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COMPACT CANINE THYROID CARCINOMA: A CASE REPORT IN A SRD DOG FROM ANÁPOLIS-GO

CARCINOMA COMPACTO EM TIREÓIDE CANINA: UM RELATO DE CASO EM UMA CADELA SRD DE ANÁPOLIS-GO

CARCINOMA COMPACTO DE TIROIDES CANINO: REPORTE DE UN CASO EN UN PERRO SRD DE ANÁPOLIS-GO

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ABSTRACT

This study describes a clinical case of compact thyroid carcinoma in an elderly mixed-breed female dog, attended in Anápolis, Goiás, Brazil. The diagnosis was established through histopathological analysis, which revealed a malignant neoplasm with aggressive behavior and invasive potential. Literature review showed that thyroid carcinomas in dogs are relatively uncommon but present high clinical relevance due to their reserved prognosis and the demand for specific therapeutic approaches. The main treatment modalities were discussed, including surgery, radioiodine therapy, and targeted therapies such as toceranib, which have demonstrated clinical benefits in advanced cases. It is concluded that a multidisciplinary approach, early diagnosis, and appropriate therapeutic choice are essential to prolong survival and improve patients' quality of life. This report contributes to the regional scientific record and to the advancement of knowledge in veterinary oncology.

Keywords: Thyroid Carcinoma. Veterinary Oncology. Dogs. Histopathology. Treatment.

RESUMO

Este estudo relata um caso clínico de carcinoma compacto de tireoide em uma cadela idosa sem raça definida, atendida na cidade de Anápolis, Goiás. O diagnóstico foi confirmado por meio de exame histopatológico, que indicou uma neoplasia maligna de comportamento agressivo e potencial para invasão. A revisão da literatura mostrou que os carcinomas de tireoide em cães são relativamente incomuns, mas têm grande importância clínica devido ao prognóstico incerto e à necessidade de tratamentos específicos. Abordaram-se as principais opções de tratamento, como cirurgia, radioiodoterapia e terapias direcionadas, como o uso de toceranibe, que têm mostrado benefícios clínicos em estágios avançados da doença. A conclusão é de que a abordagem multidisciplinar, o diagnóstico precoce e a escolha terapêutica adequada são essenciais para aumentar a qualidade de vida dos pacientes. A pesquisa contribui para o registro científico regional e para o progresso do conhecimento na área de oncologia veterinária.

Palavras-chave: Carcinoma de Tireoide. Oncologia Veterinária. Cães. Histopatologia. Terapêutica.

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RESUMEN
Este estudio reporta un caso clínico de carcinoma tiroideo compacto en un perro mestizo de edad avanzada tratado en la ciudad de Anápolis, Goiás. El diagnóstico se confirmó mediante examen histopatológico, el cual indicó una neoplasia maligna con comportamiento agresivo y potencial invasivo. Una revisión bibliográfica mostró que los carcinomas tiroideos en perros son relativamente poco frecuentes, pero tienen gran importancia clínica debido a su pronóstico incierto y la necesidad de tratamientos específicos. Se discutieron las principales opciones de tratamiento, incluyendo cirugía, terapia con yodo radiactivo y terapias dirigidas, como toceranib, que han demostrado beneficios clínicos en etapas avanzadas de la enfermedad. Se concluye que un enfoque multidisciplinario, un diagnóstico precoz y una elección terapéutica adecuada son esenciales para mejorar la calidad de vida de los pacientes. Esta investigación contribuye a la investigación científica regional y al avance del conocimiento en el campo de la oncología veterinaria.

Palabras clave: Carcinoma de Tiroides. Oncología Veterinaria. Perros. Histopatología. Terapéutica.

1 INTRODUCTION

In recent decades, veterinary oncology has progressed considerably, providing a better understanding of tumors that affect dogs, including those that originate in the thyroid gland. Although these tumors represent only a small part of canine neoplasms, they have clinical importance due to their potential for aggressiveness and the effect they cause on the patient's metabolism (Meuten, 2016).

At a global level, research indicates that thyroid carcinomas are the most frequent types of endocrine neoplasia in dogs, with follicular and compact patterns predominating. Most cases are believed to be malignant, which highlights the importance of early diagnosis and appropriate intervention to increase patients' life expectancy (Wucherer; Wilke, 2010).

