

HEMANGIOSARCOMA IN DOGS: A SILENT THREAT TO CANINE HEALTH

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ABSTRACT

Hemangiosarcoma is a highly aggressive and mesenchymal neoplasm that originates in the endothelial cells, which line blood vessels. It is most commonly diagnosed in dogs. It typically arises in organs rich in blood vessels such as spleen, liver, heart, skin, with splenic hemangiosarcoma being the most frequently encountered form. The tumor is characterized by rapid growth, early metastasis and an ability to form new blood vessels which facilitates its aggressive behaviour. Clinical signs are often vague and non-specific including lethargy, anorexia, weakness and sudden collapse. These non-specific signs often lead to a delayed diagnosis and many cases are diagnosed only at an advanced stage when the disease is already widespread. As a result, this disease carries a poor prognosis with the affected dogs having a median survival time of only a few months, even with aggressive treatment. Early detection and interventions remain critical for enhancing survival rates in affected dogs.

Keywords: malignant, blood vessels, non-specific, poor prognosis, survival

I. INTRODUCTION

Hemangiosarcoma in dogs is a life-threatening distressing malignant tumor that strikes at the core of canine health, presenting itself as formidable adversary in veterinary medicine. It predominantly affects middle-aged to older dogs but can also occur in young dogs, with certain breeds showing a predisposition, including German Shepherds, Labradors, Golden Retrievers, Boxer, and Beagles. This malignant tumor typically originates from the abnormal proliferation of endothelial cells lining blood vessels, exhibiting an invasive nature that renders its challenging to detect and combat effectively. While it can occur in various parts of the body as the blood vessels run throughout the body but it frequently develops in the spleen, heart and skin. Despite its prevalence in certain breeds, this cancer can affect any dog, presenting a significant challenge due to its often-asymptomatic nature reaching advanced stages. Understanding its pathogenesis,

clinical manifestations, diagnostic approaches, treatment modalities and the emotional impact on pet owners is crucial in navigating the complexities of this life-threatening disease.

II. CAUSES

The exact cause of hemangiosarcoma in dogs remain unclear. However, certain factors like genetic predisposition, age, breed, environmental factors (exposure to insecticides, toxins, UV radiation), hormonal factors, immune system dysfunction may play an important role in its occurrence.

Overall, it is a complex disease with multifactorial causes involving a complex interaction of genetic, environmental and biological factors. While there is no definitive cause identified, further research is needed to better understand its underlying biology and risk factors.

1. Genetic factors: Some breed of dogs appear to be more prone to develop

hemangiosarcoma, suggesting a genetic predisposition. Breeds at higher risk include Labradors, German Shepherds, Golden Retrievers, Boxers, Pitbull, Bernese Mountain dogs etc (Aronsohn *et al.*, 2009, Cleveland and Casale, 2016, Sherwood *et al.*, 2016, Linden *et al.*, 2019). The genetic factors influencing Hemangiosarcoma are still under investigation, but it is believed that inherited genetic mutations could make some dogs more susceptible to the disease.

2. Age: Hemangiosarcoma is more common in older dogs typically affecting animals between 8-15 years of age with no gender predisposition. As dogs age, their cellular processes including those involved in blood vessel formation may become altered potentially contributing to development of such tumors.

3. Environmental factors: Exposure to harmful toxins or carcinogens may play a role in the development of hemangiosarcoma.

4. Angiogenesis: The disease is characterized by abnormal blood vessel formation which allows the tumor to grow rapidly and spread. Altered blood vessel growth could be linked to a combination of genetic and environmental factors.

5. Underlying medical conditions: Some studies suggest that dogs with certain underlying conditions that affect the immune system or blood vessels may be more at risk of developing hemangiosarcoma.

III. SYMPTOMS

Hemangiosarcoma often remains asymptomatic in its early stages, making it challenging to detect but some initial signs include intermittent lethargy, decreased appetite or mild weakness. However, as the tumor progresses, more alarming symptoms may emerge, leading to sudden collapse due to internal bleeding associated with the tumor's rupture or loss of consciousness.

1. Cardiac hemangiosarcoma- It typically originates in the atria or ventricles of the heart and can quickly infiltrate surrounding tissues and spread to distant organs, such as the lungs. When it arises in

the heart, it presents unique challenges due to the critical function of this vital organ. One of the most challenging aspects of cardiac hemangiosarcoma is its insidious nature. Dogs affected by this disease may not exhibit any noticeable symptoms until the tumor has grown significantly or ruptured, causing sudden and life-threatening complications such as cardiac tamponade or pericardial effusion. Symptoms may include lethargy, weakness, exercise intolerance, difficult breathing, coughing, pale mucus membranes and collapse. However, these signs are nonspecific and can mimic other cardiac or respiratory condition, making accurate diagnosis challenging.

