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DIETARY MANAGEMENT IN DIABETES MELLITUS IN CATS

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Abstract

The study aimed to identify risk factors, predominant symptoms, and nutritional management in cats diagnosed with diabetes mellitus. The specialized literature indicates the negative, even harmful, impact of carbohydrates in food on blood sugar levels in many animal species, including cats. This study examined how informed cat owners are about the risk of diabetes onset, what commercial foods they choose, and how nutritionally special-purpose feeds meet the nutritional requirements of animals with this pathology.The nutritional management was investigated in 39 cases of cats diagnosed with diabetes mellitus. An online questionnaire https://forms.gle/FGPAyYr8sZ8k6oyS8 was applied to the owners of cats diagnosed with diabetes, which focused on: I. Identification data of the cat; II. Does the cat have diabetes? III. Diet of the diabetic cat; IV. Management of meals and treatment in diabetes mellitus in cats.The results showed that proper nutritional management in cats diagnosed with diabetes can be achieved by administering foods and/or feeds with a special nutritional purpose (diets) in wet form with high protein content, moderate in fats, and low in carbohydrates. Most commercial diets in dry form have a high carbohydrate content, which recommends their administration with caution in the diet of diabetic cats.

Keywords: *diabetes mellitus, cats, commercial food, nutritional management*

Introduction

Metabolic disorders in animals are a major concern in veterinary medicine, having a significant impact on their health and well-being. These disorders include diabetes mellitus, hyperlipidemia, obesity, and others that can have serious consequences for animals and require proper management to ensure optimal quality of life.

The domestic cat (Felis catus), a carnivorous mammal part of the Felidae family, adapted to a predatory lifestyle, has developed specific physical and behavioral characteristics that influence its nutrient requirements. Being obligate carnivores due to their anatomy and physiology, cats depend on a constant supply of essential nutrients from animal sources to maintain their health and vitality. The cat's digestive system is specialized to process and absorb nutrients from meat. Their mouth and teeth are adapted to tear and crush meat, while their saliva contains limited enzymes for carbohydrate digestion, emphasizing their carnivorous nature.

The cat's stomach has a very acidic pH, which helps efficiently break down proteins and destroy pathogenic bacteria that might be ingested with meat. Cats require a high protein intake for muscle tissue maintenance and growth. Cat liver enzymes have a reduced capacity to adapt to variations in protein intake, necessitating a constant supply of proteins. Arginine is essential for protein synthesis and the urea cycle's functioning. Arginine deficiency can cause hyperammonemia and severe symptoms such as vomiting and coma. The recommendation is 11% arginine in the diet. Taurine is crucial for bile functions, the retina, and the myocardium.

Cats cannot synthesize sufficient taurine, requiring supplementation through food. The National Research Council (NRC) recommends 500-700 ppm taurine/SU food. Lipids are the main energy source, composed of triglycerides and fatty acids. Cats cannot synthesize arachidonic acid from linoleic acid, thus requiring intake from animal-origin food sources. Essential fatty acids influence the quality of the skin, coat, renal function, and reproduction. Cats have reduced carbohydrate requirements, with low amounts of amylase in saliva and pancreas; glucokinase and fructokinase enzymes are also quantitatively deficient (Simion V. 2009). Lactose digestion decreases after 7 weeks, and carbohydrates are limitedly metabolized in the liver. Cats tolerate up to 40% carbohydrates in the diet, with a minimum of 85% digestibility, but the maximum recommended value is 9% lipids in the diet.

Diet plays an essential role in managing and preventing metabolic disorders in animals. Appropriate dietary modifications can help control symptoms, maintain healthy body weight, and manage blood glucose and lipid levels correctly. Regarding hyperlipidemia, previous research has highlighted the link between excessive fat consumption and increased lipid levels in animal blood. Diets high in saturated fats and cholesterol have been associated with a higher risk of hyperlipidemia and cardiovascular complications.

Obesity in pets has become increasingly prevalent in recent decades, with inadequate diet and sedentary lifestyle identified as major contributing factors. Studies have shown that low-calorie and high-fiber diets can effectively control body weight and improve health in obese animals.

Diabetes mellitus is one of the most common metabolic disorders in animals, characterized by persistent hyperglycemia and disturbances in glucose metabolism. Studies have demonstrated that diet plays a crucial role in managing diabetes mellitus in animals, with special attention to carbohydrate, fiber, and fat content in the diet. Diabetes mellitus develops when blood sugar levels cannot be controlled. Type 1 occurs when pancreatic beta cells cannot produce enough insulin. Type 2 is characterized

by two aspects. First, as in type 1, there is a reduced capacity of the pancreas to secrete insulin. The second characteristic is insulin resistance. Adipocytes produce a substance that makes the body's cells resistant to insulin. This increased insulin resistance is the hallmark of type 2 diabetes. Approximately 65% of diabetic cats are diagnosed with non-insulin-dependent type II diabetes (Rand JS and Martin GJ 2001).

Materials and methods

The nutritional management was investigated in 39 cases of cats diagnosed with diabetes mellitus. An online questionnaire https://forms.gle/FGPAyYr8sZ8k6oyS8 was applied to the owners of cats diagnosed with type 1 and type 2 diabetes, which focused on four sections: I. Identification data of the cat; II. Does the cat have diabetes? III. Diet of the diabetic cat; IV. Management of meals and treatment in diabetes mellitus in cats

Results and discussions

Risk Factors and Symptoms in Diabetes Mellitus in Cats

Risk factors for diabetes mellitus in domestic cats include advanced age, obesity, male gender, neutering/spaying, and physical inactivity due to limited movement in indoor spaces (Rand JS et al. 2004). Our study largely confirmed this information. Thus, 79.5% of the investigated cases are male (Fig. 1), and 97.4% of the cats are neutered/spayed (Fig. 2)

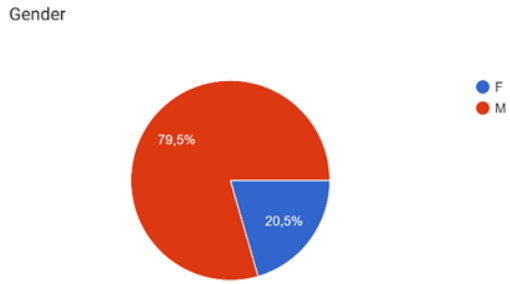

Fig. 1 Gender of the studied cats

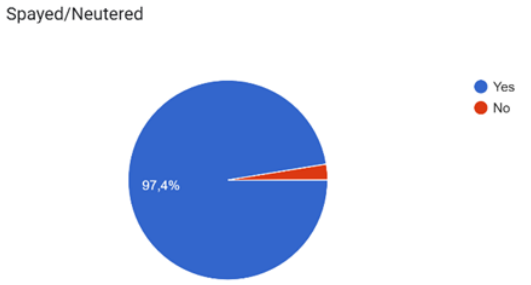

Fig. 2. Reproductive status of the cats

Regarding the age of the animals, 66.7% are between 10 and 15 years old, the rest being between 5 and 10 years old (Fig. 3). Also, 64.1% of the studied cats live exclusively indoors (Fig. 4).

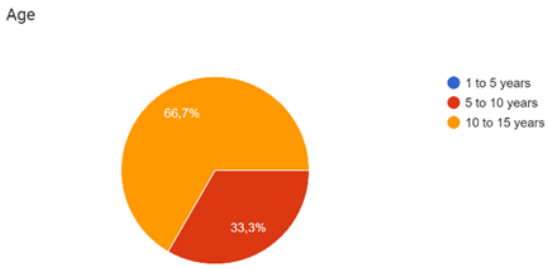

Fig. 3. Gender of the studied cats

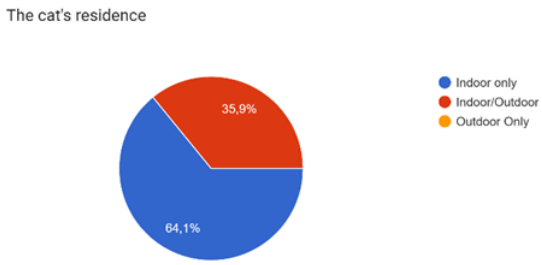

Fig. 4. Housing conditions of the cats

Among the breeds of cats investigated in this study, the Domestic Shorthair breed stood out (20 cases representing 51.28%), and only one case is a Burmese cat, predisposed to this pathology according to the specialized literature (Öhlund M. et al. 2015).

Regarding the weight (kg) of the investigated patients, the values varied from 2.8 kg to 8 kg, with only one case mentioning a weight of 17 kg (Fig. 5). This parameter shows relatively low weight values but cannot be interpreted as it is conditioned by the period the cat was on a diet and the time passed since this moment until the current investigation.

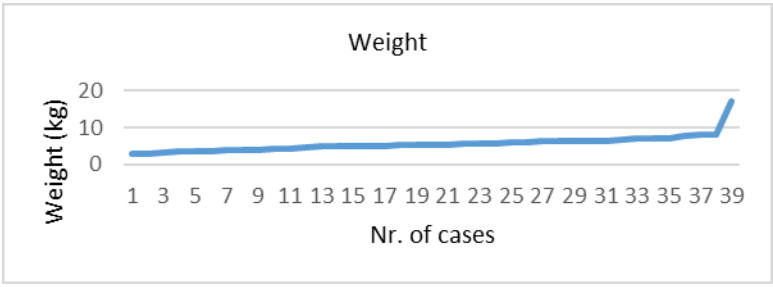

Fig. 5. Weight variation graph of the investigated cats

Type 2 diabetes is the most common form of diabetes in cats, and among the signs of this pathological condition are weight variations, anorexia, lethargy, vomiting, polyuria, polydipsia, diarrhea, and neurological signs. According to the responses provided by the owners of diabetic cats, 64.1% were confirmed with type 1 diabetes, and the rest, 35.9%, with type 2 diabetes (Fig. 6).

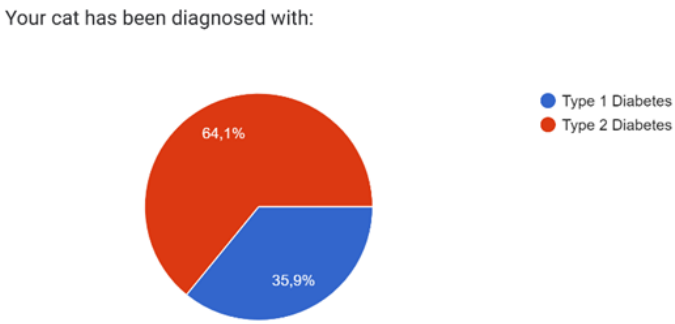

Fig.6. Type of diabetes diagnosed in the studied cats

The results obtained in our study showed that in 66.7% of cases, a rapid weight loss of the cats diagnosed with diabetes was observed at the time of diagnosis?) (Fig. 7), while in 74.4% of cases, lack of appetite was not reported (Fig. 8).

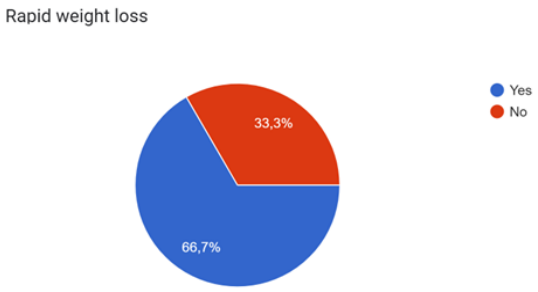

Fig. 7. Weight variations in the studied cats

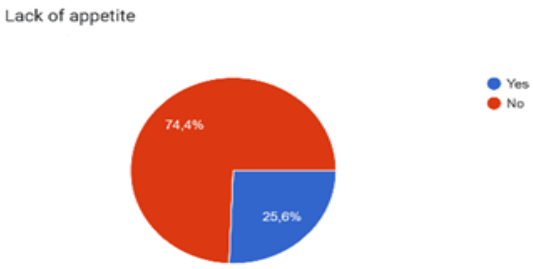

Fig. 8. Lack of appetite in cats

Polydipsia was reported in 87.2% of cases (Fig. 9), while polyuria manifested in 84.6% of cases (Fig. 10).

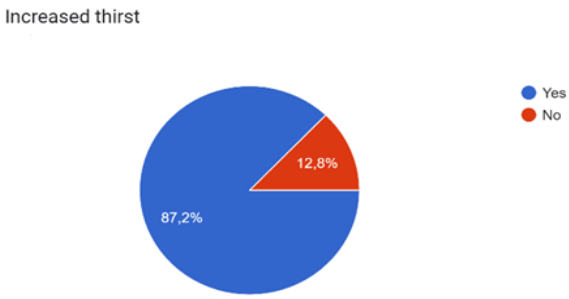

Fig. 9. Percentage of cases with polydipsia

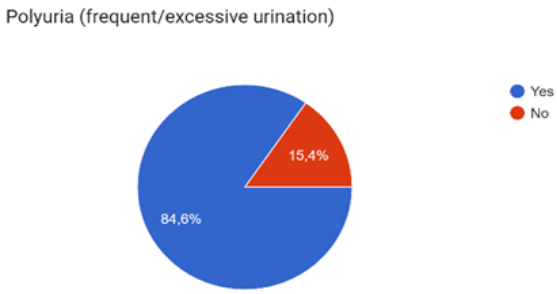

Fig. 10. Percentage of cases with polyuria

Other specific manifestations of diabetes pathology reported by the owners of the investigated cats were vomiting in 30.8% of cases (Fig. 11) and lethargy in 64.1% of cases (Fig. 12).

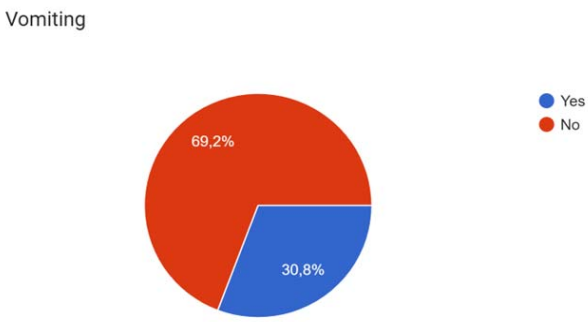

Fig. 11. Percentage of cases with vomiting

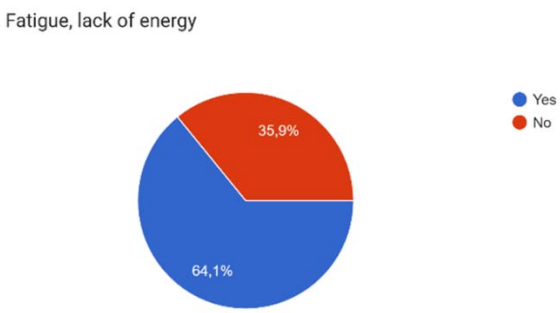

Fig. 12. Percentage of cases with lethargy

It is known that this pathology is found in elderly cats, as confirmed by our study. In 25 cases, the disease was diagnosed at ages over 40 months (3 years), of which 16 cases were over 9 years old (Fig. 14).

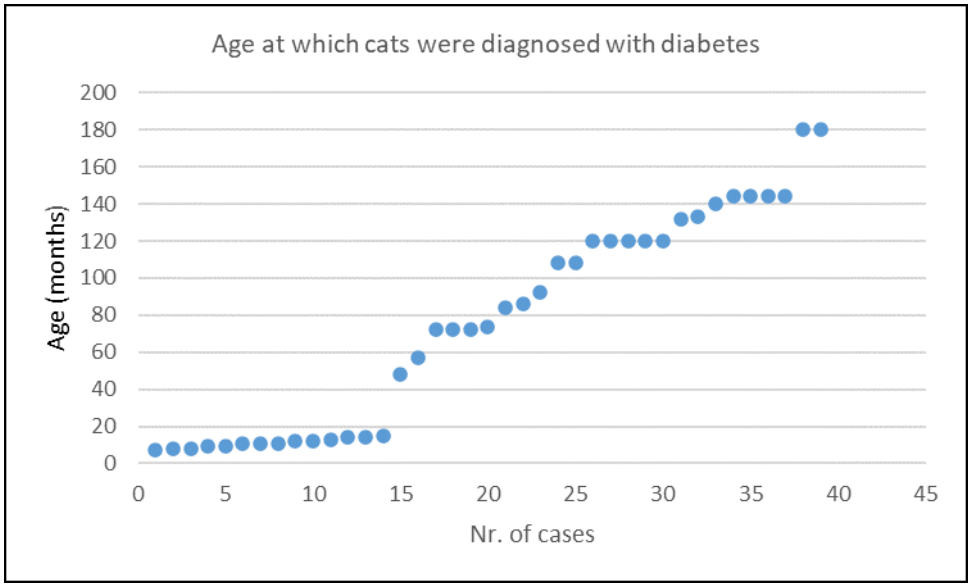

Fig. 13. Age at which cats were diagnosed with diabetes mellitus

The owners of the investigated cats mentioned that they periodically monitor blood glucose levels in 66.7% of cases (Fig. 14), and insulin is administered in 94.9% of these cases (Fig. 15).