In Brazil, studies indicate a prevalence comparable to that recorded in other countries, with a higher incidence in older dogs and possible racial predispositions. Advanced age is considered a significant risk factor, as aging is linked to a greater propensity for cellular changes that can lead to the development of neoplastic processes (Carvalho 2012; Dagli, 2019).

Veterinary Medicine plays an essential role in combating this condition, integrating clinical, diagnostic imaging, histopathology, and available therapies. For treatment to be successful, a multidisciplinary approach is essential, which enables collaboration between clinicians, surgeons, pathologists, and oncologists in the personalized planning of each case (Withrow; Vail, 2020).

The main objective of this study was to describe the clinical case of an elderly dog named Gaby, mixed breed, treated in Anápolis, Goiás, who was diagnosed with compact thyroid carcinoma. The research sought to correlate the clinical and histopathological results with the literature already published, addressing definition, causes, prevention methods, diagnosis and treatment.

The reason for conducting this study is linked to the lack of records on thyroid neoplasms in dogs in the Midwest region, making a detailed description of cases essential. Clinical reports support evidence-based practice, promoting scientific advancement and the improvement of veterinary medical practices (Birchard; Sherding, 2016).

2 THEORETICAL FRAMEWORK

2.1 DEFINITION OF COMPACT THYROID CARCINOMA

Thyroid carcinoma in dogs is defined by neoplasms that affect the cells of the thyroid gland, which is responsible for the production of hormones that are fundamental for metabolism. These changes lead to the formation of cervical masses that can grow quickly and invasively, affecting nearby structures and causing an imbalance of the patient's physiological structures (Meuten, 2016). Most thyroid tumors in dogs are classified as carcinoma, while adenomas are less frequent. Carcinomas have a more aggressive behavior, and can infiltrate adjacent tissues and cause metastases, which distinguishes them from benign tumors and justifies the need for immediate clinical intervention (Wucherer; Wilke, 2010).

Carcinomas can exhibit a variety of histopathological patterns, such as follicular, compact, mixed, or poorly differentiated. The compact pattern, as observed in the case described, is characterized by its expansive and invasive growth, and is often linked to unfavorable prognosis due to its aggressiveness (Carvalho; Dagli, 2019). The anatomical location of the thyroid gland also increases the complexity of the disease, as its proximity to structures such as the trachea, esophagus, and large blood vessels makes surgery more difficult. This aspect makes early diagnosis and staging evaluation fundamental to determine therapeutic feasibility (Withrow; Vail, 2020).

In addition to its local severity, thyroid cancer in dogs can present with a variety of clinical signs, such as respiratory problems, difficulty swallowing, and changes in eating patterns. These signs are usually nonspecific, which complicates the initial clinical suspicion and may delay the confirmation of the diagnosis (Birchard; Sherding, 2016). Understanding the definition and characteristics of this neoplasm is essential to guide clinical decisions, enabling the identification of histological patterns, the distinction between benign and malignant tumors, and the creation of appropriate treatment protocols. For effective oncological management in dogs, it is essential to be clear about these aspects (Feldman; Nelson, 2015).

2.2 ETIOLOGY OF THYROID CARCINOMA IN DOGS

It is not yet known for sure what causes thyroid cancer in dogs, but studies indicate that the disease is the result of a combination of biological and environmental factors. One of the main factors involved is aging, since cell multiplication throughout life increases the

likelihood of mutations that can result in neoplastic transformation. This process increases the vulnerability of senior animals, which justifies the higher incidence of diagnoses in dogs over ten years old. During this period, the accumulated molecular changes weaken the mechanisms of cell repair and favor tumor advancement (Capen, 2002).

Genetic predisposition should also be considered a risk factor, as certain breeds have a higher prevalence of thyroid neoplasms. Beagles, Boxers, and Golden Retrievers are commonly mentioned in studies as more prone, indicating the possibility of inherited mutations or a greater sensitivity of follicular tissue to genetic instability. Although there is no agreement on which specific genes are linked to tumor development, this information emphasizes the importance of preventive clinical follow-up in breeds that are known to be predisposed (Owen, 1980).

