors . In recent years, there has been an increase in cancer both in number and organization, with about one in four dogs over two years of age dying from cancer annually, and skin neoplasms being more common in dogs. They are classified according to their origin into epithelial tumors,

round cells, melanocytes, and mesenchymal neoplasms (González et al., 2020).

The development of tumors is due to the continuous and uncontrollable proliferation of cells that are unable to respond to the signals that govern behavior, normal cell division, and growth. The cells divide uncontrollably and are capable of invading healthy organs and tissues (Fajardo et al., 2013).

In past studies, there were records of neoplasms in dogs, because pet owners went to veterinary centers and histopathological examinations were performed to make the diagnosis. It was also reported that malignant neoplasms were more prevalent at the time of the study. In turn, malignant neoplasms are more frequent in patients between the ages of 5 and 9, with squamous cell carcinoma being the most common in the study.

In a study conducted in Lima in 2012, skin tumors accounted for almost half of the neoplasms that were part of the case series. The increase is due to the fact that in recent times, animal owners have reported these pathologies found in pets for diagnosis in order to obtain therapeutic options for improvement. In turn, there was a higher incidence of malignant neoplasms than benign neoplasms, with squamous cell carcinoma being the most frequently found neoplasm (Medina et al., 2017). In a study conducted in the city of Guayaquil, 35 patients with skin masses were examined and characterized according to their behavior. Malignant tumors were found to be 49.6% higher than the rest, followed by neoplastic tumors with 28.6% and finally benign tumors with 22.9%. This study shows that malignant neoplasms in patients between 5 and 9 years of age frequently affect the canine population, with around 28.6% (Mena León, 2017) .

In current studies, it is known that most tumors are not sent to laboratories to determine whether they are benign or malignant neoplasms. Likewise, the most common neoplasms are those of the epithelium and round cells. The location where these tumors appear plays a very important role, with the abdominal region of the integumentary system being the most predisposed area. Another factor is prolonged exposure to sunlight in patients with white coats and short hair.

In the metropolitan region of Goiânia, in the state of Goiás, Brazil, 1,266 skin neoplasms in dogs were analyzed. It is known that not all

skin tumors in dogs are sent for histological analysis. About 9.8% of the dogs in this study had more than one skin neoplasm, and other studies added the possibility of non-neoplastic tumors. Epithelial neoplasms were the most common in dogs in this region. Mast cell tumors are described as the main neoplasm in dogs and have a multifactorial etiology. The frequency of these neoplasms in dogs is directly associated with geographical location, as it is associated with long sun exposure and breeds with little skin pigmentation and short hair (Da Silva et al., 2020). According to the study, benign tumors are significantly more common than malignant ones, with epithelial and round cell tumors occurring in a greater number of cases. Location is an important factor in the appearance of tumors, with the abdominal region of the integumentary system being more predisposed (García and Martínez, 2021).

When tumors are removed from animals, there should always be a record of the mass, its severity, and the type of tumor present so that these pathologies can be diagnosed in the future.

Neoplasms are common in dogs, but these masses are rarely sent to laboratories, and there is a possibility that there is no record or even that anatomical pathology residents cannot routinely diagnose these tumors (Wiener, 2021). Due to the lack of previous research and studies that could serve as a basis for such studies, and because of the absence of a comprehensive protocol for the registration of sick animals, there is no adequate classification (Ben et al., 2012).

It is extremely important to understand the behavior of the neoplasm and to know which techniques will be used at the time of treatment, what diagnosis will be made, and what the prognosis is, as this will help us to achieve a better outcome for the pet.

The prevalence and biological behavior of cutaneous mast cell tumors, in terms of cost and therapeutic response, make it important to select the most appropriate therapeutic approach for these neoplasms (Webster et al., 2016). Up-to-date information on diagnostic techniques, treatments, and prognoses is of utmost importance to ensure the best results for the patient (Barboza et al., 2022).

It is important to recognize the risk factors that give rise to these neoplasms. In order to diagnose such tumors or neoplasms, certain procedures and tests must be performed.

Skin tumors are most often diagnosed in veterinary clinics because the skin is exposed to various environmental factors that give rise to these neoplasms. These masses are diagnosed by cytology and

histopathological examinations, and the presence of these neoplasms must be based on clinical signs and complementary examinations (Mathewos et al., 2020).