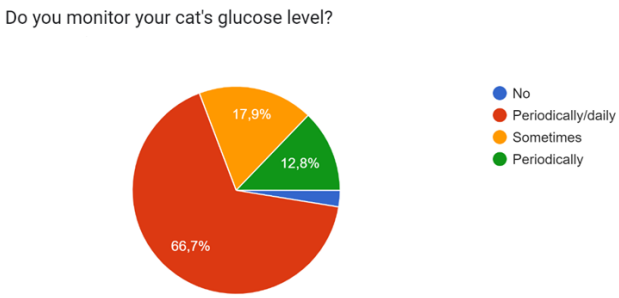

Fig. 14. Monitoring blood glucose levels

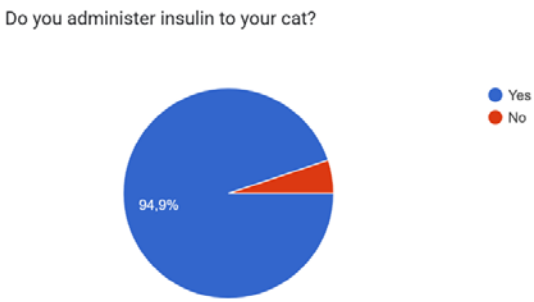

Fig. 15. Administering insulin to cats

Nutritional Approach in Diabetes Mellitus in Cats

Commercial products - special-purpose feeds - recommended for diabetes in cats come in wet and dry food forms. In this study, diabetic cats consumed dry food (2 cases), combinations of wet and dry food (6 cases), and wet food (31 cases). Commercial dry food is notable for its low water content, generally between 8 and 12% humidity, and high carbohydrate content. An analysis of special-purpose nutritional commercial products recommended for diabetes in dry form available on the Romanian market shows an extractable non-nitrogenous substance (SEN) intake, which are soluble carbohydrates, with values ranging between 15.5% and 33.4%. Cats' ingestion of carbohydrate-rich foods predisposes them to obesity and increases the demand for β-cells necessary for insulin secretion, thus predisposing individuals to hyperinsulinemia, apoptosis, β-cell failure, and the development of type 2 diabetes (Porte D. 1991). Inherited insulin resistance, combined with environmental risk factors such as physical inactivity, obesity, and consumption of easily digestible carbohydrate-rich foods, imposes a high and prolonged demand on β-cells for excessive insulin secretion, ultimately leading to β-cell exhaustion and diabetes. Previous studies have demonstrated that the ingestion of various carbohydrate sources from cereals, such as rice, increases the insulin demand in cats and could contribute to β-cell failure in cats fed long-term with this type of food (Appleton DJ et al. 2004). Commercial wet products (without sauce) have a high protein content, over 30%, and a lower sugar content compared to dry food. From this perspective, they are undoubtedly recommended in the diet of cats with this pathological condition. Food is administered in several meals per day as much as possible, or there is also

the option to use appropriate feeders so that food distribution is gradual. "The 'carnivore connection' theory proposes that resistance to the hypoglycemic effects of insulin evolved during the ice age to maintain euglycemia on a high-protein, low-carbohydrate diet" mentions Brand Miller JC and Colagiuri S (1994). Although cats evolved as strict carnivores, many commercial diets are moderately to highly carbohydrate-rich (>50% of calories). This shift from a low-carbohydrate, high-protein diet typical of wild cats to a high-carbohydrate diet has become increasingly common in the last 20-30 years and may be partially responsible for the recent increase in diabetes incidence in domestic cats. This dietary change has also been accompanied by a shift from an outdoor environment to indoor isolation and decreased physical activity, as cats no longer need to hunt for nutrition (Rand JS et al. 2004). Home blood glucose monitoring is recommended and used by owners of diabetic cats. It should be noted that the postprandial blood glucose value in cats fed a moderate carbohydrate diet persists for an average of 12 hours. If the cat receives insulin and is switched to a low-carbohydrate diet without reducing the insulin dose, the cat is at significant risk of a hypoglycemic crisis.Foods that produce relatively rapid and high postprandial glucose and insulin responses (high glycemic index foods) have been associated with lower satiety and higher food intake in humans (Holt S et al. 1992; Brand JC et al. 1985; Jenkins DJA et al. 1982). Thus, consuming high glycemic index foods can lead to increased hunger and promote overeating and weight gain. As carnivores, wild cats consume high levels of protein through hunted food and are not naturally adapted to eat large amounts of carbohydrates (Drochner W. and Müller-Schlösser S. 1980).

Conclusions

A percentage of 79.5% of the investigated cases are male, and 97.4% of the cats are neutered/spayed. Regarding the age of the animals, 66.7% are between 10 and 15 years old, the rest being between 5 and 10 years old. Also, 64.1% of the studied cats live exclusively indoors. Among the breeds of cats investigated in this study, the Domestic Shorthair breed stood out (20 cases representing 51.28%), and only one case is a Burmese cat. Regarding the weight (kg) of the investigated patients, the values varied from 2.8 kg to 8 kg, with only one case mentioning a weight of 17 kg. According to the responses provided by the owners of diabetic cats, 64.1% were confirmed with type 1 diabetes, and the rest, 35.9%, with type 2 diabetes. The results obtained in our study showed that in 66.7% of cases, a rapid weight loss of the cats diagnosed with diabetes was observed, while in 74.4% of cases,

lack of appetite was not reported. Polydipsia was reported in 87.2% of cases, while polyuria manifested in 84.6% of cases. Other specific manifestations of diabetes pathology reported by the owners of the investigated cats were vomiting in 30.8% of cases and lethargy in 64.1% of cases. In 25 cases, the disease was diagnosed at ages over 40 months (3 years), of which 16 cases were over 9 years old. The owners of the investigated cats mentioned that they periodically monitor blood glucose levels in 66.7% of cases, and insulin is administered in 94.9% of these cases. In this study, diabetic cats consumed dry food (2 cases), combinations of wet and dry food (6 cases), and wet food (31 cases). It is essential that diabetic patients consume enough total calories per day to help prevent the onset of diabetic ketoacidosis. These calories will be predominantly provided from proteins, moderately from fats, and low from carbohydrates. A weight loss of more than 1-2% of GV/week is not recommended in obese cats. Providing an intake of 30 calories/kg/day is sufficient to prevent hepatic lipidosis. The recommended food is wet, without sauces, with a high protein content and low carbohydrate content (regardless of their nature - soluble or fiber).

Acknowledgement

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INVOLVEMENT OF CYTOKINES IN THE INFLAMMATORY PROCESS

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Abstract

Cytokines are small proteins, produced and released by various cells, that play a crucial role in regulating the body's immune and inflammatory response. In the inflammatory process, cytokines have several essential functions, including mediating and regulating inflammation, recruiting immune cells to the site of infection or injury, and coordinating cellular activities to eliminate pathogens or repair damaged tissues.

Key words*: cytokines, mediating inflammatory reactions, acute inflammation, chronic inflammation*

Introduction

The inflammatory process is defined as the response of the immune system to the action of harmful stimuli such as pathogens, damaged cells, toxic compounds or radiation [1], and acts, firstly, by eliminating the harmful stimuli and, secondly, by initiating the healing process [2]. Therefore, the inflammatory process is a vital defense mechanism for the homeostasis of the organism [3]. Usually, during acute inflammatory responses, cellular and molecular events and interactions effectively minimize impending injury or infection. This attenuation process helps to restore tissue homeostasis and resolve acute inflammation. However, uncontrolled acute inflammation can become chronic, contributing to a variety of chronic inflammatory diseases [4].

At the tissue level, acute inflammation is characterized by hyperemia, edema, hyperthermia, pain, and loss of function, resulting from local immune, vascular, and inflammatory cell responses to infection or injury [5]. Important microcirculatory events that occur during the inflammatory process include changes in vascular permeability, leukocyte recruitment and accumulation, and release of inflammatory mediators [2, 6]. These

mediators are represented by a variety of soluble factors, including a group of secreted polypeptides known as cytokines.

Depending on the duration of the inflammatory process, cytokines can be divided into two groups: those involved in acute inflammatory processes and those responsible for chronic inflammatory processes (Fig. 1).

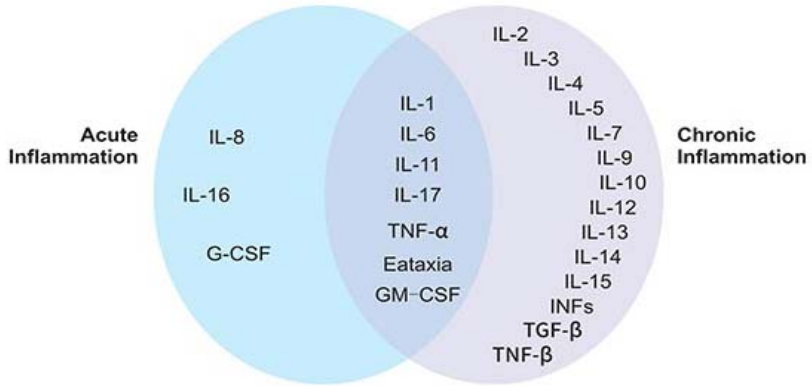

Fig. 1 Cytokines involved in acute and chronic inflammatory response [7]

1. Cytokines involved in the acute inflammatory response

The cytokines that play key roles in mediating acute inflammatory responses are IL-1, TNFα, IL-6, IL-11, IL-8, G-CSF and GM-CSF.

1.1 Interleukin-1 (IL-1) in the acute inflammatory process

Interleukin-1 is a cytokine with potent inflammatory and immuno-amplifying effects, mainly produced by monocytes and macrophages during defence reactions [8].

It is responsible for the induction of fever (originally described as 'endogenous pyrogen') [9-12], thus contributing to the creation of an unfavourable environment for pathogenic microorganisms and facilitating lymphocytic functions (which in mammals are more pronounced at temperatures above 37°C). IL-1 also stimulates the production of neutrophils, acute-phase proteins [13, 14], proteolytic enzymes and prostaglandins by fibroblasts, chondrocytes and other cells [15-18], regulates the expression and production of chemokines (IL-8, MCP-1) and inflammatory cytokines (TNFα, IL-6, IL-1 itself), induces the production of reactive oxygen species (ROS) and nitric oxide (NO) and is a potent adjuvant of antigen-specific antibody responses in vivo [8].

1.2 Tumour necrosis factor (TNFα) in the acute inflammatory process

TNFα is a homotrimeric, hormone-like protein of 157 amino acids that acts both locally and distally by entering the bloodstream.It is produced mainly by activated macrophages, but also by T lymphocytes, NK cells,

mast cells, endothelial cells, cardiac myocytes, adipose tissue, fibroblasts and neuronal tissue [22, 23]. Although TNF receptors are differentially expressed on a wide range of cells and tissues, many of the pro-inflflammatory effects of TNF are represented by: activation of neutrophils and macrophages; stimulation of endothelial cell proliferation; stimulation of the expression of MHC 1 and 2 molecules as well as the expression of adhesion molecules on the surface of keratinocytes, endothelial cells and fibroblasts; stimulation of B lymphocytes to transform into plasma cells and increased antibody synthesis; stimulation of T cell activity; increased trans-endothelial passage of fluids and macromolecules to create oedema.

1.3 Interleukin-6 (IL-6) in the acute inflammatory process

Like interleukin-1, interleukin-6 has several roles. It is synthesised by leukocytes, epithelial cells, fibroblasts, endothelial cells, in response to different stimuli. In the integument, its secretion is stimulated by ultraviolet radiation or by various traumas to the epithelium and skin. In the acute inflammatory process, interleukin 6 has the following actions: it causes fever by action in the hypothalamus, stimulates the transformation of B lymphocytes into plasma cells and the synthesis of antibodies; it activates T lymphocytes and stimulates haematopoiesis [23].

1.4 Interleukin-8 (IL-8) in the acute inflammatory process

Neutrophil infiltration in inflammatory areas is one of the hallmarks of acute inflammation. Locally produced chemotactic factors are presumed to mediate the sequence of events that lead to infiltration in inflammatory areas. IL-8 is produced at sites of inflammation and promotes neutrophil chemotaxis to the site of injury. Its synthesis by monocytes, fibroblasts, endothelial cells is stimulated by interleukin 1 and tumour necrosis factor alpha.

1.5 Interleukin-11 (IL-11) in the acute inflammatory process

IL-11 is a cytokine of the interleukin-6 (IL-6) family that has been shown to play a protective role in acute inflammatory environments, including systemic infections [24]. It acts mainly to stimulate haematopoietic cell growth, with a major effect on megakaryocyte production. It also stimulates the growth of T cells, B cells and fibroblasts.

1.6 Interleukin-16 (IL-16) in the acute inflammatory process

IL-16 is considered a proinflammatory cytokine and is produced not only by T cells, mast cells, eosinophils, fibroblasts, but also by dendritic cells and epithelial cells [25].

IL-16 promotes lymphocyte migration, induces the expression of proinflammatory factors and modulates apoptosis. As a potent chemoattractant for peripheral immune cells, IL-16 has been associated with inflammatory diseases such as asthma and Crohn's disease [25].

1.7 Interleukin-17 (IL-17) in the acute inflammatory process

IL-17 is an important proinflammatory cytokine produced by T helper cells and natural killer (NK) cells [26]. In addition to its potential role in regulating the immune response to balance cytotoxic and tolerogenic immune profiles, it also results in acute injury [27].

1.8 Eoataxin in the acute inflammatory process

Eoataxin is a specific chemoattractant for eosinophils being structurally represented by 74 amino acids. It is produced by cytokine-stimulated cells produced by epithelial and endothelial cells as well as by eosinophil-stimulated IL-3-producing cells. Eotaxin is implicated in inflammatory bowel disease, where mRNA levels.[29]

1.9 G-CSF in the acute inflammatory process

Granulocyte colony-stimulating factor (G-CSF) is a cytokine that stimulates neutrophil production in the bone marrow and modulates the cellular functions of mature neutrophils. In addition to neutrophils and their precursors, monocytes are direct target cells of G-CSF action. G-CSF influences monocyte functions in an anti-inflammatory manner: Stimulation of monocytes with G-CSF leads to an attenuation of LPS-induced release of IL-1β, TNF-α, IL-12 and IL-18.G-CSF exerts its biological functions on neutrophils and monocytes via membrane-bound receptors [28].

1.10 GM-CSF in the acute inflammatory process

GM-CSF was initially defined as a haemopoietic growth factor due to its ability to form granulocyte and macrophage colonies in vitro by proliferating and differentiating bone marrow progenitor cells and macrophages. bone marrow progenitor cells [48]. Subsequently, it was shown that GM-CSF can act on mature myeloid cells [49, 50], such as macrophages and neutrophils, as a pro-survival and/or activation factor with a potential role in inflammation [28]**.**

2. Cytokines involved in the chronic inflammatory response

In the chronic phase of the inflammatory process, cytokine interactions result in chemotaxis of monocytes from the vascular bed to the site of inflammation, where macrophage-activating factors (MAFs), such as interferon-gamma (IFN- δ), monocyte chemoattractant protein-1 (MCP-1) and other molecules which then activate macrophages while migration inhibitory factors (MIFs), such as GM-CSF [38] and IFN-δ, retain them at the site of inflammation.

Macrophages contribute to the inflammatory process by chronically elaborating low levels of IL-1 and TNF that are responsible for some of the resulting clinical symptoms such as anorexia, cachexia, fever, somnolence and leukocytosis.

The cytokines known to mediate the chronicisation of chronic inflammatory processes can be divided into those that participate in humoral inflammation, such as IL-3, IL-4, IL-5, IL-6, IL-7, IL-9, IL-10, IL-13 and transforming growth factor- β (TGF- β), and those that contribute to cellular inflammation, such as IL-1, IL2, IL-3, IL-4, IL-7, IL-9, IL-10, IL-12, interferons (IFN), IFN- δ inducing factor (IGIF), TGF-β and TNF-α and - β.