In addition to genetics, environmental factors have been increasingly considered in recent research. Long-term exposure to air contaminants, pesticides, and ionizing radiation can cause changes in DNA structure and increase the risk of cancer. There is a greater interest in relating the presence of endocrine tumors with urban and agricultural regions, where dogs are more exposed to chemical agents, although definitive proof still requires further studies (Mooney, 2005).

Endocrine factors are also cited as a possible cause of thyroid cancer in dogs. Although rare in dogs, functional changes in the gland, such as hypothyroidism or hyperthyroidism, are analyzed in relation to their ability to predispose to neoplastic changes. The theory proposes that hormonal imbalances can alter the microenvironment of the glands, affecting the balance between cell proliferation and apoptosis, which could facilitate the appearance of malignant tumors (Fighera; Graça, 2009).

The literature also addresses the influence of nutritional status on thyroid health. In humans, there is a clearly defined relationship between iodine deficiency or excess and changes in the gland, which include the formation of nodules. Although there is little data on dogs, it is believed that unbalanced diets or inadequate supplementation can affect thyroid function, creating favorable conditions for the development of neoplastic processes. Although little addressed in veterinary medicine, this aspect opens space for new research (Brodey; Kelly, 1968).

Thus, it is understood that thyroid cancer in dogs is a disease of multifactorial origin, in which there is genetic predisposition, advanced age, environmental factors and, possibly, endocrine and nutritional changes and exposes factors that can develop cancer. This

complexity indicates that the disease does not have a single cause, being multifactorial because it can contribute to its development. Understanding these elements is essential to expand epidemiological knowledge, help in early diagnosis, and direct treatment and monitoring strategies for dogs considered more vulnerable and predisposed to the disease (Jubb; Kennedy; Palmer, 2016).

2.3 PREVENTION AND TREATMENT

The prevention of thyroid cancer in dogs is still limited, as knowledge about the triggering factors is still insufficient. However, when used systematically, preventive medicine can minimize the effects of the disease, especially in senior animals and predisposed breeds. Early detection of resectable nodules is possible through regular clinical evaluations, which include cervical palpation and imaging tests, such as ultrasound or tomography. This is critical, since even smaller tumors are more likely to have an effective surgical response and a more favorable overall prognosis (Giannasi, 2021).

Patient awareness and history are also essential to enhance clinical prevention. Animals that have previous endocrine dysfunctions or that inhabit environments exposed to pollutants or radiation should be monitored more closely. This environmental-food approach can contribute to earlier intervention, reducing the time between the appearance and diagnosis of the tumor, which improves prognosis and quality of life (Galli et al., 2021).

Thyroidectomy remains the treatment of choice when the tumor is already present. Recent research indicates that even in situations of vascular invasion or bilateral tumors, surgery can offer a survival of about three years or more, particularly when performed by a qualified team with the necessary support (Frederick et al., 2020).

In situations where the tumor is advanced, invades other tissues or has metastases, surgery alone may not be enough. Radiotherapy and the use of iodine-131 have been shown to be effective alternatives in the role of adjuvant therapies. In research, radioactive iodine treatment for thyroid tumors in dogs has demonstrated an objective response in approximately 35% of cases, with a progression-free interval and prolonged survival, even if the complete response rate remains low (Galli, 2021).

In addition, emerging pharmacological strategies, such as the use of toceranib (tyrosine kinase inhibitor monoclonal antibody), have shown considerable clinical benefit. In a study of 42 dogs diagnosed with thyroid carcinoma treated with toceranib, a median progression-free interval of up to 206 days was observed in early stages, in addition to a

median overall survival of about 563 days, suggesting efficacy for cases that cannot undergo immediate surgery (Sheppard-Olivares et al., 2020).

Continuously monitoring them after the definitive intervention is also essential. Surveillance through clinical, laboratory, and imaging tests enables the detection of recurrences, progression, or developing metastases, allowing the implementation of additional therapeutic interventions. Even in the face of aggressive tumors, this collaborative strategy improves prognosis and quality of life, complements surgical intervention, and integrates new therapies according to the evolution of the case (Enache et al., 2023).