There are several risk factors, such as breed, sex, age, and geographic region, that must be taken into account when diagnosing neoplasms in pets. Underlying genetic factors may also play a role in increasing the risk of tumors. It is necessary to know the history of some breeds that may be predisposed to neoplasms, as well as the development of certain diseases. A less favorable prognosis is also related to surgery, as the approach to the procedure can lead to incomplete tumor resection (Martins et al., 2021).

The types of skin tumors should be recorded and documented depending on each geographic region in order to have information for possible research. This helps veterinarians improve their practice. Studies show that skin papillomas in dogs are well documented and have a high incidence (Hassan et al., 2022).

Methodology

Information from histopathological studies was collected digitally from the various veterinary clinics mentioned. Data was collected from the establishments to identify how many studies were carried out in the clinics. Skin mass removal surgeries were performed weekly, but not all of them were sent for analysis. Therefore, a preliminary census of the number of hepatological studies was conducted, resulting in approximately 86 reports from the aforementioned veterinary clinics. All histopathological studies of skin tumors in dogs from three years ago and two months ago, in the four veterinary clinics. No sampling was applied, and the entire study population was used, that is, the histopathological reports recorded in the veterinary clinics.

Results

Classification of histological pattern according to histopathological studies

Table 1. *Types of tumors recorded*

TYPES OF TUMORS	FR	FA
Breast carcinoma	14	22%
Mastocytoma	12	18%
Adenoma	4	6%
Histiocytoma	4	6
Well-differentiated squamous cell carcinoma	3	5%
Hemangiosarcoma	3	5%
Lipoma	3	5%
Melanoma	3	5
Nasal adenocarcinoma	2	3%
Breast comedocarcinoma	2	3%
Sebaceous epithelioma	2	3%
Undifferentiated round cell tumors	2	3%
Perianal gland carcinoma (hepatoid)	1	2
Acinar cell salivary carcinoma	1	2
Hemangiopericytoma	1	2%
Histiocytosis	1	2%
Leiomyosarcoma	1	2%
Myxoma	1	2%
Myxosarcoma	1	2%
Papilloma	1	2%
Plasmacytoma	1	2%
Trichoblastoma	1	2%
Germ cell tumor	1	2%
Total	65	100%

Prepared by: Naula, 2024.

Table 1 shows the analysis of the types of tumors recorded in the study. Among the most frequent neoplasms, mammary carcinoma stands out, with 14 cases, representing 22% of the total. This is followed by mast cell tumors, which accounted for 12 cases, equivalent to 18%. Both types of tumors stand out as the most frequent in the canine population analyzed, reflecting their clinical relevance.

Table 2. *Histological pattern of tumors recorded*

HISTOLOGICAL PATTERN	FA	FR
Benign	21	32%
Malignant	44	68%
Total	65	100%

Prepared by: Naula, 2024.

Table 2 shows the histological pattern of tumors according to the results obtained from histopathological reports, in which 65 cases were analyzed, of which 32% (21 cases) corresponded to benign lesions, while the majority, 68% (44 cases), were classified as malignant. This indicates a higher prevalence of malignant lesions in the study.

Relationship between tumor types and race, age, and sex.

Table 3. *Tumor types according to sex*

TYPES OF TUMORS	FEMALE	MALE
Nasal adenocarcinoma	1	1
Adenoma	2	2
Breast carcinoma	14	0
Well-differentiated squamous cell carcinoma	3	0
Perianal gland carcinoma (hepatoid)	0	1
Acinar cell salivary carcinoma	0	1
Breast comedocarcinoma	2	0
Sebaceous epithelioma	2	0

Hemangiopericytoma	1	0
Hemangiosarcoma	2	1
Histiocytoma	2	2
Histiocytosis	0	1
Leiomyosarcoma	0	1
Lipoma	2	1
Mastocytoma	8	4
Melanoma	1	2
Myxoma	0	1
Myxosarcoma	0	1
Papilloma	1	0
Plasmacytoma	0	1
Trichoblastoma	1	0
Germ cell tumor	0	1
Undifferentiated round cell tumor	0	2
Total	42	23

Prepared by: Naula, 2024.

Table 7 shows a relationship between the types of tumors recorded and gender groups. It was determined that there is a significant relationship between tumor types and gender ($P>0.05$).