2.1 Interleukin 1 (IL-1) in the chronic inflammatory process

IL-1 is mainly produced by leukocytes [especially monocytes and macrophages] and is responsible for many functions related to the chronic inflammatory process by enhancing B and T lymphocyte proliferation, stimulating the production of proteolytic enzymes and prostaglandins by fibroblasts, chondrocytes and other cells and is a potent adjuvant to antigen-specific antibody responses in vivo [32].

2.2 Interleukin 2 (IL-2) in the chronic inflammatory process

IL-2 is a cytokine produced almost exclusively by activated T cells and promotes the proliferation of lymphocytes, macrophages and NK cells. IL-2 is important for the differentiation of CD4+ T cells into effector T helper1 and T helper 2 subgroups, while inhibiting T helper 17 differentiation [35]. Furthermore, we and others have shown that IL-2 is required for the development of memory T cells [33, 34].

2.3 Interleukin 3 (IL-3) in the chronic inflammatory process

IL-3, also called colony-stimulating factor (CSF), is produced by activated T lymphocytes and mast cells. Its role in the chronic inflammatory process is to stimulate the differentiation of eosinophils and B lymphocytes, while inhibiting the differentiation of lymphokinetically activated K cells (LAK). IL-3 is also involved in biological activities alongside the granulocyte-macrophage colony-stimulating factor GM-CSF [30].

2.4. Interleukin 4 (IL-4) and Interleukin 13 (IL-13) in the chronic inflammatory process

Interleukins IL-4 and IL-13 are related cytokines that regulate many aspects of allergic inflammation. They play important roles in regulating the responses of lymphocytes, myeloid cells and non-haematopoietic cells. In T cells, IL-4 induces the differentiation of naïve CD4+ T cells into T helper cells, in B cells, IL-4 induces immunoglobulin class switching to IgG and IgE, and in macrophages, IL-4 and IL-13 induce alternative macrophage activation [31].

2.5 Interleukin 5 (IL-5) in the chronic inflammatory process

IL-5 is a cytokine with a central role in eosinophil differentiation, recruitment, survival and degranulation, maintaining and amplifying eosinophilic inflammation [36].

2.6 Interleukin 6 (IL-6) in the chronic inflammatory process

IL-6 is a cytokine involved in both acute-phase and chronic-phase reactions through the development of specific cellular and humoral immune

secretion and T-cell activation. The main transition from acute to chronic inflammation is the recruitment of monocytes to the area of inflammation.

IL-6 plays a rather unexpected role in leukocyte recruitment in vivo. A complex of IL-6 can activate endothelial cells to secrete IL-8 and monocyte chemoattractant protein (MCP-1) but also to induce the expression of adhesion molecules [37].

2.7 Interleukin 7 (IL-7) in the chronic inflammatory process

IL-7, expressed by stromal cells in primary lymphoid lymphoid organs, is a cytokine known for its critical role in the development and homeostatic expansion of T lymphocytes in humans and mice. IL-7 is equally important for B-lymphocyte development in humans and mice, but only in mice does it appear to be critical for B-lymphocyte development and expansion.

IL-7-mediated T lymphocyte-dependent activation of macrophages, dendritic cells and B lymphocytes is accompanied by upregulation of T lymphocyte differentiation factors, chemokines, adhesion/co-stimulatory molecules and catabolic cytokines and enzymes. In addition, IL-7 promotes T-cell-driven osteoclastogenesis and fibroblast activation, processes involved in tissue destruction in chronic inflammation. Taken together, this suggests that IL-7 is an important proinflammatory mediator in several rheumatic chronic inflammatory autoimmune diseases [38].

2.8 Interleukin 9 (IL-9) in the chronic inflammatory process

Recent studies have highlighted a crucial regulatory role of the cytokine IL-9 in stimulating immune responses in chronic inflammatory and autoimmune diseases at mucosal surfaces. IL-9 activates different types of immune and non-immune cells carrying membrane-bound IL-9R. IL-9 signalling plays an essential role in controlling the differentiation and activation of T helper cells and affects the function of various tissue-resident cells such as mast cells and mucosal epithelial cells [39].

2.9 Interleukin 10 (IL-10) in the chronic inflammatory process

IL-10 is described as a cytokine produced in almost all leukocytes: T helper cells, monocytes, macrophages and dendritic cells, but a multitude of immune effector cell types are capable of producing IL-10 in certain contexts, including B cells, cytotoxic T cells, NK cells, mast cells, and granulocytes such as neutrophils and eosinophils. In addition, non-immune effector types, such as epithelial cells and keratinocytes, are also capable of producing IL-10 in response to infection or tissue injury, as are tumour cells [40].

2.10. Interleukin 12 (IL-12) in the chronic inflammatory process

IL-12 is produced mainly by monocytes and macrophages and, to a lesser extent, by B lymphocytes and dendritic cells. IL-12 receptors are mainly localised on T lymphocytes and NK cells and stimulate the growth of T helper 1 and NK cells while inhibiting T helper 2 cell responses.

IL-12 enhances the cytotoxicity of T lymphocytes and NK cells, at least in part by increasing the secretion of IFN-γ and TNF-α and inhibiting the production of IL-4. Accordingly, IL-12 favours T helper type 1 responses over T helper type 1 responses [41].

2.11 Interleukin 14 (IL-14) in the chronic inflammatory process

IL-14 is a product of malignant B and T lymphocytes as well as normal Tsi B lymphocytes. Like IL-4, IL-14 induces B lymphocyte proliferation but inhibits their secretion of immunoglobulins [20].

2.12 Interleukin 15 (IL-15) in the chronic inflammatory process

IL-15 is a cytokine produced by a wide variety of cells, including T lymphocytes and monocytes, and is a chemoattractant of T lymphocytes. It also enhances the expansion of B lymphocytes [30].

2.13 Interferons in the chronic inflammatory process (INFs)

There are three main types of interferons; interferons α and β (collectively referred to as type 1 interferon), which are structurally similar and exert common effects, and interferon γ (type 2 interferon), which is chemically and functionally different from the others.

Nearly any cell can produce interferon-α or interferon-β in response to an appropriate stimulus, especially a virus or cytokine. Interferon-γ can only be produced by stimulated T lymphocytes and natural killer cells [43]. IFN-I elicits multiple anticipatory and responsive mechanisms that promote inflammatory immunity in a regulated manner. However, in response to chronic exposure, these regulatory mechanisms may predominate and suppress immunity, thereby promoting pathogen or tumour persistence [42]. In the setting of antiviral immunity, chronic IFN-I signalling is associated with hyperimmune activation and disease progression in persistent infections.

Blocking IFN-I signalling, in mice, has been shown to decrease chronic immune activation and immune suppression, restore lymphoid tissue architecture and increase immune parameters associated with the control of virus replication, ultimately facilitating the clearance of persistent infection [44].

2.14 Transforming growth factor-β (TGF-β) in the chronic inflammatory process

In the chronic inflammatory process, transforming growth factor-β is involved in mediating the recruitment and activation of leukocytes, which are essential for the smooth progression of this process. It is released by platelets during the aggregation process and by leukocytes stimulated by bacterial antibodies or inflammatory mediators. In the chronic phase of the inflammatory process, TGF-β has a strong chemotactic activity for monocytes and lymphocytes in the blood. Thus, TGF-β-stimulated mononuclear cells,

once at the inflammatory focus, start to release cytokines to regulate the host response to biotic factors and immunological challenge [45].

2.15 Tumour necrosis factor-β (TNF-β) in the chronic inflammatory process

TNF-β, also called lymphotoxin-α (LT-α) [46], is a multifunctional cytokine produced mainly by activated T and B lymphocytes. Macrophages are also an important producer of TGF-β, which is activated by phagocytosis of apoptotic cells. TNF-β plays a key role in suppressing inflammation, but recent studies have also demonstrated its positive roles in inflammatory responses and immunoregulation. TNF-β exerts a proliferative capacity on fibroblasts, thus participating in the healing of injured tissues. In the inflammatory process, TGF-β is involved in the suppression of NK cells, mast cells, granulocytes and controls the proliferation of CD8+ T cells [47].

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PERIODONTAL DISEASE CASE STUDY

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Abstract

Periodontal disease is an inflammation of the periodontium caused by bacterial plaque, with the inflammatory reaction of the tissue in the area. The bacterial plaque matures in a few days, and calculus is formed through mineralization.

The materials used for this study were: bacteriological examination and histopathological examination. These two examinations helped us to make a more precise diagnosis for the patient and to establish a specific therapeutic protocol. We can conclude that the existence of periodontal disease is not limited to the presence of halitosis and tartar on the surface of the teeth.

Keywords: *periodontal disease, bacterial plaque, periodontal ligament*

Introduction

Periodontitis is present when plaque bacterial induced inflammation has affected the gingiva (gingivitis) as well as other tissues of the periodontium. The periodontium is made up of the tissues that surround and support the tooth including the gingiva, cementum of the tooth, periodontal ligament, and the alveolar and supporting bone [1].

Chronic periodontitis is an extremely common problem in dogs and cats. Aggressive periodontitis (localized or generalized) is a severe form of periodontitis which is seen less frequently. Periodontitis is an infectious disease caused by plaque bacteria and the resulting inflammatory response in a susceptible individual [2].

Gingivitis is present prior to the development of periodontitis. However, not all dogs and cats with gingivitis will develop periodontitis [3].

Periodontal disease is an extremely common condition in dogs in veterinary clinics, over 80% from dogs. Periodontal disease can manifest itself with the loss of soft and bone structures: gum, periodontal ligament, cementum, and alveolar bone [4].

Materials and methods

This study was conducted by Dr. Zvorasteanu Raluca in the veterinary clinic Qincyvet. The analysis methods for this patient were bacteriological

examination in collaboration with Synevovet laboratory and histopathological examination in collaboration with Laboklin laboratory.

The bacteriological and histopatological examination were taken from an 11-year-old male, unsterilized (neutered) Bichon dog. Both samples were taken from the oral cavity of the animal.

The bacteriological sample was collected in a sterile eSwab container and sent to the laboratory for processing.

The histopatological samples were taken from the oral cavity with a 15mm blade scalpel, collected, of alveolar bone 109, in a sterile container with 10% formalin. After collection, these samples were sent to the laboratory for processing.

Results and discussions

The owner presented himself with the quadruped, a canine species, Bichon Maltese, male – intact, 11 years old. The animal consumed industrial-type dry food and wet food. He had no dental medical history (no periodic scaling). At home, the owner did not apply a periodic care protocol.

The examination was performed without sedation and the following aspects were noted: mesocephalic skull type, halitosis, tartar, bilaterally reactive submandibular ganglia. The presumptive diagnosis was stage III and IV periodontitis.

The therapeutic plan consisted of examination with sedation, intraoral radiography, scaling, and collection of samples for histopathological examination and extraction of affected teeth. It was recommended to carry out biochemistry and hematology analyses, pre-anesthetic cardiological examination, intraoral radiology.

Blood tests (biochemistry and hematology) and cardiological consultation were performed.

The blood tests were within physiological limits and no changes were found during the cardiological examination.

During the examination with sedation, several aspects were noted. The gingivitis index was GI3, there was color change, edema; there was also bleeding on examination and the presence of gingival hyperplasia, bacterial plaque and gingival retraction (Fig.1).

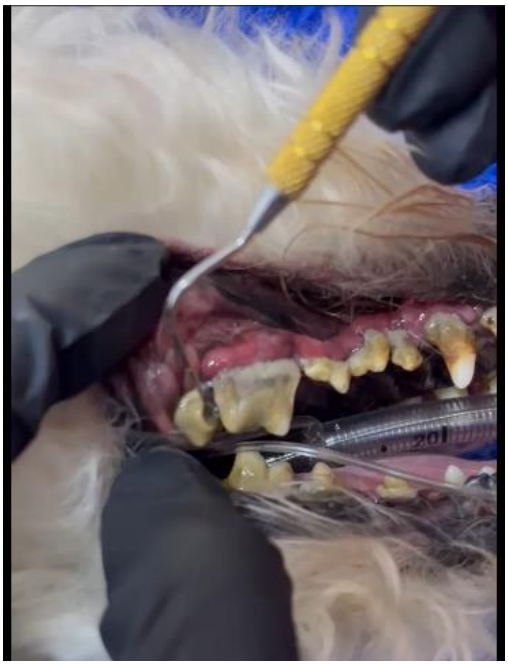

Fig.1 the image of the oral cavity with the performance of the periodontal test

In the images above the depth of the sulcus was measured by the periodontal sample. In the images below, radiographic images, in (Fig. 2) gingival retraction was 2 mm gingival retraction and apical abscesses were observed and apical abscess (Fig.3) observed.

Fig.2 Radiological image with gingival retraction

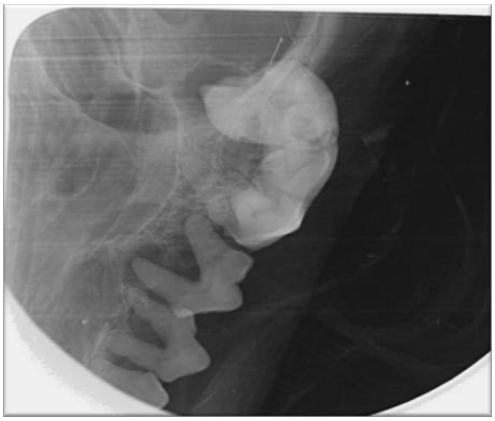

Fig. 3 Apical abscess, radiological image

The diagnosis of certainty was periodontitis type 4 and apical abscess. Similarly, we could also identify the following: the PPD index-measurement of subgingival sulcus PPD general was 2-3mm (Fig. 4), the dismissal test was M2, the tartar index was CI3 in quadrants 1, 2, 3 and 4, and an oligodontia: 110, 210 (Fig. 4). For the bacterial plaque (tartar), a scaling was performed - dental mobility - oligodontia: 110, 210 - surgical extractions according to PM, PPD and RX: 101,102,103,105,106,107,109,201,202,203,207,302,303,403.

Fig.4 Oligodontia

The treatment protocol for this patient was as follows: descaling with respect to the stages, and extraction of affected teeth according to PM, PPD and RX: 101, 102, 103, 105, 106, 107, 109, 201, 202, 203, 207, 302, 303, 403 (Fig. 5 and Fig. 6).

An inhalation anesthesia was performed (using branula, branula fitting, endotracheal tube, endotracheal tube fitting, inhalation anesthesia, fluid therapy, local antiseptic, antibiotic and injectable anti-inflammatory).

A postoperative antibiotic therapy for 10 days was recommended (amoxicillin with clavulanic acid and doxycycline), local application of gel (Restormyl®) and in drinking water, veterinary mouthwash was recommended, after the 10-day recheck, tooth brushing with veterinary toothpaste and brush.

A vet visit was also recommended every 10 days to check on the progress, one month and after every 6 months to monitor the hygiene of the oral cavity and possible relapses.


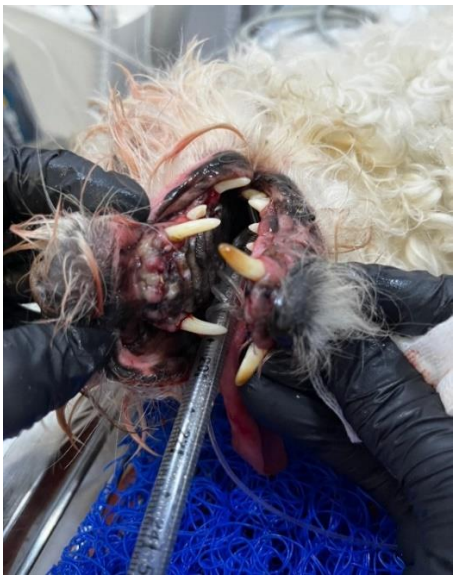

Fig. 5 and Fig. 6 Appearance of the oral cavity after scaling and extractions

The result of the bacteriological examination received from the Synevovet laboratory was as follows: the antibiogram for *Staphylococcus spp*. showed resistance to Cefotaxime, an intermediary resistance for Pradofloxacin, and sensitivity to Enrofloxacin, Marbofloxacin and Ciprofloxacin CIP. The sensitivity interpretation was performed according to the Guide Performance Dilution Susceptibility Test for Bacteria Isolated from Animals. Colonies of *Staphylococcus scluri* developed on culture media. Antibiogram for *Staphylococcus scluri* showed resistance to Penicillin P and Ceftiofur, an intermediary resistance for Clindamycin and sensitivity to Amoxicillin, ampicillin, bacitracin, doxycycline, tetracycline, gentamicin, amoxicillin, clavulanic acid, and chloramphenicol. The prognosis was favorable, at the follow-up after 3 months, no changes were found.