3 MATERIAL AND METHODS

This study was based on a clinical case report of an elderly dog, who goes by the name of Gaby, of no defined breed who weighed about 10.2kg, she lives far from the city, living in a rural area, being attended at a veterinary clinic called Hane'i located in Anápolis, Goiás, in the Boa Vista neighborhood. The patient had a nodule in the neck that indicated an alteration in the thyroid gland, she was being medicated with Levothyroxine Dose of 18mg/kg, histopathological (nº 2387/25) – an exam made from a tissue fragment. Hematoxylin and eosin stains were used. The material analyzed was a thyroid nodule (left side). Data related to clinical history, physical examination, and complementary findings such as blood count, biochemistry, thyroid profile, tomography, and ultrasound were collected and recorded in a systematic manner for analysis and correlation with the literature.

The surgical team performed thyroidectomy during the procedure, employing appropriate asepsis techniques and an electric and ultrasonic scalpel to ensure greater hemostatic safety. This moment was crucial for the removal of the tumor mass and for the clinical stabilization of the patient, as shown in the following image:

Figure 1

Thyroidectomy surgical procedure being performed

Source: Personal archive (2025).

The option for the technique aimed to reduce the risks during surgery and ensure greater effectiveness in controlling hemorrhage, considering that the thyroid area has a high vascularization. To confirm the diagnosis, a transsurgical incisional biopsy was performed, and the material obtained was sent to the veterinary pathology laboratory. The tissue fragment was treated with traditional histological techniques, employing eosin and hematoxylin staining. The tumor type and its morphological characteristics were identified by microscopic analysis performed by a veterinary pathologist, as reported in the image.

In addition to the histopathological examination, additional information provided by the clinical team in charge of care was taken into account, such as the progression of the case, the clinical signs identified, and the initial response to the suggested treatment. These elements allowed the integration of clinical and laboratory data for a better analysis of the case presented.

To discuss the diagnosis, prognosis, and treatment options, a literature review was carried out in scientific databases such as PubMed, Scielo, Scopus, and Google Scholar, with priority given to articles published in the last 20 years. In addition to equivalent terms in English, the keywords "thyroid cancer in dogs", "veterinary oncology", "radioiodine therapy in dogs" and "toceranib in dogs" were used.

The identified articles were analyzed based on their relevance to the theme, giving priority to original studies, systematic reviews and case reports linked to thyroid carcinoma in dogs. The inclusion of national and international publications ensured a comprehensive analysis of the clinical, diagnostic and therapeutic aspects of the disease. In order to support the construction of the theoretical framework, the results and the discussion, all the information collected was organized into categories. The clinical case report was presented in alignment with the histopathological results and compared with the literature, enabling the identification of convergent and divergent aspects that highlight the relevance of case registration and analysis in Veterinary Medicine.

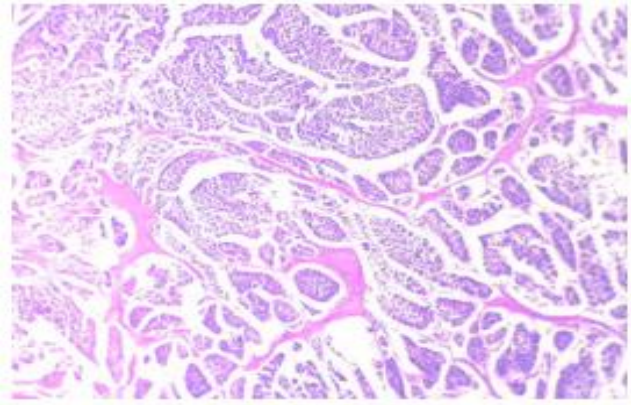
4 RESULTS AND DISCUSSION

The histopathological report of the analyzed dog indicated compact thyroid carcinoma, characterized by an expansive and invasive growth, accompanied by necrosis, hemorrhage and discrete mineralization. This histological pattern is considered highly aggressive and with a poor prognosis, since the proximity of the gland to vital structures makes complete resection more difficult and increases the likelihood of local recurrences (Meuten, 2016).