Table 4. Types of tumors according to age

TYPES OF TUMORS	BETWEEN 1 AND 3 YEARS	OVER 4 YEARS
Nasal adenocarcinoma	0	2
Adenoma	0	4
Breast carcinoma	0	14
Well-differentiated squamous cell carcinoma	2	1
Perianal gland carcinoma (hepatoid)	0	1
Acinar cell salivary carcinoma	0	1
Breast comedocarcinoma	0	2
Sebaceous epithelioma	0	2
Hemangiopericytoma	0	1

Hemangiosarcoma	0	3
Histiocytoma	2	2
Histiocytosis	0	1
Leiomyosarcoma	0	1
Lipoma	0	3
Mastocytoma	4	8
Melanoma	0	3
Myxoma	0	1
Myxosarcoma	0	1
Papilloma	0	1
Plasmacytoma	0	1
Trichoblastoma	0	1
Germ cell tumor	0	1
Undifferentiated round cell tumor	1	1
Total	9	56

Own source, 2024.

According to Table 4, which focuses on the relationship between the age of individuals and tumor types, it was determined that there is no significant relationship between the presence of neoplasia and race ($P>0.05$).

Table 5. *Types of tumors according to race*

TYPES OF TUMORS	PURE	MESTIZO
Nasal adenocarcinoma	2	0
Adenoma	4	0
Breast carcinoma	8	6
Well-differentiated squamous cell carcinoma	3	0
Perianal gland carcinoma (hepatoid)	1	0
Acinar cell salivary carcinoma	1	0
Breast comedocarcinoma	0	2
Sebaceous epithelioma	1	1

Hemangiopericytoma	1	0
Hemangiosarcoma	2	1
Histiocytoma	2	2
Histiocytosis	1	0
Leiomyosarcoma	1	0
Lipoma	2	1
Mastocytoma	9	3
Melanoma	2	1
Myxoma	0	1
Myxosarcoma	1	0
Papilloma	1	0
Plasmacytoma	1	0
Trichoblastoma	1	0
Germ cell tumor	0	1
Undifferentiated round cell tumor	1	1
Total	45	20

Own source, 2024

Table 5 investigates the relationship between the race of individuals and the types of tumors recorded, indicating that there is no significant relationship between the presence of neoplasia and sex ($P>0.05$).

Description of the topographic area where tumors are frequently located

Table 6. *Topographical area where tumors are located*

TOPOGRAPHICAL AREA	FA	FR
Mammary glands	17	26
Extremities	9	14%
Loin	9	14%
Rear	5	8%
Nasal	4	6

Abdomen	3	5
Head	3	5%
Scrotum	3	5%
Maxilla	2	3%
Thigh	2	3%
Ear	2	3%
Vulva	2	3%
Inguinal	1	2%
Eyelid	1	2%
Foreskin	1	2%
Testicle	1	2%
Total	65	100%

Own source, 2024

Table 6 shows an analysis of the distribution of neoplasms according to topographical area. Of the 65 cases recorded, the highest frequency of neoplasms was located in the mammary glands, with 17 cases, representing 26% of the total. Other topographical areas that showed a significant incidence are the extremities and the back, both with 9 cases each, representing 14% of the total.

Meanwhile, the anus was another significant topographical area, with 5 cases (8%), followed by other areas such as the nose with 4 cases, representing 6%, and the abdomen, head, and scrotum with 3 cases each, representing 5% of the total. Areas such as the maxilla, thigh, ear, and vulva had a lower frequency compared to the aforementioned topographic areas, with 2 cases each, while areas such as the groin, eyelid, foreskin, and testicle showed only 1 case each, representing 2% of the total.

Table 7. *Types of tumors according to their topographical area*

TYPES OF TUMORS	TOPOGRAPHIC AREA					
	HEAD	EXTREMITIES	MAMMARY GLANDS	INGUINAL	LOWER BACK	FACE
Nasal adenocarcinoma	0	0	0	0	0	2
Adenoma	0	0	1	1	0	2
Breast carcinoma	0	0	14	0	0	0
Well-differentiated squamous cell carcinoma	0	1	0	1	1	0
Perianal gland carcinoma (hepatoid)	0	0	0	1	0	0
Acinar cell salivary carcinoma	0	0	0	0	0	1
Breast adenocarcinoma	0	0	2	0	0	0
Sebaceous epithelioma	1	0	0	1	0	0
Hemangiopericytoma	0	1	0	0	0	0
Hemangiosarcoma	0	0	0	3	0	0
Histiocytoma	2	0	0	0	2	0
Histiocytosis	0	0	0	0	0	1
Leiomyosarcoma	0	0	0	1	0	0
Lipoma	0	1	0	1	1	0
Mastocytoma	0	5	0	2	4	0
Melanoma	0	1	0	1	0	1
Myxoma	0	0	0	0	1	0
Myxosarcoma	0	0	0	1	0	0
Papilloma	0	1	0	0	0	0
Plasmacytoma	0	0	0	1	0	0
Tricoblastoma	2	0	0	0	0	0
Germ cell tumor	0	0	0	1	0	0
Undifferentiated round cell tumor	0	1	0	1	0	0
Total	5	11	17	16	9	7

Table 7 shows the types of tumors in different topographical areas. It can be seen that the mammary glands present the highest number of cases, with 17 cases of tumors, notably mammary carcinoma with 14 cases. Likewise, mastocytoma is one of the most common tumors, especially in the extremities (5 cases) and on the back (4 cases).