The result of the histopathological examination received laboratory was as follows based on two tissue samples that were submitted: 0,8 x 0,6 x 0,4 cm and 1,8 x 1,7 x 0,9 cm in size - from the jawbone. Seven sites were embedded in toto for histological investigation.

From the microscopic examination, we concluded the following: the following staining was performed according to standard operation procedures: H&E (Hematoxylin and Eosin). The samples included multiple fragments of trabecular bone and intertrabecular space. The bone appeared orderly and well mineralized but often had empty lacunae (necrosis of osteocytes).

The intratrabecular space was expanded and effaced by abundant granular debris, hemorrhage, small areas of granulation tissue, and some

densely cellular areas. The cells consisted primarily of plasma cells with fewer small lymphocytes, macrophages, and occasional neutrophils. Low numbers of hematopoietic precursors cells were also present. The cells often infiltrated the granulation tissue. There were also small deposits of fibrin. Some clusters of fine bacteria were also visible.

The diagnosis given was chronic-active osteomyelitis, with bone necrosis and with bacteria.

The critical report mentioned that the lesions were inflammatory and reactive in nature. This appeared to be bacterial osteomyelitis with bone necrosis. The cause was not directly visible. Trauma to the bone (fracture) with secondary infection or a tooth root infection could have been considered as possible causes. Inflammation and infection could sometimes be secondary changes, but at least in these samples, no neoplasia was visible.

Conclusion

After performing the 2 examinations, the following could be identified: the presence of *Staphylococcus scluri* colonies and receiving a diagnosis of certainty of osteomyelitis. The lack of oral hygiene at home and at work leads to advanced periodontal disease with loss of soft tissue, bone, and the formation of apical abscesses and even osteomyelitis.

The evolution of periodontal disease can be aggressive. In many situations it is irreversible. The goal of the treatment is to prevent new lesions from developing and to slow down the disease.

Meticulous care, at home, through supragingival brushing, prevents the migration of bacteria into the subgingival groove. Periodic health check is very important to verify that the owner complies with the recommendations. Descaling is recommended to be carried out annually or, if needed, every 6 months.

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BACTERIAL DETERMINATIONS IN PETS IN DISEASES WITH URINARY ETIOLOGY

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Abstract

This article aims to present some research carried out in the bacteriology laboratory, regarding the identification of possible bacterial pathogens that affect the urinary tract in pets. Antibiograms were performed on positively diagnosed samples to determine the most effective antibiotics to be used in the treatment. Samples were taken from pets (canids, felines) with clinical signs in the urinary system, bacteriological examinations were performed, and the sensitivity of germs to antibiotics was determined by performing the antibiogram.

The research was carried out in a veterinary office in Bucharest, over a period of one year, namely May 2023-April 2024.

Keywords*: urinary bacterial etiology, antibiogram, antibiotic sensitivity.*

Introduction

Most urinary system infections are caused by bacteria. The infection usually develops when bacteria enter the body through the urethra (1). The bacteria then pass into the bladder and, in some cases, create an infection. Sometimes the bacteria continue to move up the urinary tract to the kidneys and can lead to kidney infections (pyelonephritis). There are several factors that increase the risk of urinary tract infection (2). These include problems with urine flow (especially the inability to completely empty the bladder during urination), urine that is too diluted, sugar in the urine (often a sign of diabetes), old age, a weakened immune system, and the presence of other diseases (such as long-term kidney disease or hyperthyroidism). Healthy adult cats are relatively resistant to urinary tract infections (3).

Treatment of bacterial urinary tract infections is important for several reasons. Bacteria that cause urinary tract infections can become resistant to antibiotics if infections are not treated properly. Antibiotic resistance can lead to an infection that won't go away. In some cases, an untreated or inadequately treated bladder infection can be the cause of a kidney infection, which is a more serious condition (4).

However, not every disease is caused by infection with bacteria, viruses, or other external agents. There are a variety of non-infectious disorders that

can affect the urinary system. All these diseases and conditions can be serious threats to the animal's health.

Materials and Methods

Pets were examined that presented symptoms related to the urinary system. We took urine samples from the animals in question, samples that were processed in the bacteriology laboratory of the Faculty of Veterinary Medicine, of Spiru Haret University. The research was carried out in a veterinary office in Bucharest, over a period of one year, namely May 2023-April 2024.

The materials used were the following: bacteriological loops, Pasteur pipette, spatula, container with disinfectant solution, gas bulb or spirit washer, culture media, Petri dishes.

Samples were cultivated, incubated, and inoculated using a variety of growth media, namely techniques for seeding and transplanting bacteria, the method of serial dilutions and culture in broth and on inclined agar – incubation of the usual liquid and solid media (broth and nutrient agar)-microscopic examination was performed following the performance of Gram staining.

Results and Discussions:

Pets that showed symptoms related to the urinary tract were examined. After taking the anamnesis and identifying the respective signs, a series of bacteriological tests were performed.

In the present paper, tests carried out from a bacteriological point of view are highlighted. Urine samples were taken from the animals in question, samples that were processed in the bacteriology laboratory of the Faculty of Veterinary Medicine, within the Spiru Haret University.

A total of 9 cases were examined during the study period, of which 6 were feline and 3 were canid. Also, out of the 9 cases, 6 had bacterial etiology, and 3 were sterile, bacteriological.

After performing the laboratory tests, they were identified 3 strains of *Escherichia coli*, 2 strains of *Proteus spp*., and one strain of *Staphylococcus spp.*

The general presentation of all cases with urinary symptoms, for which it was considered necessary to perform bacteriological examinations, led to the presence of the following symptoms: renal colic (animal in the kyphosis position, avoid the sitting position); pain in the sides in the lumbar area; frequent urination; painful or difficult urination; urinating in the wrong

places; blood may also be present in the urine (hematuria or hemoglobinuria); fever and a deteriorated general condition; vomiting, decreased appetite and excessive thirst may occur.

After the bacteriological examinations, Gram negative bacteria were identified. The bacteria identified were from the following genera: *Escherichia coli*, *Proteus spp*.

Conclusion

Based on the semiological examination of pets with urinary disorders, a series of laboratory examinations were performed, which were corroborated with the bacteriological examination, which is the object of the research in this scientific work and will have as its purpose the eventual bacterial etiological diagnosis, as well as the determination of the sensitivity of the identified germs to antibiotics by performing the antibiogram.

1. During the testing period, 9 samples were taken from pets, which had urinary disorders.
2. It is observed that felines are more likely to contact urinary disorders than canids.
3. It can be said that bacterial urinary tract infections in animals are superimposed entities on top of urinary disorders with a different etiology.
4. After the bacteriological examinations, Gram negative bacteria were identified.
5. The bacteria identified were from the following genera: *Escherichia coli*, *Proteus spp*.
6. It is important to perform the antibiogram because bacteria very frequently change their resistance to antibiotics.

Acknowledgement

This study is part of an undergraduate research carried out in the Faculty of Veterinary Medicine, Spiru Haret University, 2024.

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SAFETY MARGINS IN MAMMARY TUMOUR SURGERY IN CATS

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Abstract

Mammary tumors are the 3rd most common neoplasia in cats, making up between 10% up to 12%. Males are also affected; in this case the range represents between 1%- up to 5% from the total numbers of tumors. The role of the safety margins in oncological surgery has always been discussed regarding the tumoral recurrence at the survival rate in cancer surgery. Former reports suggest that extended surgery with a wide resection range together with the regional lymph nodes will increase the percentage of a favorable prognosis.

For this article there have been studied 7 subjects (6 females, 1 male) which were monitored from the first check up at clinic, going through all the necessary steps (clinical and laboratory, surgical and adjuvant treatment, recheck). The surgical safety margins have been evaluated through histopathological examination, then making the correlation between them and the survival period, resulting a positive correlation. Abstract

Keywords: *mammary tumors, safety margins lymph nodes, tumoral recurrence, survival rate*

Introduction

Mammary glands are modified subcutaneous apocrine sweat glands, found only in mammals, and have the important role of providing nutrition and passive immunity to the newborn. Ovarian and exogenous steroid hormones, often used as contraceptives, are risk factors for the development of breast tumors (1).

Tumors of the mammary glands of the feline occupy the third place in frequency, after lymphoid and skin neoplasms (2). As a percentage, mammary tumors in cats constitute approximately 17% of all feline neoplasms (3, 4).

Spayed animals are less likely to develop tumors than intact cats (5). Unlike humans and dogs, at least 80% of all feline mammary tumors are malignant (2, 6). Ulceration, lymphatic invasion, and regional or distant metastases are common findings in most malignant neoplasms of the feline mammary gland (5).

Prognostic factors are the clinical, pathological, and biological characteristics of cancer patients and their tumors that predict clinical

outcome (11). Tumor size, extent of surgery and histological grade have been described as the most important prognostic factors (5).

Feline mammary carcinomas are characterized by their clinical and histological aggressiveness and by their consecutive systemic progression (9, 10). Reported metastatic rates range from 50% to 90%, with the most commonly affected sites being the lungs, lymph nodes, liver, and pleura (10). The reported median survival time for cats with stage IV disease is approximately 1 month (15).

Most feline mammary tumors have a malignant appearance on microscopic examination, and a large proportion are life-threatening even after complete excision (2, 1, 12, 13, 14). A statistically significant correlation between tumor size and postoperative survival of cats was a common finding (15, 16, 17, 18). Postexcisional survival of cats with mammary carcinomas and adenocarcinomas greater than 3 cm in diameter has been reported to be 6 months or less. (15, 16, 18). Some retrospective studies have found that the postexcisional survival of cats with mammary carcinomas and adenocarcinomas smaller than 3 cm in diameter was 12 months or less (15, 18) but MacEwen et al (16). reported that cats diagnosed with mammary carcinomas and adenocarcinomas smaller than 2 cm survived for 54 months. And those with breast carcinomas and adenocarcinomas 2 to 3 cm in diameter survived for 24 months.

Cats with distant metastases are classified according to the modified World Health Organization staging system as stage IV, with an associated poor prognosis, as metastatic disease is the leading cause of death in these animals (7, 8).

The role of a surgical margin in surgical oncology has always been discussed regarding tumor recurrence and survival rate in gastrointestinal cancer surgery. Previous reports have suggested that extensive surgery with a wide resection margin and extensive lymph node dissection is likely to result in a better prognosis (19).

Safety margins are of two types: macroscopic and microscopic. The macroscopic evaluation is observed by the surgeon at the time of the intervention, and the microscopic one is a laboratory technique that ultimately produces histopathological results that can be further expanded with histochemical analyses (20).

Materials and methods

7 animals from the feline species were examined, six females and one male aged between 8 and 17 years. They presented themselves at the

veterinary clinic for a clinical consultation in order to examine some formations that appeared on the mammary chain.

The clinical examination includes anamnesis (when the formations were observed, if the patient is sterilized/castrated and the age at which this procedure was done, previous hormonal treatments, water and food appetite, defecation, urination), general examination of the patient (weight, temperature, state of maintenance, appearance of mucous membranes, capillary refill time, palpation of lymph nodes, ascultation), examination of breast formations (careful palpation of both breast chains and regional lymph nodes, appearance, size and location of formations), paraclinical examinations (blood count, serum biochemistry, radiological examination of the chest). Following these examinations, the treatment plan is established (surgery and adjuvant treatment).

The surgical plan consists in removing the formation and the affected breasts and those with which they communicate lymphatically with as wide tissue margins as possible to prevent metastasis and recurrence. Because breast tumors are correlated with the level of sex hormones, it is recommended to perform ovariohysterectomy in the same surgery.

After excision, the sample taken will be send to the pathological anatomy laboratory for histopathological examination to establish the nature of the formation, whether the resection margins were large enough, the presence of lymphatic and hematogenous invasion, and whether the excised regional lymph node shows tumor changes. Depending on these factors, a prognosis related to the probability of metastasis, recurrence and the duration of postoperative survival is issued, and the necessary adjuvant treatment is determined.

The patients were then monitored periodically clinical and paraclinical examinations to establish the correlation between complete excision with safety margins of the mammary formations and the duration of postoperative survival.

Results and discussion

Case 1

The first case was represented by Delilah, 11 years, female, European breed, spayed at age 9 at which time the lump was discovered on the M4 left mammary chain. No histological examination and chemotherapy treatment were performed after the excision of M3 and M4 of the left breast chain. No data on excision with safety margins.

Two years ago he was brought to our clinic for a clinical consultation because the owner noticed a mass on his abdomen. During the clinical

examination, nodules were observed on the M1 and M4 nipples, the right chain with an approximate size of 0.5 cm, and on the left chain, the nodule on the M2 nipple with a size of 1 cm. No lung metastases were revealed in the radiological examination, and the blood tests were within normal limits.

When performing the surgical treatment, the entire right mammary chain together with inguinal and axillary regional lymph nodes and M1 and M2 left mammary chain together with the axillary regional lymph node were excised with a safety margin of 2 cm. The samples taken were sent to the pathological anatomy laboratory.

The result of the histopathological examination of the right chain showed a neoplastic structure with an invasive appearance, completely excised with the interpretation diagnosis of grade III adenocarcinoma with embolism in the lymphatic vessels and a reserved prognosis for serious with risk of recurrence and metastasis.

At the left chain, a structure with an areolate appearance, completely extirpated, was evident, which represents skin tissue and adjacent subcutaneous tissue in which a rich cellular mass consisting of typical adipocytes develops, without histological characteristics of malignancy, delimited by a pseudocapsule with the interpretation of a lipoma.

Two weeks postoperatively, the operation healed without complications. Five sessions of chemotherapy (Epirubicin) were performed. The last check-up was a year ago when the patient was within physiological limits, and the chest radiological examination did not reveal lung metastases. The patient did not show up for subsequent check-ups.

Case 2

The second case was Atom, 15 years old, female, not spayed, European breed. He presented to our clinic 2 years ago for a clinical examination due to some nodules that appeared four weeks ago on his abdomen. Clinical examination revealed multiple nodules on both breast chains. No pulmonary metastases were revealed during the radiological examination, and the blood tests were within normal limits.

During the surgical treatment, bilateral mastectomy was performed, regional lymph nodes were also removed. The safety margins were only 1 cm, considering the constraints related to closing the wound. An ovariohysterectomy was performed simultaneously with the mastectomy. The sample taken was sent to the pathological anatomy laboratory (Fig. 1).

The histopathological examination showed neoplastic formations, completely extirpated, made up of epithelial cells showing a marked proliferation with malignant morphology. The lymphatic vessels in the examined section present embolism with neoplastic cells, the diagnosis

being solid carcinoma, moderately differentiated, grade III, with neoplastic embolism in the lymphatic vessels, and the prognosis reserved for serious.

Postoperatively, there were minimal complications (seroma), and one month later the surgical wound was completely healed. 5 sessions of chemotherapy (Epirubicin) were performed. At 6 months postoperatively, no pulmonary metastases were revealed in the radiological examination, but the patient developed grade 4 renal failure, dying after 2 months

Fig. 1. Case 2 - Post-surgery - patient Atom (original)

Case 3

The third case was Frisco, 12 years old, male, neutered at 1 year old, European breed. He presented to our clinic 1 year ago for a clinical examination.

During the clinical examination, a formation on the M2 breast with a size of 1 cm was observed on the left mammary chain, and a formation with a size of 0.5 cm on the M4 breast. No pulmonary metastases were revealed during the radiological examination, and the blood tests were within normal limits (Fig. 2).

When performing the surgical treatment, the entire left mammary chain was excised together with the regional inguinal and axillary lymph nodes, the safety margins being 1 cm. The sample taken was sent to the pathological anatomy laboratory.

The histopathological examination showed a neoplastic structure, completely excised, made up of epithelial cells with malignant morphology. The sample examined did not present embolism with neoplastic cells in the lymphatic vessels, the diagnosis being simple tubular adenocarcinoma, solid type, with an associated inflammatory process, the prognosis being reserved.

Two weeks postoperatively, the operation healed without complications. Three sessions of chemotherapy (Epirubicin) were performed. At the last check-up, which was six months ago, during the clinical examination, the patient had no nodules on the right chain or at the site of the previous resection, and the control radiograph did not reveal lung metastases.