Microscopic analysis revealed proliferated epithelial cell trabeculae, indicating the infiltrative pattern characteristic of this type of tumor (Figure 2). These results corroborate the literature, which indicates that compact carcinoma is one of the most aggressive variants of the neoplasm, usually linked to adverse biological behavior (Wucherer; Wilke, 2010).

Figure 2

Trabeculae of proliferated epithelial cells

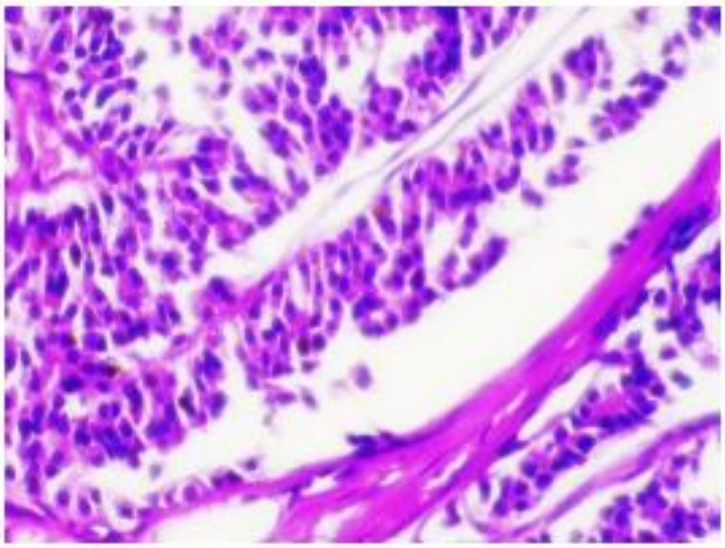


Source: Personal archive (2025).

This pattern confirms the invasive nature of the lesion and highlights the importance of histopathology to differentiate benign tumors from malignant processes that require immediate therapeutic management. In greater magnification, it was possible to identify discrete cellular atypia, which demonstrate partial loss of nuclear and cytoplasmic organization **(Figure 3).** According to Carvalho and Dagli (2019), the presence of nuclear atypia, even when discrete, is related to an increased risk of tumor progression and a poor prognosis, especially in elderly animals.

Figure 3

At a higher magnification, note mild atypia



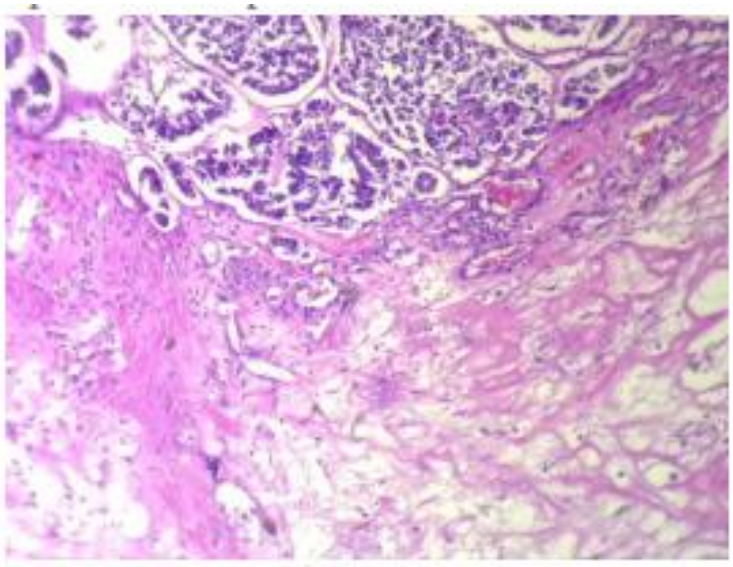
Source: Personal archive (2025).

These histological signs corroborate the classification of the tumor as malignant and help in the interpretation of the prognosis, as they indicate the ability of the carcinoma to invade surrounding tissues and affect nearby vital structures. Similarly, research indicates that the compact form has a higher risk of metastases, although its frequency may vary according to the degree of cell differentiation observed (Wucherer; Wilke, 2010).