2. Splenic hemangiosarcoma

Spleen is the most frequent primary location. One of the hallmark features of splenic hemangiosarcoma is its tendency to remain asymptomatic until the tumor reaches an advanced stage or ruptures, causing internal bleeding. Dogs with splenic hemangiosarcoma may exhibit signs such as lethargy, weakness, loss of appetite, pale gums, abdominal distension and collapse.

3. Cutaneous hemangiosarcoma-

When this cancer develops in the skin, it is known as cutaneous hemangiosarcoma. The symptoms can vary but often include the presence of a single or multiple nodules or lumps on the skin. These may appear red, purple or black and can range in size from small to large masses. In some cases, these nodules may ulcerate or bleed. Due to the aggressive nature of the disease, rapid growth and progression are common.

IV. DIAGNOSTIC APPROACHES

Diagnosing hemangiosarcoma often involves a combination of physical and clinical evaluation, blood tests, imaging techniques like ultrasound, X-rays and sometimes needle aspiration. Hemangiosarcoma is definitively diagnosed with a biopsy of the tumor. However, due to the tumor's fragile nature, biopsy may pose a

risk of bleeding or metastasis, necessitating careful consideration by veterinarians.

Furthermore, advancements in imaging techniques such as positron emission tomography (PET) and magnetic resonance imaging (MRI) have revolutionized the diagnosis and monitoring of hemangiosarcoma. These imaging modalities allow for early detection of tumors, precise tumor staging and monitoring of treatment response, enabling veterinarians to tailor treatment plans to individual needs of each patient.

V. TREATMENT

The treatment options for hemangiosarcoma depend on various factors, including the tumor's location, size and stage, as well as the overall health of the dog. Unfortunately, the treatment is often limited due to the advanced stage of the disease at the time of diagnosis and the aggressive nature of the tumor. As it frequently metastasizes to other organs, it limits the success of surgical approaches alone. Common approaches include surgery to remove the tumor, chemotherapy and in some cases, radiation therapy. Chemotherapy in conjunction with surgery, aims to slow down tumor growth and prolong survival but often offers limited success in eradicating the disease. In cases where surgery is not an option and the tumor has already spread, palliative treatment options may be recommended to alleviate symptoms and improve the quality of life. This may include medications to manage pain, reduce fluid buildup around the heart, and improve cardiac function in case of cardiac hemangiosarcoma and wound management in cutaneous hemangiosarcoma.

However, recent advancement in veterinary medicine have brought about promising novel treatments that offer hope for dogs battling this aggressive disease. One such innovative approach involves the use of immunotherapy. Immunotherapy harnesses the dog's immune system to target cancer cells. It works by stimulating the immune system to recognize and attack cancer cells,

offering a targeted and potentially less toxic treatment option compared to traditional chemotherapy. Another emerging treatment modality is targeted therapy which involves the use of drugs that specifically target molecular abnormalities driving cancer growth. By identifying and targeting these specific genetic mutations or signalling pathways, targeted therapy can effectively inhibit cancer progression while minimizing damage to healthy cells.

VI. PROGNOSIS AND PALLIATIVE CARE

The prognosis for the dogs diagnosed with hemangiosarcoma is guarded or poor, especially if the cancer has spread to other organs. However, it depends on various factors including the location and extent of tumor, the presence of metastasis, and the overall health and condition of dog

Even with treatment, the median survival time is typically short, ranging from a few months to years. However, palliative care plays a crucial role in maintaining the dog's quality of life, focusing on pain management, nutritional support and providing comfort during their remaining time.

VII. EMOTIONAL IMPACT ON PET OWNERS

The emotional toll of hemangiosarcoma on pet owners cannot be overstated. Witnessing the decline of a beloved companion due to this life-threatening disease can be devastating. Families grapple with difficult decisions regarding treatment options, facing the reality of their dog's limited time. The impending loss and the struggle to balance hope with the pet's well-being create profound emotional distress.

VIII. CONCLUSION

Hemangiosarcoma is a devastating diagnosis for dogs and their owners. While the exact causes remain elusive, factors such as genetics, age, environmental influences,

hormonal factors and immune system dysfunction may contribute to its development. Early detection, though challenging, remains crucial for better management. Owners should remain vigilant for any unusual symptoms and seek immediate veterinary attention if they suspect any health concern in their pets. While advancements in diagnostics and treatment modalities offer glimpses of hope, the battle against hemangiosarcoma in dogs remains an ongoing challenge. Regular monitoring by a veterinarian, open communication between

the owner and the doctor, and adjustment to the treatment plan as needed are essential for ensuring the best possible outcome and comfort for the dog. While the prognosis for dogs with hemangiosarcoma can be daunting, palliative care offers a valuable opportunity to improve quality of life and provide comfort for dogs. By focusing on pain management, symptom control and supportive care measures we can help dogs and their owners navigate this challenging journey with compassion and dignity.

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