Fig. 2. Case 3 - Postoperative - Patient Frisco (original)

Case 4

The fourth scenario is about Guessy, 17 years old, F, unspayed, European breed. He presented to our clinic 1 year ago for a clinical examination.

Clinical examination revealed multiple nodules on both breast chains. No lung metastases were revealed in the radiological examination, and the blood tests were within normal limits.

During the surgical treatment, mastectomy was performed together with excision of regional inguinal and axillary lymph nodes, the safety margins were 1 cm, simultaneously with mastectomy, ovariohysterectomy was also performed. The sample taken was sent to the pathological anatomy laboratory.

The histopathological examination showed a neoplastic structure on the left chain, completely excised, with tumor cell embolism in the blood and lymphatic vessels, the diagnosis being solid carcinoma, grade II. And on the right chain, a completely excised neoplastic structure was revealed with the diagnosis of tubulo-papillary carcinoma, well differentiated, grade II with embolism in the lymphatic vessels. The prognosis was reserved.

Two weeks postoperatively, the operation healed without complications. 5 sessions of chemotherapy (epirubicin) were performed. 5 months after surgery, the patient had no local recurrences or pulmonary metastases, but she developed grade 4 renal failure, dying after 2 months.

Case 5

The fifth case was Monalisa, 13 years old, unspayed female, European breed. She presented to our clinic 2 years ago for a consultation because she had an abscessed breast lump.

On clinical examination, a 5 cm abscessed nodule with ichorous odor was observed on the M2 breast straight mammary chain. No pulmonary metastases were revealed during the radiological examination, and the blood tests were within normal limits.

During the surgical treatment, the entire right mammary chain was excised together with the regional inguinal and axillary lymph nodes, respecting the safety margins of 1 cm, at the same time an ovariohysterectomy was performed. The sample taken was sent to the pathological anatomy laboratory.

The histopathological examination showed a neoplastic structure made up of epithelial cells showing tubulo-acinar pattern, with malignant morphology. The inguinal lymph node shows distorted architecture, the diagnosis being simple tubular carcinoma, grade III, with neoplastic embolism in the local lymphatic vessels and lymphnodal metastasis. The prognosis was reserved for serious considering the risk of recurrence and metastasis.

Two weeks postoperatively, the operation healed without complications. A treatment with cytostatics (lomustine) was initiated, but after the first administration, severe digestive reactions appeared, which is why it was decided to stop the treatment. The last control was 4 months postoperatively, the patient was in a decompensated state, with slightly dyspneic breathing. The radiological examination revealed pulmonary metastases. The patient died of lung metastases 6 months after surgery (Fig. 3).

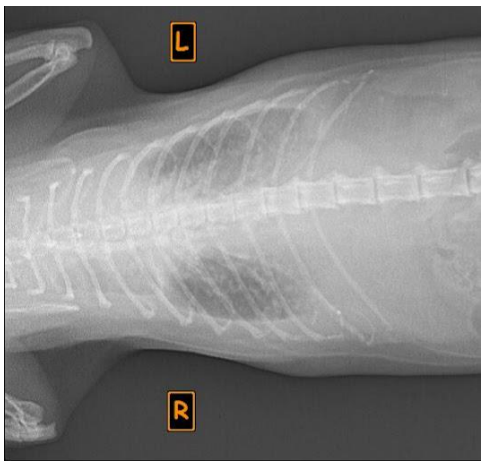

Fig. 3. Case 5- Lung metastases

Case 6

The sixth scenario is about Baghera, 12 years, female, European breed, spayed at 2 years of age when multiple nodules were discovered on the right chain. The entire right mammary chain was removed, but the sample taken was not sent to the pathology laboratory, the safety margins and whether the regional lymph nodes were removed are not known. He came to our clinic 2 months ago because the owner noticed the presence of some nodules in the abdominal area.

The clinical examination revealed nodules on the M3 and M4 left mammary chain nipples and a recurrence in the area where the right mammary chain M4 nipple was previously located. The radiological examination did not show lung metastases, and the blood tests were within parameters.

During the surgical treatment, the entire left mammary chain and the inguinal and axillary regional lymph nodes and the nodule in the area where the M4 nipples of the right mammary chain were previously were excised, respecting the safety margins of 3 cm. The samples taken were sent to the pathological anatomy laboratory.

The histopathological diagnosis for all 3 formations was tubular carcinoma, grade I, without neoplastic hemoembolism in the lymphatic vessels. The lymphnodal structure showed preserved architecture, without neoplastic changes. The prognosis was favorable to reserved.

Two weeks postoperatively, the operation healed without complications. Treatment with cytostatics (lomoustine) was initiated. The last checkup was one month postoperatively, and the patient was in good clinical condition.

Case 7

The seventh case was Tasha, 13 years, F, spayed at age 6 when a breast lump was discovered on M3 left chain. Only the nodule was surgically removed along with M3. Histological examination and chemotherapy treatment were not done. Local recurrence occurred 5.5 years after the initial excision as a cystic nodule approximately 0.5 cm in size.

Cytological examination revealed a malignant epithelial tumor with suspicion of breast carcinoma. Chest X-ray did not reveal the presence of metastases.

4 sessions of chemotherapy (Doxorubicin) were performed. Following treatment, the nodule shrank and became less infiltrative, at which point it was decided to excision of the entire left mammary chain. The sample taken was sent to the pathological anatomy laboratory.

The histopathological examination showed a completely excised neoplastic breast structure, with free margins, the diagnosis being papillary

tubular carcinoma with cystic areas. Local vessels do not show embolism with tumor cells Local lymphnodal structure with preserved architecture, without tumor involvement. The prognosis was reserved.

One month postoperatively, the operation has healed without complications, and the patient is in good clinical condition.

Conclusions

Safety margins in breast tumor surgery are useful in preventing local recurrence and the occurrence of regional metastases. A wide-margin resection together with regional lymph nodes lead to a favorable prognosis.

Cats operated without respecting the safety margins resulted in a recurrence in less than 12 months. And in cats operated on where both safety margins and excision of regional lymph nodes were not respected, they resulted in metastasis in less than 6 months.

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INCIDENCE OF VIRAL DISEASES IN DOGS AND CATS: CASE STUDY FROM A VETERINARY CLINIC IN PLOIEȘTI, ROMANIA

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Abstract

This study investigates the incidence of viral diseases in dogs and cats at a veterinary clinic in Ploiești, Prahova County, during the period from November 2023 to April 2024. Throughout the mentioned period, a total of 4650 animals were examined, of which 76 exhibited clinical signs suggestive of viral diseases. Diagnoses were made using specific rapid diagnostic tests to identify viral etiological agents. The results indicate that 61 of the 76 animals displaying suggestive clinical signs (80.26%) were confirmed positive, emphasizing the importance of rapid and accurate diagnosis. The study highlights the need for ongoing surveillance and optimization of prevention and control strategies for viral diseases in urban pet populations.

Keywords*: viral diseases, dogs, cats, rapid diagnostic tests, clinical study*

Introduction

Viral diseases pose a significant threat and are constantly a concern in veterinary medicine, profoundly impacting the welfare of pets, particularly dogs and cats. These pathologies can range from mild to severe, sometimes fatal, manifesting diverse symptoms that significantly affect the quality of life of the animals and can lead to increased mortality. Therefore, identifying and characterizing the predominant viral agents in a specific region is crucial for developing appropriate therapeutic measures and for establishing effective prevention and control strategies.

This study focuses on an analysis made at a veterinary clinic in Ploiești, Prahova County. The primary aim of the study was to assess the incidence and distribution of viral diseases among dogs and cats presented at the clinic with clinical signs of viral infections. By identifying these diseases, the study aims to contribute to the development of more effective strategies for managing and controlling the spread of these conditions in the pet population.

Materials and Methods

In order to achieve a comprehensive understanding of the incidence of viral diseases in dogs and cats, a systematic literature review was performed. This review included studies conducted not only in various cities across Romania but also in other countries. A wide array of sources was consulted, including academic journals, books, industry reports, and relevant online databases. These resources were instrumental in establishing a foundational understanding of the topic, enabling a thorough analysis of the existing research landscape. This approach ensured the inclusion of diverse perspectives and methodologies within the field of veterinary epidemiology [1,2,3,4].

The diagnostic process for viral diseases involves a combination of clinical methods, paraclinical investigations, and laboratory tests, with the selection of methods often influenced by available resources. The protocol includes the use of clinical observation sheets for detailed recording of information gained from the anamnesis and clinical examination. The anamnesis collects detailed information about the animal's symptoms, medical history, and exposure to risk factors, which is vital for determining the viral etiology. The clinical examination complements the data obtained from the anamnesis.

In terms of epidemiological methods, contact tracing is used to identify the source of infection and to prevent its transmission, while epidemiological surveillance allows for the identification of infection outbreaks and the implementation of control strategies.

Rapid diagnostic tests play a crucial role in effective diagnosis of viral diseases. They revolutionized traditional methodologies due to their speed in providing a result and cost-effectiveness. These tests can be categorized into immunological, molecular, or chemical types, each possessing its own specificity. Immunological tests are designed to detect specific antibodies or antigens, whereas molecular tests focus on identifying disease-specific DNA or RNA. Chemical tests, on the other hand, determine the presence of relevant metabolites or enzymes associated with the disease.

The protocol for using rapid diagnostic tests includes the collection of a relevant biological sample, preparation according to the manufacturer’s guidelines, execution of the test, followed by the interpretation of the results. These tests provide rapid outcomes, proving invaluable for prompt diagnosis and urgent medical intervention.

Among the advantages of rapid tests are the short waiting time for results, ease of use even by veterinary staff with minimal training, and their

applicability in various environments, including field conditions. However, these tests may present disadvantages such as lower sensitivity compared to traditional laboratory methods and the potential to yield false-negative results or detect non-specific pathogens [5,6,7,8,9,10].

Results and Discussion

During the period from November 2023 to April 2024, out of a total of 4650 animals examined at our clinic, 76 animals (dogs and cats) presented with clinical signs suggestive for viral diseases. Following the anamnesis, the animals underwent a detailed clinical examination, and the collected biological samples (blood, feces) were analyzed using rapid tests to confirm the diagnosis.

Studied Population

Seventy-six animals (dogs and cats) were presented at the veterinary clinic in Ploiești with clinical signs suggestive of viral diseases.

Results

Sixty-one animals (80.26%) were diagnosed with viral diseases, while fifteen animals (19.76%) showed similar clinical signs but were ultimately diagnosed with hemorrhagic gastroenteritis (HGE) or infestation with the intestinal parasite Giardia lamblia (Fig 1).

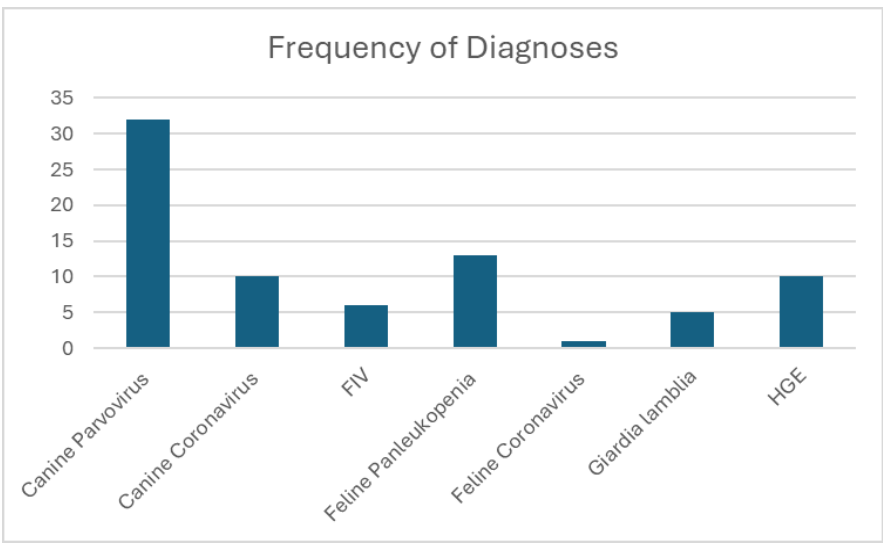

Fig.1 Frequency of Diagnoses

It was observed that for dogs, all instances of canine coronavirus were associated with giardiasis.

Species Distribution

Table 1

Canine	42 cases
Feline	19 cases

A total of 42 cases were diagnosed in dogs and 19 in cats, demonstrating a higher prevalence of viral diseases in canines (Table 1)

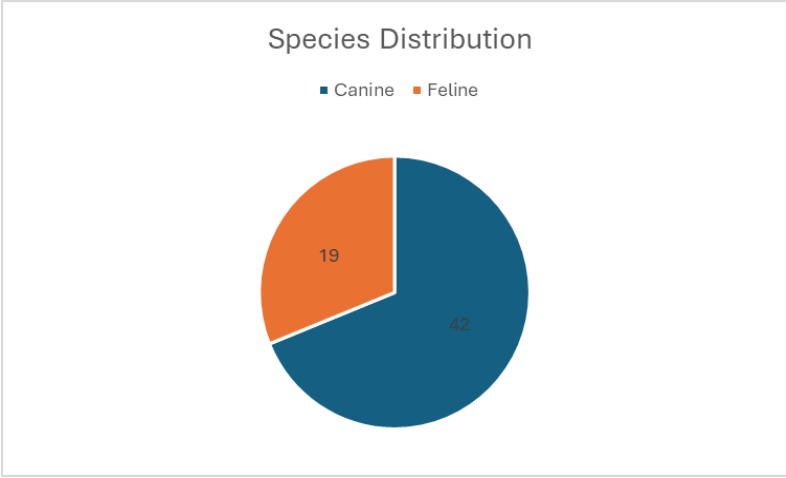

Fig. 2 Species Distribution

Breed Distribution

Table 2

Bichon	26 cases
German Pointer	3 cases
French Bulldog	1 case
Rottweiler	3 cases
Central Asian Shepherd	1 case
Mixed Breed	7 cases
European	14 cases
British Shorthair	5 cases

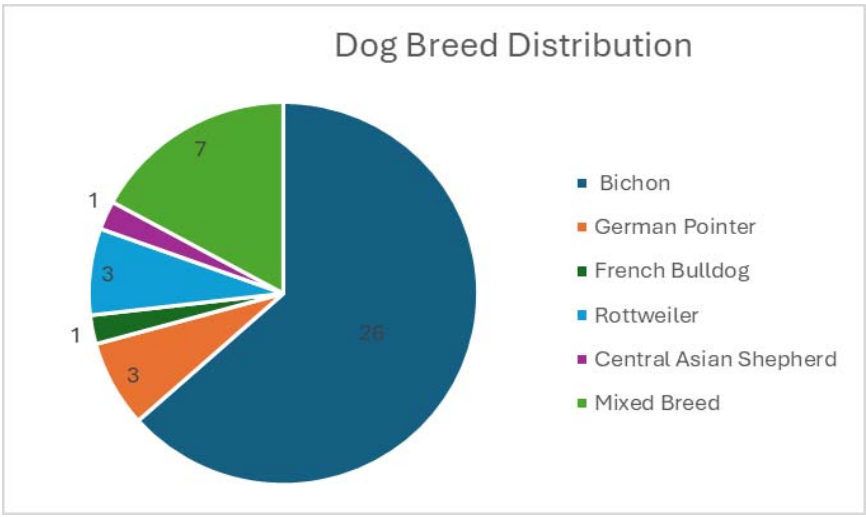

Fig. 3 Dog Breed Distribution

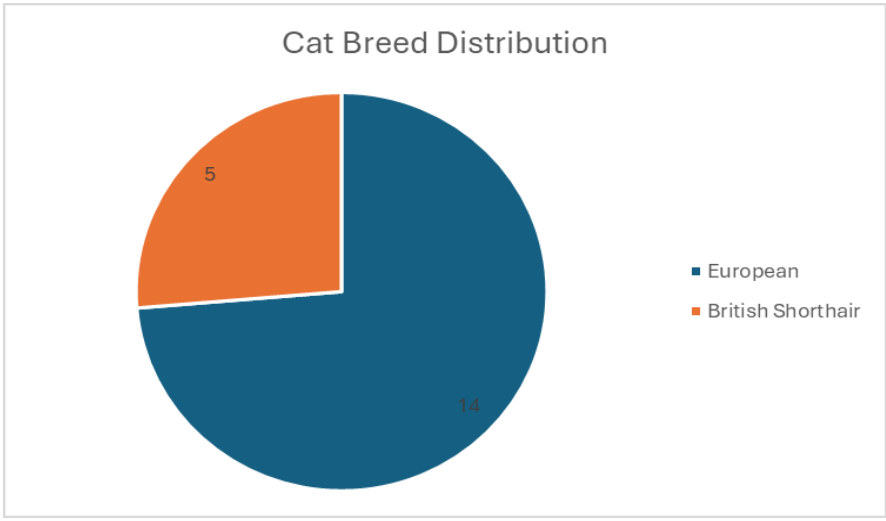

Fig. 4 Cat Breed Distribution

The study's findings regarding the overrepresentation of Bichon breed among animals diagnosed with viral diseases raise intriguing questions that warrant further investigation. While the literature lacks explicit references to a genetic predisposition for viral illnesses in this breed, alternative explanations could shed light on this observation (Table 2).