Another significant finding was the presence of areas of necrosis and tumor invasion in adjacent regions, evidencing the severity of the process (Figure 4). According to Withrow and Vail (2020), the occurrence of necrosis in thyroid carcinomas indicates a more advanced stage of the disease, in which tumor hypoxia and disordered cell growth aggravate tissue destruction.

Figure 4

Areas of necrosis and invasion present



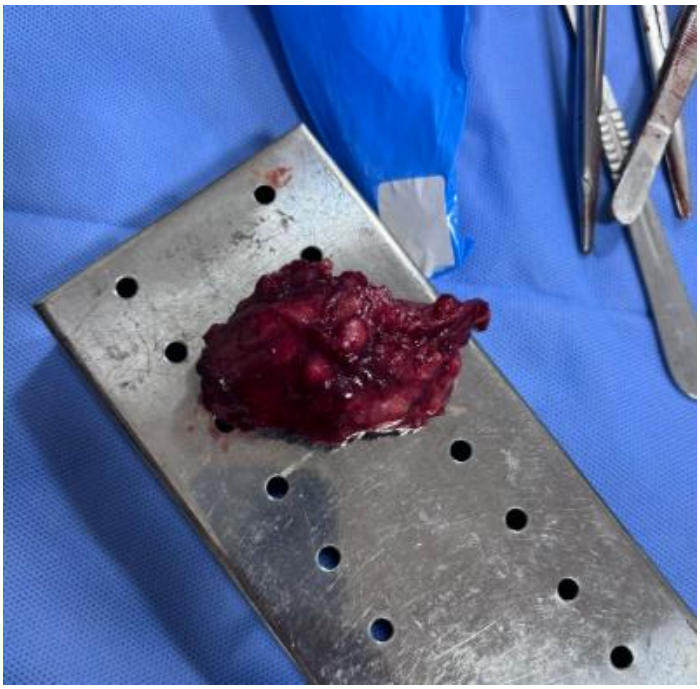
Source: Personal archive (2025).

These factors reinforce the importance of combined therapeutic strategies, such as surgery along with radioiodine therapy or molecular targeted therapies. In these cases, simple surgical excision tends to have a lower success rate. Therefore, the combination of different therapeutic approaches is recommended, especially the use of toceranib, which has been shown to be effective in advanced stages (Sheppard-Olivares et al., 2020). During surgery, the tumor mass was removed completely. Macroscopically, the lesion exhibited an irregular surface and a varied coloration, consistent with the indications of necrosis and

invasiveness previously reported in the histopathological report. This factor highlighted the seriousness of the clinical condition and the need for a combined therapeutic approach.

Figure 5

Tumor mass removed during thyroidectomy



Source: Personal archive (2025).

The surgical specimen was sent for histopathological analysis, which confirmed the diagnosis of compact thyroid carcinoma. The relationship between the macroscopic and microscopic results allowed a better understanding of the aggressive behavior of the neoplasm and supported the patient's poor prognosis.

Tumor staging is directly related to the clinical progression of dogs with thyroid carcinoma. Animals that have mobile tumors and are less than 4 cm in size usually respond better to treatment, with the possibility of surgical cure in certain situations (Withrow; Vail, 2020). On the other hand, larger, infiltrative tumors, such as the one observed in the present case, have a more restricted prognosis and usually require combined therapeutic approaches. In addition, the patient's age, 11 years, should be taken into account, as older dogs are more prone to malignant changes in the cells (Carvalho; Dagli, 2019).

After surgery, the dog was followed up in the immediate postoperative period, receiving care with analgesics, fluid therapy and continuous monitoring. Although she was small and of advanced age, the patient showed signs of satisfactory recovery in the first few hours.

Figure 6

Patient in the immediate postoperative period, under clinical observation

Source: Personal archive (2025).

In cases of resectable nodules, especially when there is no significant invasion of adjacent structures, surgery is still the first option. However, in cases of large, infiltrative tumors, there is a high risk of complications, and the survival rate is usually lower when surgery is done in isolation. Data indicate that combination with radioiodine therapy can provide median survival rates of up to 34 months, in contrast to only 3 months in dogs that do not receive any type of treatment (Mooney, 2005).