In the present study, 87 cases of histopathological reports presenting skin tumors in dogs were recorded, of which 65 reports were of neoplastic origin. Tumors of neoplastic origin are characterized by

abnormal and uncontrolled cell proliferation, occurring due to various genetic alterations and phenotypic changes, either inherited or acquired (Alves et al., 2022).

During the investigation, most of the tumors recorded were of a malignant histological pattern, which was obtained in 44 of the 87 reports reviewed, representing 68%. In comparison with previous investigations, it is mentioned that the masses present are of an abnormal type, with excessive growth that causes a marked increase in size in the affected tissue, due to abnormal cell divisions. This growth is characterized as being autonomous, progressive, invasive, or infiltrative. Tumors can be benign or malignant according to clinical and pathological classification (Patarroyo, 2021). Benign tumors occur more frequently, and their location is important when they appear (Garcia and Martinez, 2021).

Results were obtained from the topographical areas where these masses were most prevalent, located in areas such as the mammary glands, which accounted for 17 cases (26%) of histopathological reports, followed by other relevant topographical areas such as the extremities and the back, with 9 cases, representing 14%. Similarly, research shows that when tumors appear, the abdominal region of the integumentary system is more predisposed (Garcia and Martínez, 2021). Meanwhile, another study demonstrated the frequency of skin tumors in the mammary region (Tapia Barraza, 2021).

The most common neoplastic tumors in dogs in the study with the highest incidence were mammary carcinoma with 14 cases (22%), mast cell tumor with 12 cases (18%), and squamous cell carcinoma with 3 cases (5%). This study was similar to previous research that mentions that hemangiosarcoma, mast cells, and squamous cell carcinoma are the most common tumors in dogs, due to environmental and genetic factors and exposure to substances, mainly in pets with white skin and little fur.

In the study of skin tumors, there was no significant relationship between the neoplasms recorded and age, in contrast to the authors mentioned above who state that the appearance of tumors is due to the age of the animal; the older the pet, the greater the possibility of neoplasms occurring. In European countries and the United States, disease prevention allows dogs to have a longer life expectancy, and therefore a higher incidence of neoplasms. In other words, the longer the animal lives, the greater its exposure to carcinogenic factors, since living longer means more mutations in genes that lead to the

development of cancer, due to longer exposure to carcinogens (Possa dos Reis et al., 2020). Thus, in middle-aged to geriatric animals, the age factor for the onset of neoplasia is widely studied, showing that the longer the animal's longevity, the greater the chances of these neoplasms occurring (Prado et al., 2021).

Likewise, these neoplasms were related to factors such as sex and breed, with sex showing a significant relationship, while breed did not show a significant relationship. This contrasts with research indicating that these neoplasms can occur for different reasons, such as factors called micro- or macro-environmental, which can also be identified as intrinsic and extrinsic. Extrinsic agents include ionizing and ultraviolet radiation, chemical and biological carcinogens (viruses, bacteria, and parasites), while intrinsic (endogenous or microenvironmental) influences are determined by factors such as age, diet, and genetics. In other words, carcinogenesis is multifactorial (Campoverde, 2019). Likewise, other authors mention that it is related to sex, race, coat size, and even sun exposure (Jakoski et al., 2022).

Conclusions

Sixty-five cases of neoplastic tumors were recorded, and the most relevant histological pattern was malignant tumors, represented by 44 cases (68%), compared to benign tumors, which had a lower presence with 21 cases (32%). The tumors with the highest incidence in the histopathological reports were mammary carcinoma, represented by 14 cases (22%), followed by mastocytoma, represented by 22 cases (18%).

When correlating the presence of skin tumors with factors such as age, sex, and race in the 65 histopathological reports, it was concluded that both age and race were not significant in relation to tumors, while sex was significant in that it affected females more than males.

According to the results obtained, various topographical areas were classified in which the mammary glands, the inguinal area, and the extremities presented a higher incidence of these tumors.

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