Bichons have gained immense popularity in recent years, leading to a substantial increase in their population. This larger population size could inherently translate into a higher number of diagnosed cases, simply due to the sheer volume of individuals.

The preferences and behaviors of Bichon owners might play a role in the observed disease prevalence. Certain owner practices, such as exposing their pets to unvaccinated animals or frequenting public spaces, could increase the risk of viral exposure.

While no definitive genetic predisposition has been established, it is plausible that Bichons may possess certain physiological or immunological characteristics that make them more susceptible to specific viral infections. Further research is needed to explore this possibility.

Gender Distribution

Table 3

Male	32
Female	29

The distribution by gender was relatively balanced, with 32 cases in males and 29 in females (Table 3).

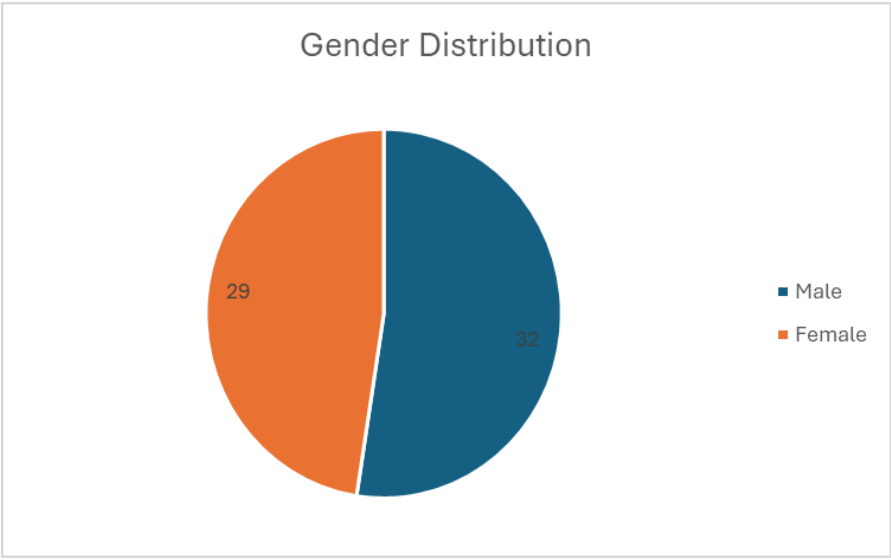

Fig. 5 Gender Distribution

Age Distribution

The average age of the animals diagnosed with viral diseases was 9.65 months.

Vaccination Status

Out of the total animals included in the study, 5.1% of the animals had been vaccinated against the disease, while the remaining 94.9% had never been vaccinated.

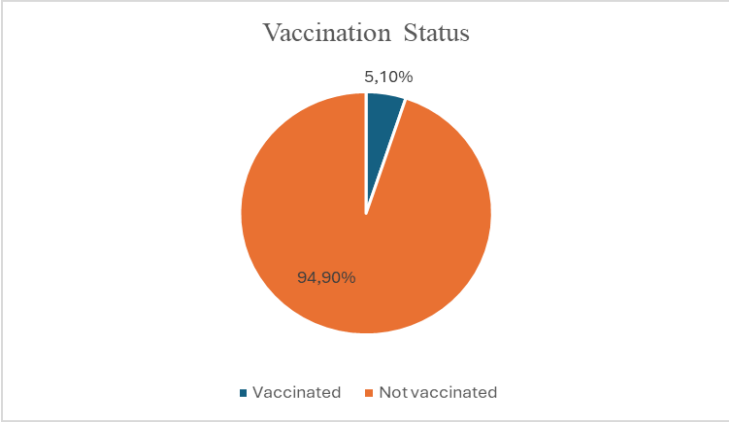

Fig. 6 Vaccination Status

The fact that only 5.1% of the animals diagnosed with viral diseases had been previously vaccinated, while the overwhelming majority of 94.9% had not been vaccinated, underscores the crucial importance of vaccination in the prevention and control strategies of infectious diseases.

Survival Rate Distribution

Table 4

Discharged	90,16%
Deceased	9,84%

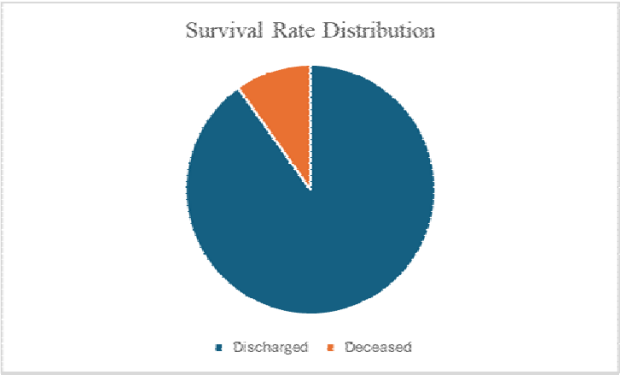

Fig. 7 Survival Rate Distribution

It is essential to emphasize that the early presentation of animals to the veterinary clinic immediately after the onset of clinical signs, along with accurate diagnosis and prompt administration of appropriate treatment, significantly contributes to increasing survival rates. This approach allows for early medical interventions, which can prevent the progression of the disease to more severe stages, thus reducing mortality (Table 4).

During the period from November 2023 to April 2024, at the veterinary clinic in Ploiești where the study was conducted, approximately 4650 animals were examined, with an average of 30 cases per day. Of these, 61 animals were diagnosed with viral diseases.

The incidence of viral diseases during this period was approximately 1.3%.

Conclusions

1. During the period starting from November 2023 to April 2024, at the veterinary clinic where the study was conducted, the incidence of viral diseases in cats and dogs presented with clinical signs suggestive for such conditions was 1.3%. Throughout this period, approximately 4650 animals were examined, with an average of 30 cases per day. Out of these, 61 animals were diagnosed with viral etiology diseases.
2. Canine Parvovirus is the most common viral disease (52.45% of total cases), followed by Feline Panleukopenia (21.31% of total cases) and Canine Coronavirus (16.39% of total cases).
3. Feline Coronavirus (1.63% of total cases) and FIV (Feline Immunodeficiency Virus) (9.83% of total cases) are the least common viral diseases in cats (8.6% of the total).

4. Accurate differential diagnosis is essential to distinguish viral diseases from intestinal parasite infestations or other pathologies with similar symptoms.
5. Continuous monitoring of the incidence of viral diseases in animals is necessary to evaluate the effectiveness of prevention and control efforts and to identify potential upward trends. This monitoring can be conducted through active surveillance and by collecting data from veterinary clinics.
6. Based on the data obtained through monitoring, prevention and control strategies can be continuously adapted and improved. This adaptation may involve the introduction of new vaccines, intensification of educational campaigns for pet owners, or the implementation of stricter biosecurity measures.
7. Although the incidence of viral diseases in companion animals is low (1.3%), it is imperative to maintain a high level of vigilance and to perpetuate initiatives for the prevention and control of these conditions. Continuous monitoring and adaptation of preventive and therapeutic strategies are crucial to ensure a low incidence rate and to protect the health of companion animals, with direct implications for public health. This systematic and proactive approach is essential in preventing the emergence and spread of viral diseases in companion animal populations.

Acknowledgement

This study is part of an undergraduate research carried out in the Faculty of Veterinary Medicine, Spiru Haret University, 2024.

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CONTACT DERMATITIS IN DOGS

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Abstract

Contact dermatitis is a common skin condition in canines characterized by inflammation of the skin caused by contact with irritants or allergens. This paper examines the main pathological changes in the dermis, triggering factors, pathogenic mechanisms and diagnostic and treatment modalities of contact dermatitis, by changing or imposing the natural living environment (diets, temperature, allergens, immunity, humanization, psychological, etc.) of dogs with owners.

Common substances that can cause contact dermatitis include detergents, metals, dust mites, pollen, various ingredients in pet food, cosmetics and plants. Due to the complex nature of allergic dermal pathologies, diagnosis may require several visits to the veterinary surgery before a definitive diagnosis is made and is often based on history, clinical examination and paraclinical examinations (cytological examination using adhesive tape). Treatment is carried out following a definitive diagnosis and a personalised treatment plan, topical or systemic anti-inflammatory drugs are recommended. In severe cases or refractory to commonly used treatment, immunosuppressive therapies may be required.

Because atopy is a diagnosis of exclusion, the process of identifying the disease can be time-consuming and frustrating for clients. Clear communication about timelines and expectations is crucial to successful outcomes.

Keywords*: dermatitis, contact, environment, treatment, examinations, canine.*

Introduction

Pathological changes of the dermis are represented by erythema, oedema, vesicles and pustules, erosions and ulcerations, thickening and hardening of the skin, alopecia, hyperpigmentation by darkening of the dermis in the affected areas.

Triggers of contact dermatitis are: environmental allergens, chemicals, materials such as wool, plastic, cinders, plastic or rubber toys, etc; plants - poison ivy, pampas grass; metals that may be present in cinders or accessories, nickel, chromium (4).

The pathogenic mechanisms of contact dermatitis are type IV allergic reactions also called delayed-type hypersensitivity: immunoglobulins and allergen-specific T cells are involved in the inflammatory response, causing itching and erythema. And direct irritation by irritant chemicals causing an inflammatory reaction by directly damaging the skin barrier and epidermal cells.

The physiological condition of the skin and coat of pet dogs is essential for their well-being and quality of life, and it is therefore particularly important how dermatological conditions are approached and treated in the clinic. In this paper, we aim to highlight some differences between apartment-bred dogs and yard dogs, highlighting the threshold of adaptability mechanisms in both apartment and yard dogs, given the common underlying pathophysiological mechanism, but with different clinical expression depending on the habitat.

Exposure to environmental factors is different in apartment dogs, which mainly come into contact with indoor environmental factors such as: cleaning chemicals, scented candles, decorative plants, excessive washing by owners, etc., while yard dogs are exposed to external environmental factors such as: dust, soil, pollution, ectoparasites, vegetation and tree products depending on the season, as well as construction dust, traffic or industrial pollution.

Another criterion is activity level, as usually yard dogs tend to be more active and more exposed to weather conditions - positive or sometimes negative (heat, frost, etc). House dogs tend to be less exposed to these conditions, but are more sedentary, with tendencies towards behavioural disorders in the absence of stimulation and various other metabolic pathologies: endocrine disorders, obesity and others.

Hygiene conditions differentiate apartment dogs from yard dogs. In the former situation, dogs are more exposed to factors that can lead to skin dryness, such as dry indoor air, aerosols from cleaning products, excessive washing of dogs' fur, humidity or vibrations from building noise, daytime and nighttime human activity noises of varying intensity, inadequate nutrition. Barnyard dogs are exposed to factors that lead to skin irritation, such as high humidity and dirt, but on the other hand, the natural conditions in which they have developed as a species can favourably influence their resistance to skin diseases.

Materials and methods

The clinical study of the paper was conducted on 8 dogs, aged between 2 and 10 years, of which six males (50% neutered) and two unspayed females were diagnosed with contact dermatitis.

The dermatological examination and the establishment of a diagnosis of certainty in the above mentioned dogs included an anamnesis, clinical examination excluding other pruritic phenomena: parasitic dermatitis, skin infections. Determination of total serum immunoglobulin E concentration is performed by peripheral venous (accessory cephalic vein) blood sampling. IgE may be associated with allergic reactions in dogs examined.

Results and discussions

Abstract: The study investigated contact dermatitis in 8 dogs, aged 2 to 10 years, both male and female, medium and large breed, vaccinated and dewormed internally and externally up to date. The main objective was to evaluate clinical symptoms, triggers and treatment efficacy.

Results: demographics and clinical symptoms:

The study group included 6 males and 2 females. Symptoms observed were intense pruritus, erythema, papules and vesicles at allergen contact sites.

The main triggers identified were: certain care products (shampoos), household chemicals.

Sensitivity to various substances, including nickel, lanolin and perfumes, was confirmed in patch tests.

Treatment included elimination of contact with identified allergens and application of topical corticosteroids and antihistamines.

In all cases, significant symptom improvement was observed within 2 weeks.

Relapse and Monitoring:

Four of the dogs experienced minor relapses of symptoms within six months, correlated with occasional exposures to allergens not initially identified.

Long-term monitoring involved strict avoidance of triggers, use of hypoallergenic products, i.e., chlorhexidine shampoo baths, and changing the dogs living environment; they were taken between April and November to the yard to build up their own immunity and avoid contact with apartment allergens.

Variability in response to treatment was notable, suggesting individual differences in allergen sensitivity and immune response. The importance of accurate allergen identification was emphasised as having a major impact on treatment success.

Involvement of Environmental Factors. The study highlighted the significant role of the home environment in triggering contact dermatitis.

Recommendations for owners included avoiding non-hypoallergenic grooming products and minimizing exposure to household chemicals.

The study demonstrates the importance of accurate diagnosis and rigorous management of contact dermatitis in dogs. Elimination of allergens and appropriate treatments can significantly improve the quality of life of these dogs.

Dermatitis in dogs is one of the most common dermatological problems encountered in veterinary practice. The results of the study presented in this paper showed that allergic dermatitis is the most common form of dermatitis in dogs, and the most common allergens include dust mites, pollen and various ingredients in pet food.

Because dermatitis in dogs is uncomfortable and painful for the animal, it is important to apply sequentially assessed diagnostic methods in a scale of complexity, especially when signs of inflammation or skin irritation are observed. In addition, we have found that pet owners should strictly follow the treatment plan recommended by their veterinarian and avoid exposing their dog to the factors that caused the cause, to prevent recurrences. Dermatitis in dogs is one of the most common dermatological problems encountered in veterinary practice.

Conclusions

We always have to take into account the natural conditions in which dogs are evaluated as a species. Interference between dog and human must encompass a clear concept - these animals, whatever the breeds obtained, come structurally from environments in which they naturally formed as a species. In clinical veterinary dermatology, specialists must give anamnesis current importance. Thus, it becomes evident that in the dermatological healing process, external environmental conditions are of vital importance, with the clinician debriding in parallel with therapy and access to natural climatic conditions. By combining environmental changes and medical treatments, contact dermatitis in dogs can be managed efficiently, relieving symptoms and preventing future relapses.

Acknowledgement

This study is part of an undergraduate research carried out in the Faculty of Veterinary Medicine, Spiru Haret University, 2024.

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RISK FACTORS AND EXPECTED PROGNOSIS IN UROLITHIASIS IN GUINEA PIG

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Abstract

Urolithiasis, the formation of urinary stones, poses a significant health risk in Guinea pigs (Cavia porcellus), potentially leading to severe discomfort, urinary tract infections, and even mortality if not managed promptly. This review examines the incidence, etiology, clinical signs, diagnosis, treatment, and prognosis of urolithiasis in Guinea pigs, based on a study conducted over two years involving 250 Guinea pigs, 25 of whom were diagnosed with urolithiasis. The study identifies calcium carbonate and calcium oxalate as the most common stone types, resulting from Guinea pigs' unique calcium metabolism, where excess dietary calcium is excreted primarily through urine. Key risk factors include dietary intake, genetic predisposition, urinary tract infections, and inadequate exercise. Clinical signs range from hematuria and dysuria to lethargy and abdominal pain. Diagnosis is achieved through clinical examination, imaging techniques such as radiographs and ultrasonography, and laboratory tests. The study highlights several prognostic indicators: female Guinea pigs are more prone to lower urinary tract stones due to anatomical and hormonal factors; males experience a poorer prognosis due to their narrower urethra, which complicates stone passage; older Guinea pigs also have a worse prognosis due to potential concurrent conditions and decreased resilience to treatment stress. Additionally, multiple urolith sites and hypothermia upon veterinary admission are associated with poorer outcomes. Preventive measures, such as dietary management, adequate hydration, and regular veterinary check-ups, are essential to mitigate the risks. The findings underscore the need for tailored care strategies to improve the health and well-being of Guinea pigs prone to urolithiasis.