In situations where surgery or radioiodine therapy are not viable options, molecular-targeted therapies have become more common, especially with the use of toceranib. In retrospective studies conducted with dogs diagnosed with thyroid carcinoma, this tyrosine kinase inhibitor drug has been shown to be effective, with clinical benefit rates greater than 80% in certain groups analyzed. The progression-free period exceeded 200 days, and overall survival exceeded 1,000 days in certain patients, corroborating its potential as a promising alternative (Sheppard-Olivares et al., 2020).

However, the use of toceranib is not without side effects. Studies show hormonal changes linked to the hypothalamic-pituitary-thyroid axis, such as increased TSH and fluctuations in free T4, which requires endocrine monitoring during treatment (Feldman; Nelson, 2015). Even so, the drug has proven to be an important option in the clinical

management of cancer, as it provides benefits in terms of quality of life and survival in dogs with unresectable tumors.

The comparative analysis between the various therapeutic modalities shows that none of them should be considered in isolation as the ideal one. Although surgery provides better results in early tumors, radioiodine therapy increases survival in advanced stages, and toceranib is presented as a palliative or complementary alternative. Thus, the therapeutic approach should always be personalized, taking into account staging, age, comorbidities, and available resources (Birchard; Sherding, 2016; Giannasi, 2021).

In the case in question, the patient presented a large and invasive tumor, indicating an aggressive biological behavior. The tumor was removed using the thyroidectomy technique, where the tumor mass was removed, which was not infiltrated in the adjacent tissues, and an approach was made with combined treatments and internal therapies. The patient responded well to the surgery.

The prognosis should be considered cautious, requiring regular clinical and imaging follow-up for early detection of recurrences or metastases. The description of this case helps to expand the understanding of thyroid neoplasms in dogs in the Midwest region, highlighting the relevance of well-founded clinical reports as an instrument for evidence-based practice in Veterinary Medicine (Capen, 2002; Jubb; Kennedy; Palmer, 2016).

5 CONCLUSION

The research carried out allowed a thorough analysis of a clinical case of compact thyroid carcinoma in an elderly mixed breed dog, who goes by the name of Gaby, treated in the Midwest region of Brazil. Based on the histopathological diagnosis and the literature review, it was found that this neoplasm has an aggressive behavior and an uncertain prognosis, requiring personalized therapeutic approaches. The case description enriches the regional scientific record and helps to understand how to deal with this condition in practice.

The results of the research highlighted the relevance of early diagnosis and appropriate staging, since tumors in early stages respond better to surgical treatment. On the other hand, large, infiltrative lesions require combined treatments, such as radioiodine therapy and tyrosine kinase inhibitors, which have been shown to improve quality of life and increase patient survival. This analysis highlights the importance of combining several therapeutic modalities according to the clinical reality.

The development of this work revealed that studying veterinary oncology has a considerable progression, providing safer and more effective options for dogs diagnosed with thyroid neoplasia. However, obstacles are still significant, especially in areas where infrastructure for advanced therapies is insufficient. The analysis of the case in Anápolis highlights the importance of expanding access to imaging tests, specialized surgical procedures, and individualized chemotherapy or radiotherapy protocols.

The area of concentration of the internship and research made it possible to deepen the understanding of clinical and oncological pathology, in addition to highlighting the relevance of the multidisciplinary approach. The direct interaction with the routine of diagnosis and management of complex cases helped in practical and critical training, improving skills that transcend theoretical knowledge. This knowledge is essential to strengthen evidence-based veterinary practice, favoring the patient's well-being and quality of life.

From a personal perspective, the conclusion of this study marked a moment of academic and professional growth. Overcoming the challenges related to access to data, the need for an updated literature review and the thorough analysis of the clinical case reinforced the understanding of the relevance of research for the progress of Veterinary Medicine. It is a valuable experience, which expands perspectives and encourages the continuous search for scientific updating.

Finally, it is suggested that future research increase the number of reported cases, carrying out comparative studies that enable the creation of more efficient and standardized therapeutic protocols. In addition, it is recommended to encourage regional studies that analyze the prevalence and risk factors linked to thyroid cancer in dogs. Thus, it will be feasible to establish a more solid knowledge base, bringing benefits to both the academic community and veterinary clinical practice, favoring the quality of life and well-being of the patient.

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