Keywords: *urolithiasis, Guinea pig, urinary tract, prognosis, metabolism, diet*

Introduction

Urolithiasis is a significantly health concern which refers to the formation of calculi or stones within the urinary tract. This condition which can obstruct the flow of urine, can lead to severe discomfort, urinary tract infections, and even death if not promptly and adequately managed [1].

These stones can form in the kidneys, ureters, bladder, or urethra, with bladder stones being the most frequently reported. The most common types of urinary stones observed in Guinea pigs are calcium carbonate and calcium oxalate stones.

In terms of etiology the formation of urinary stones in Guinea pigs is multifactorial, involving dietary, genetic, and even environmental factors.

One of the main factors which lead to the appearance of this health concern is the fact that Guinea pigs have a unique calcium metabolism, where excess dietary calcium is excreted primarily through the urine, predisposing them to stone formation.

Additionally, genetic predisposition, urinary tract infections, and inadequate exercise can contribute to urolithiasis.[3]

Clinical signs of urolithiasis in Guinea pigs vary depending on the location and size of the stones. Common symptoms include: hematuria, dysuria, stranguria, anorexia, lethargy, abdominal pain and frequent attempts to urinate with little output.

Diagnosis of urolithiasis in Guinea pigs involves a combination of clinical examination, imaging, and laboratory tests. Radiographs (X-rays) and ultrasonography are essential tools for visualizing stones within the urinary tract. Urinalysis can reveal hematuria, crystalluria, and signs of infection. In some cases, blood tests are performed to assess kidney function and electrolyte balance.

The incidence of urolithiasis in Guinea pigs is relatively high compared to other small mammals as a study done in an exotic veterinary clinic showed. The study had a two years length and a number of 25 Guinea pigs from a total of 250 were diagnosed with a form of urolithiasis.

Methods and materials

The aim of the study is to provide a comprehensive understanding of the factors influencing the incidence, prognosis, and management of urolithiasis in Guinea pigs. By identifying key risk factors and prognostic indicators, the study seeks to improve the diagnosis, treatment, and prevention strategies for this significant health concern in Guinea pigs

The study was conducted over a two-year period in an exotic veterinary clinic. A total of 250 Guinea pigs were examined, and 25 were diagnosed with urolithiasis. The study focused on analyzing several risk factors and expected prognostic indicators associated with urolithiasis in Guinea pigs.

The primary objectives of this study are to investigate the gender disparity in the incidence of urolithiasis in Guinea pigs, specifically examining the prevalence of lower urinary tract uroliths in females compared to males; to evaluate the effectiveness of an alfalfa-free diet in preventing the formation of uroliths in Guinea pigs; to assess the impact of providing multiple water sources on the hydration levels and subsequent development of urolithiasis in Guinea pigs; to compare the prognosis of male and female Guinea pigs with urolithiasis, focusing on the anatomical challenges faced by males in passing uroliths; to analyze the influence of

age on the prognosis of Guinea pigs with urolithiasis, considering the presence of undiagnosed concurrent conditions and the ability to recover from medical or surgical interventions; to determine the prognosis for Guinea pigs with urolithiasis affecting multiple sites within the urinary tract versus those with single-site uroliths; to examine the prognostic significance of hypothermia (body temperature below 37.2°C) upon veterinary entry in Guinea pigs diagnosed with urolithiasis.

Data was collected on the following parameters for each Guinea pig diagnosed with urolithiasis: gender, age, diet (alfalfa-free or not), water sources (single or multiple), clinical signs, location and number of uroliths, body temperature upon veterinary entry, outcomes of medical or surgical treatment.

We used as diagnostic methods the following items: physical examination for signs of urolithiasis, such as hematuria, dysuria, and abdominal pain, radiographs (X-rays) and ultrasonography to visualize stones within the urinary tract, analysis of urine samples to detect hematuria, crystalluria, and signs of infections and blood tests for the assessment of kidney function and electrolyte balance.

Discussion

In my study I have analyzed several risk factors and expected prognosis which have a strong connection with the disease.

Risk factors

Females would outnumber males in the occurrence of uroliths in the lower urinary tract (urinary bladder and urethra) [3].

Notably, there is a marked difference in the incidence of urolithiasis between genders, with females outnumbering males. There are a few underlying risk factors which contribute to gender disparity based on anatomical, physiological, dietary, and hormonal influences that predispose female Guinea pigs to a higher occurrence of the stones in the lower urinary tract.

The anatomical difference can facilitate the formation and retention of stones within the urinary tract because the female Guinea pigs possess a shorter and wider urethra compared to males. Additionally, the female reproductive system's proximity to the urinary tract may increase the risk of urinary infections, which are a known precursor to stone formation. Another disparity factor is that the female Guinea pigs may be more susceptible to dietary imbalances due to differences in nutritional requirements during reproductive cycles. Increased calcium excretion during pregnancy and

lactation can elevate the risk of stone formation. Moreover, dietary preferences and feeding behaviors influenced by hormonal changes can contribute to a higher intake of stone-forming substrates in females [5].

Hormonal variations are significant contributors to the gender disparity in urolithiasis prevalence because elevated estrogen levels can lead to increased urinary calcium excretion, creating a favorable environment for stone formation.

Also, hormonal fluctuations during reproductive cycles can influence urinary pH and solute concentration, enhancing the likelihood of urolithiasis in females.

From 25 Guinea pigs diagnosed with urolithiasis 20 of them had lower urinary tract uroliths and 13 were females and 7 males. This finding sustains my hypothesis.

An adequate diet free of alfalfa would not be protective against the formation of uroliths; Guinea pigs (Cavia porcellus) exhibit a distinctive calcium metabolism that sets them apart from many other mammals. This unique metabolic process significantly influences their dietary requirements and health, particularly regarding urolithiasis, or the formation of urinary stones.

In most mammals, dietary calcium absorption is regulated by vitamin D and parathyroid hormone, maintaining a balance between calcium intake and excretion. However, Guinea pigs absorb calcium from their diet in a more continuous and less regulated manner [2].

The continuous absorption of calcium does not rely heavily on vitamin D. Diet is a critical factor in the development of this condition, and it is often recommended that Guinea pigs avoid alfalfa, which is high in calcium. However, even an alfalfa-free diet does not fully protect against urolithiasis.

Patients with > 1 source of water (bottle, bowl, etc.) would be less likely to develop urolithiasis.

Proper hydration is essential for maintaining urinary health. Sufficient water intake dilutes urine, reducing the concentration of minerals and other solutes that can precipitate and form stones.

Concentrated urine is a primary risk factor for urolithiasis. When Guinea pigs are not adequately hydrated, their urine becomes more concentrated, increasing the likelihood of crystal formation and stone development [1].

Providing more than one source of water can encourage increased water intake. Multiple water bottles or bowls placed in different locations can make water more accessible.

Guinea pigs may be more likely to drink water if it is readily available in various forms. Different types of water delivery systems (bottles versus

bowls) can cater to individual preferences, promoting more consistent drinking behavior.

Expected prognosis

Males with uroliths would have a poorer prognosis than females due to their anatomical difficulty passing uroliths.

The prognosis of this condition varies significantly between genders due to anatomical differences in the urinary tract. While both male and female Guinea pigs can develop uroliths, males typically experience a poorer prognosis.

Males have a narrower and longer urethra compared to females, making it more challenging for them to pass uroliths naturally. This anatomical constraint increases the likelihood of urinary obstruction, which can lead to acute pain, infection, and potential renal damage if not promptly addressed. Due to the difficulty in passing stones, male Guinea pigs often require surgical intervention, such as cystotomy, to remove uroliths. Surgery carries inherent risks, including anesthesia complications, post-operative infections, and recovery challenges, all of which can negatively impact the prognosis [7].

In contrast, females have a shorter and wider urethra, which facilitates the expulsion of small uroliths. While females can still suffer from urolithiasis, the risk of complete obstruction and subsequent severe complications is generally lower compared to males.

Older patients would have a poorer prognosis as they may have undiagnosed concurrent conditions and decreased ability to recover from the stress of anesthesia, surgery, or even medical treatment.

Urolithiasis is a multifactorial condition that affects Guinea pigs of all ages, but the prognosis varies significantly with age.

The prognosis of this condition can be significantly influenced by the age of the affected Guinea pig. Older Guinea pigs tend to have a poorer prognosis due to the presence of undiagnosed concurrent conditions and a diminished ability to recover from the stress associated with anesthesia, surgery, and medical treatments.

Older Guinea pigs are more likely to have undiagnosed concurrent conditions such as renal insufficiency, cardiovascular disease, and metabolic disorders. These comorbidities can complicate the clinical picture and hinder the treatment of urolithiasis

The ability of older Guinea pigs to recover from stress, including that induced by anesthesia and surgery, is reduced compared to younger animals [6]. Anesthesia poses significant risks for older Guinea pigs due to their decreased physiological reserves and potential underlying health issues.

Anesthetic complications, such as hypotension and respiratory distress, are more common in older animals, leading to higher perioperative mortality rates [6].

Older Guinea pigs with urolithiasis generally have higher mortality rates compared to younger counterparts. The combination of concurrent conditions, reduced physiological resilience, and treatment-related stress contributes to this increased risk.

Recovery times for older Guinea pigs are often prolonged due to slower healing processes and greater susceptibility to complications such as infections and tissue necrosis

Patients with uroliths in multiple sites would have a poorer prognosis [3]. The prognosis of urolithiasis is notably poorer in Guinea pigs with uroliths in multiple sites within the urinary tract. While single-site uroliths pose significant health risks, the presence of uroliths in multiple sites exacerbates the clinical challenges and worsens the prognosis

The presence of uroliths in multiple sites, such as the kidneys, ureters, bladder, and urethra, increases the likelihood of complete urinary obstruction. Multiple stones can simultaneously obstruct various parts of the urinary tract, leading to acute and severe urinary retention, bladder distension, and potential rupture.

Managing multi-site urolithiasis is significantly more complex than treating single-site stones. Surgical intervention may be required to remove stones from different locations, which increases the duration and invasiveness of surgery [4].

The presence of multiple stones can cause persistent inflammation, irritation, and infection, leading to chronic pain and repeated veterinary interventions.

Hypothermia (< 37.2 °C) on entry would be a negative prognostic indicator. Hypothermia, defined as a body temperature below 37.2°C, upon entry to a veterinary facility, has been identified as a negative prognostic indicator in Guinea pigs with urolithiasis. Hypothermia in Guinea pigs with urolithiasis can result from various factors, including: severe pain and stress (urolithiasis can cause intense pain and stress, leading to shock and subsequent hypothermia), systemic infection (urolithiasis may be complicated by urinary tract infections or sepsis, which can disrupt thermoregulation), dehydration and anorexia (reduced intake of food and water, common in Guinea pigs with urolithiasis, can impair metabolic processes and lead to hypothermia) [2].

Hypothermia (<37.2°C) on entry is a negative prognostic indicator in Guinea pigs with urolithiasis, signaling severe systemic compromise and associated with higher mortality and poorer clinical outcomes.

Conclusions

1. Females are more prone to develop lower urinary tract uroliths.
2. An alfalfa-free diet does not change the outcome.
3. More than one source of water improves the hydration level of the patient.
4. The anatomical particularities of the urinary tract in males make them prone to a poorer prognosis compared to females.
5. Older patients have a poorer prognosis due to undiagnosed concurrent conditions and decreased ability to recover from the stress of anesthesia, surgery, or even medical treatment.
6. The patients with uroliths in multiple sites have a poorer prognosis than patients with single-site uroliths.
7. Hypothermia has a negative impact on the prognosis of Guinea pigs diagnosed with urolithiasis.

Acknowledgement

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HYSTEROTOMY IN A BITCH

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Abstract
It is desirable that the mating of animals to be controlled. This is necessary for the selection of healthy and valuable parents and for avoiding medical problems, during pregnancy and parturition, as well as afterwards. But this is not always possible. We are often asked, as doctors, to give details about the stage of pregnancy and about the moment of delivery or the perfect choice of the moment when a hysterotomy should be performed, as a therapeutic solution. In the example below, chosen as a case study, two inexpensive and accessible diagnostic tools are shown, which can be extremely valuable and should be in the daily routine of any doctor.

Keywords: *hysterotomy, c-section, progesterone, gestation, caesarean, birth*

Introduction

Sometimes, as doctors, we are put in the situation of deciding if we have to intervene promptly or, on the contrary, the optimal choice is to wait. Gestation is a special period in the life of animals and even of their owners, often unique, therefore the medical decisions that must be taken during this period are of the utmost importance for the life-threatening animal. Knowing the details related to the physiology of pregnancy are essential, also a basic level in handling the ultrasound machine and the correct interpretation of the results can be, most of the times, enough to get out of the borderline situations [1-5].

Materials and methods

During the consultation, a 2.2-year-old female Bichon named Kiki was presented; the owner estimated that the mating took place approximately 55-60 days ago and was concerned about both the female's condition and the actual time of delivery (and the actual timing of calving), as there was a size discrepancy between the two partners.

He requested a hysterotomy but wanted to ensure that the chosen time was optimal and would not have a negative impact on the viability of the puppies.

In such situations, the first recommended step is an abdominal ultrasound and measuring the progesterone level (Fig. 1) (Fig. 2) (Fig. 3).

The ultrasound examination follows the standard procedure, and the parameters considered are:

DSG – gestational sac diameter;

LCP – skull-pelvis length measurement (Fig. 2) (Fig. 5);

DBT – trunk diameter measurement.

The crown-rump (skull - pelvis) length and the measurement of the gestational sac diameter are used to assess a pregnancy up to approximately 40 days (Fig. 1) (Fig. 2). In Kiki's case, the internal organs of the fetuses could be easily observed; therefore, the visualization of the liver confirmed a pregnancy exceeding 50 days (Fig. 7).

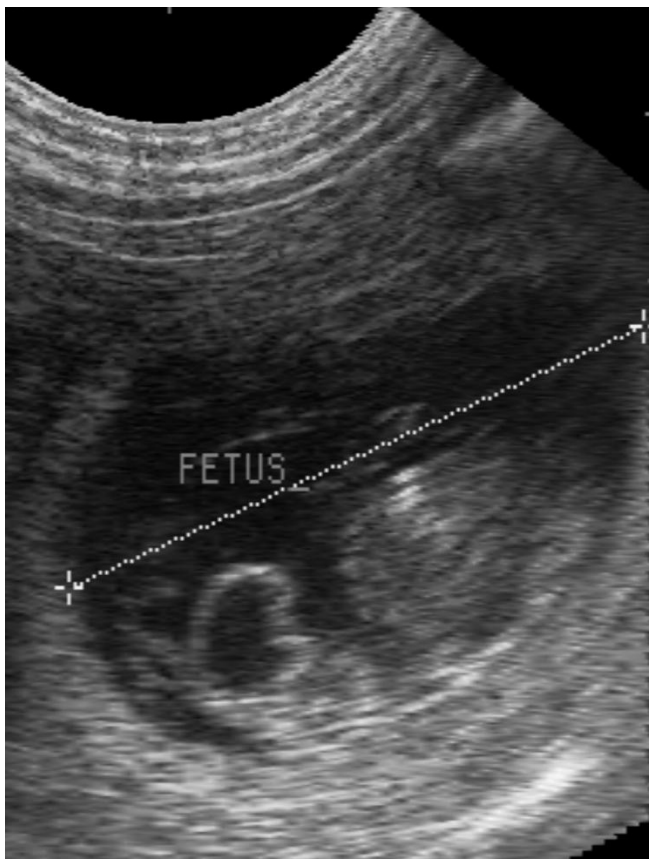

Fig.1. Measuring of the gestational sac

Fig. 2. Measuring the length lungine skull-pelvis

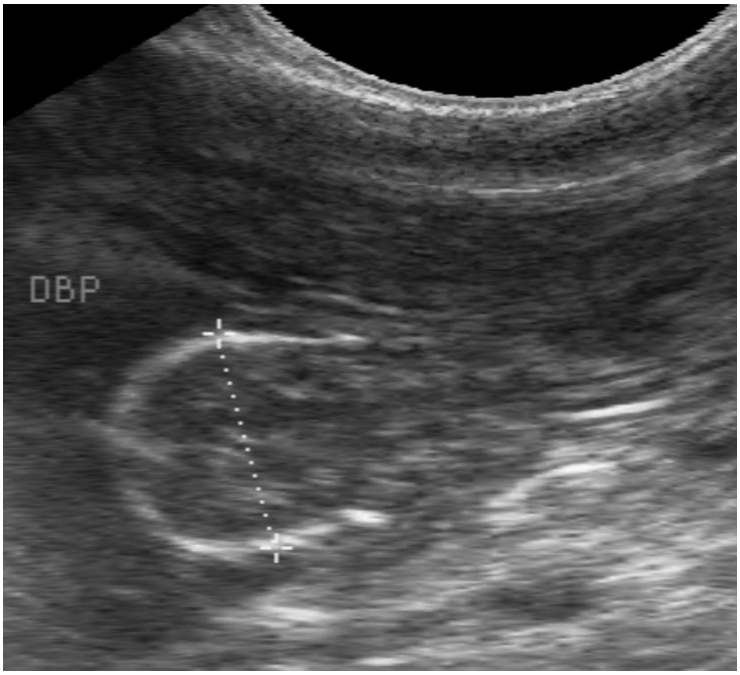

Fig. 3. Measuring the biparietal diameter

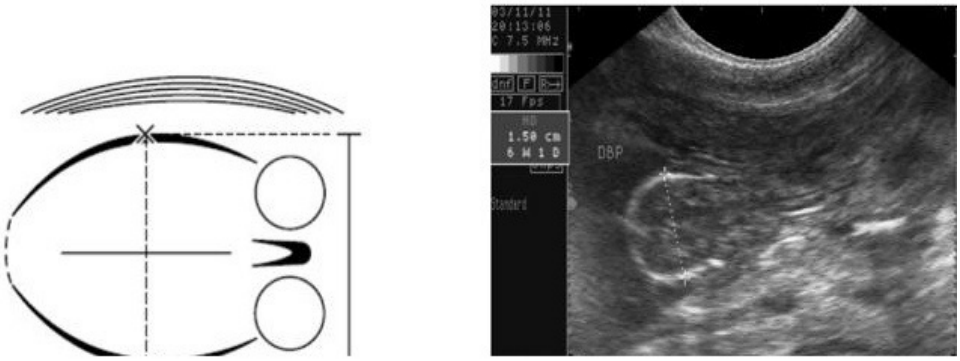

Fig. 4. Measuring the biparietal diameter scheme

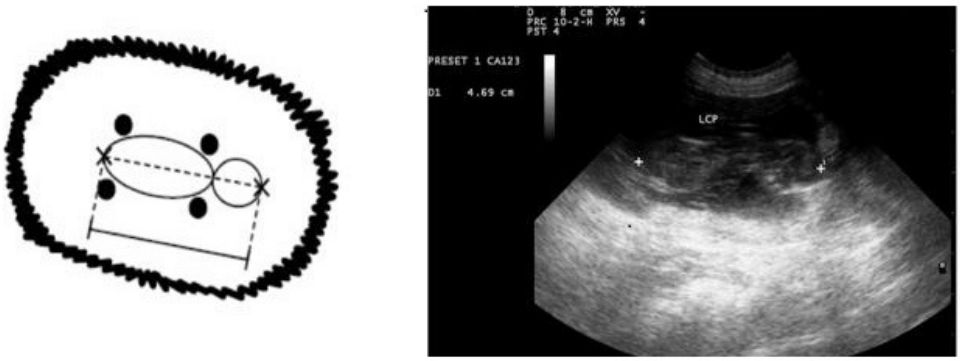

Fig. 5. Measuring the length skull-pelvis

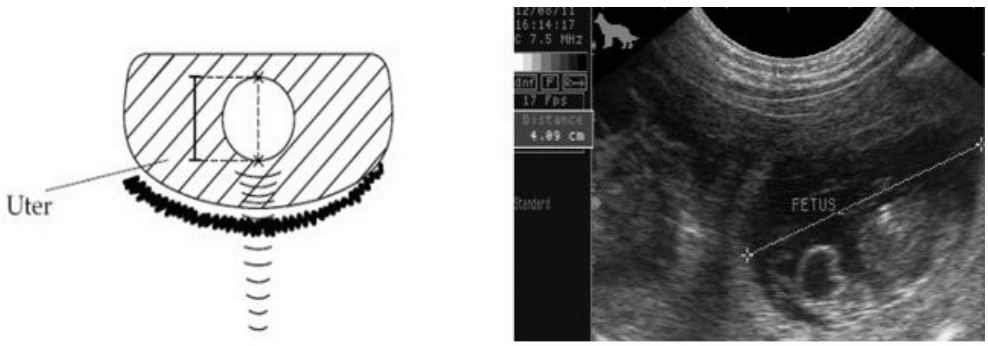

Fig. 6. Measuring the gestational sac

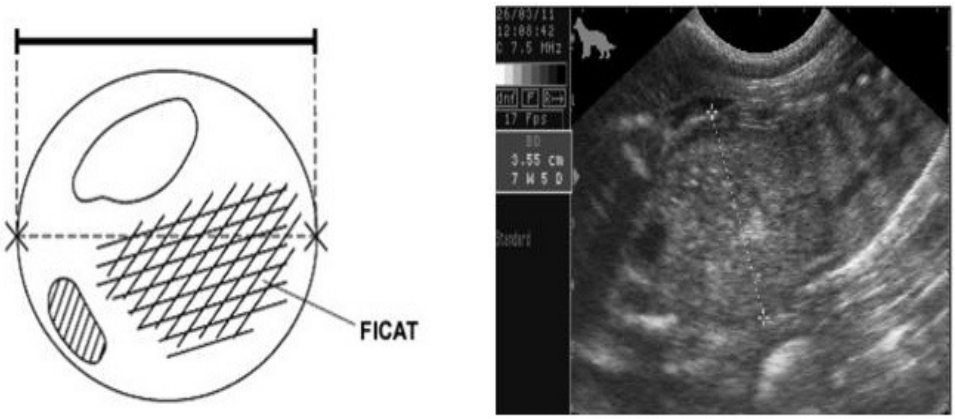

Fig. 7. Measuring the length of gestational sac al the liver level

The gestational age (GA) is estimated, if the pregnancy is over 40 days, using different formulas:

VG(GA) = (15xDBP) + 20 (Fig. 3) (Fig. 4);

VG(GA) = (7xDT) + 29;

VG(GA) = (6xDBT) + (3xDT) + 30.

Since Kiki's gestational age was estimated to be approximately 56 days, it was decided to measure the progesterone level to confirm the hypothesis that the request for a hysterotomy should be implemented in about a week.

The blood sample was collected in a vacutainer without anticoagulant (red cap), and immediately after, the sample was centrifuged for 5 minutes at 6000 rotations per minute. The progesterone value was 5.8 mg/mL, a value that did not indicate the imminent onset of labor.

The patient was rescheduled for 5 days later, and the owner was asked to observe any signs that might also indicate the approaching delivery (the approach of calving):

-searching for a safe place in the house and preparing a "nest";

-possible loss of appetite;

-also, rectal temperature measurement of the patient and recording the obtained values was requested;

-in the following days, the temperature did not vary much, ranging between 38.4 - 38.8 degrees Celsius.

On the day of admission, 5 days after the first visit, Kiki was subjected to another blood sample collection. This time, the progesterone level was 4.6 mg/mL. The patient was closely monitored, and it was found that the temperature remained relatively constant, with measurements taken every 3 hours. The day after admission, a sudden drop in body temperature to

approximately 35.6 degrees Celsius was observed. The sudden drop in temperature is associated with a decrease in progesterone levels and indicates imminent labor (the imminence of calving) within 24 hours. A third blood sample was taken to check the progesterone levels, and a value of 2.2 mg/mL was obtained. The progesterone value was 5.8 mg/mL, a value that did not indicate the imminent onset of labor.

The patient was rescheduled for 5 days later, and the owner was asked to observe any signs that might also indicate the approaching delivery (the approach of calving):

-searching for a safe place in the house and preparing a "nest";

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-also, rectal temperature measurement of the patient and recording the obtained values was requested;

-in the following days, the temperature did not fluctuate much, ranging between 38.4 - 38.8 degrees Celsius.

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The day after admission, a sudden drop in body temperature to approximately 35.6 degrees Celsius was observed. The sudden drop in temperature is associated with a decrease in progesterone levels and indicates imminent labor (the imminence of calving) within 24 hours.

A third blood sample was taken to check the progesterone levels, and a value of 2.2 mg/mL was obtained. At this progesterone level, the operating room was prepared for the patient, and the procedure was to take place with close monitoring of the patient.

For anesthesia, induction was performed with Butorphanol, Medetomidine, and Ketamine, followed by Propofol and Isoflurane for maintenance. It should be noted that (it is worth noting that) Propofol was administered at an induction dose of 5 mg/kg, with maintenance doses of 0.5-1 mg/kg in repeated boluses. For Isoflurane, the induction dose was 2%, and the maintenance dose was 1.5%. Kiki received fluid therapy throughout the surgical procedure - Lactated Ringer's solution at 10 mL/kg/h during the first hour, then at 3 mL/kg/h until complete recovery. The hysterotomy followed standard procedures and resulted in the delivery of four viable fetuses (Fig. 8) (Fig. 9) (Fig. 10) (Fig. 11) (Fig. 12).

The postoperative period is particularly important, with monitoring of body temperature, calcium levels, blood pressure, uterine involution

stimulation, and milk ejection for which Ocitocin 2IU was administered subcutaneously.

No antibiotics were administered during the postoperative period, except for a single dose of Amoxicillin with clavulanic acid (intraoperatively), and this protocol is recommended, provided that asepsis was rigorously maintained.

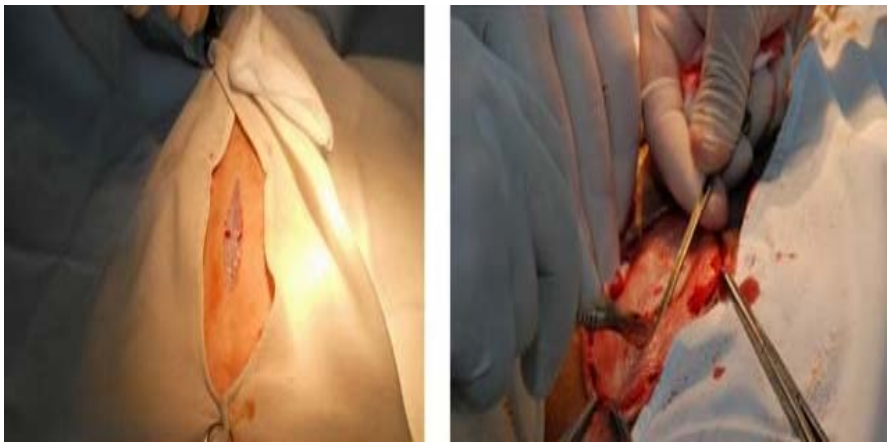

Fig. 8. Hysterotomy – surgery procedure

Fig. 9. Intraoperative times

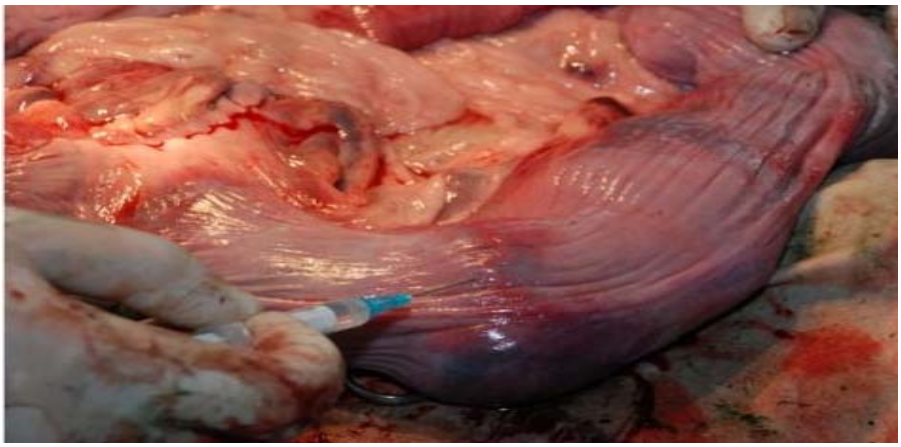

Fig. 10. Intramural injection with oxytocin

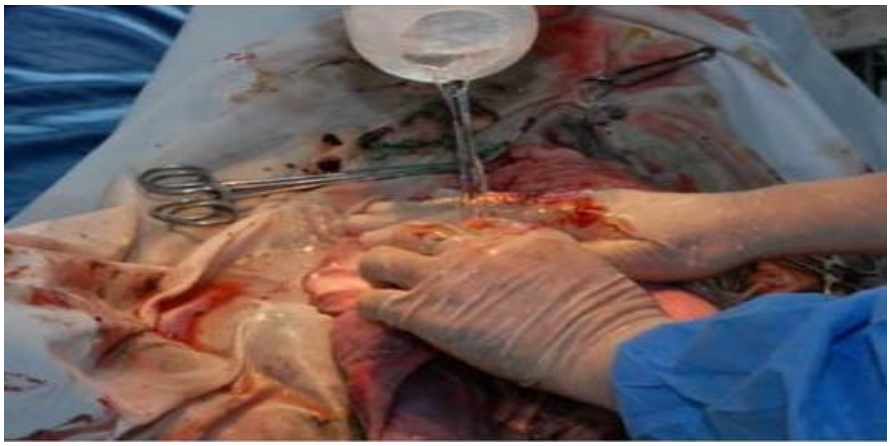

Fig. 11. Intraoperative times-lavage with warm NaCl

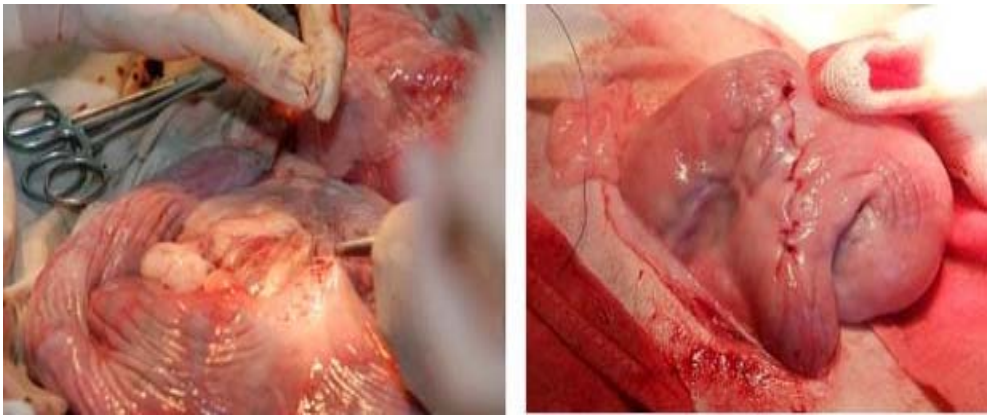

Fig. 12. Intraoperative times– 2 layers suture

Newborn care followed standard procedures:

-Airway clearance exclusively through suction with a syringe and pediatric bulb (releasing the airways exclusively by aspiration with the pediatric syringe and pump);

-Stimulation of breathing through gentle rubbing with a dry towel and, if necessary, acupuncture/pressure point stimulation at the point located just below the nose (Jen Chung point).

-Sublingual administration of Atipamezole (Antisedan) - one drop for each pup, in case the effects of anesthesia extend beyond 10 minutes after airway clearance.

-Application of chlorhexidine solution to the umbilical stump.

-Placing the non-newborns at a comfortable temperature (~29-30 degrees Celsius) alongside Kiki and monitoring the initiation of colostrum production.

One of the pups, which did not exhibit the sucking reflex, was isolated and had its blood glucose checked. A value of 40 mg/dL necessitated the intravenous administration of a dextrose solution at a dose of 0.5 g/kg diluted with Lactated Ringer's solution. After 3 hours, the blood glucose level was 70 mg/dL.

Upon discharge of the patient, 48 hours after admission, it was emphasized to the owner that it is very important for the female to be monitored continuously, checking her overall condition, appetite, and intestinal transit.

Conclusions

In conclusion, choosing the optimal time for elective hysterotomy is quite straightforward if a few factors are considered that are accessible to everyone. Correct interpretation of progesterone levels, as well as abdominal ultrasound, have become part of routine examinations in recent years and are financially accessible to any owner.

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