Canine Visceral Haemangiosarcoma: What can we do?

Haemangiosarcoma (HSA) is a malignant mesenchymal neoplasm arising from the bone-marrow-derived endothelial precursor cells (Lamerato-Kozicki et al. 2006), which behaves aggressively and has a high metastatic rate. Visceral locations such as the spleen, heart and liver are common and patients often present with internal haemorrhage due to tumour rupture. While surgical treatment alone leads to rapid death due to metastasis, the combination of surgery and chemotherapy, although not curative, can prolong survival time with good quality of life.

**Key words:** Haemangiosarcoma, mesenchymal tumour, chemotherapy, haemoabdomen, cardiac tamponade

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**Introduction**

Haemangiosarcoma (HSA) is a very aggressive and highly metastatic, malignant mesenchymal neoplasm arising from the bone-marrow-derived endothelial precursor cells. HSA represents about 4% of all malignant neoplasia in dogs (Smith 2003). It typically affects older dogs (reported median age is between 8 and 13.5 years) but has been described in young dogs as well. It is more common in large breeds such as the German Shepherd, Labrador and Golden Retriever (Tamburini et al. 2009).

**Aetiology and Predisposing Factors**

The pathogenesis of HSA remains largely unknown, however some genetic factors have been investigated as possible predisposing factors, including mutations that inactivate the tumour suppressor genes p53 and PTEN (Tamburini et al. 2009). The process of angiogenesis (new blood vessel formation) is integral to the development of HSA. Vascular Endothelial Growth Factor (VEGF) is one of the most important molecules involved in the angiogenic process and dogs with HSA have been reported to have increased serum VEGF levels (Clifford et al. 2001). Moreover, an increase in genetic expression of VEGF receptors has recently been demonstrated in haemangiosarcoma cells in Golden Retrievers (Tamburini et al. 2009).

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**Clinical Presentation and Distribution**

Haemangiosarcomas can develop in almost any site in the body. Three forms are recognised: visceral, cutaneous and subcutaneous/muscular. This article focuses on the visceral form, which is reportedly most common (Srebernik et al. 1991). The most frequently affected viscera are the spleen, followed by the heart (in particular the right atrium and auricle) and the liver. Other reported sites include the kidneys, muscle, lungs, oral cavity, bones, urinary bladder, retroperitoneum, tongue, left ventricle and penis (Shultheiss et al. 2004).

Whilst splenic HSA will present as a splenic lesion, a splenic mass is not necessarily an HSA: approximately 60% of dogs presenting with a splenic mass have a malignant neoplasm and of these, around 60% are haemangiosarcomas (Gamlem et al. 2008, Cleveland et al. 2016). (Box 1)

Visceral masses may be an incidental finding on diagnostic imaging or exploratory laparotomy performed for the investigation of another condition. However, the typical clinical presentation of HSA is weakness, lethargy, episodic collapse and pallor associated with abdominal effusion or cardiac tamponade secondary to tumour rupture, acute haemorrhage and hypovolemic shock. Patients may also present with mild and non-specific clinical signs (inappetence, weight loss and abdominal distension), or more severe manifestations such as disseminated intravascular coagulation (DIC), which, in one study, was reported in 46% of patients with haemangiosarcoma (Maruyama et al. 2004).

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Chiara Leo graduated from Milan University (Italy) in 2003, completed an internship at the Tierispital University of Zurich (Switzerland) and then a residency in Oncology at the Animal Oncology and Imaging Center in Zug (Switzerland). She was a lecturer in Oncology at the Royal Veterinary College (London, UK) from 2011 to 2016 and “ad interim” Head of the Oncology service from 2015 to 2016. In 2016 she moved back to Italy where she is Head of the Oncology service at the Istituto Veterinario Novara. In her free time, she enjoys hiking with her dog Arturo.
**What can we do?**

**Haemangiosarcoma:**
Canine Visceral Surgical Emergency.

Frequent complication and it represents a diagnostic challenge (Bertazzolo et al. 2005). Indeed, haemoabdomen is the most sensitive diagnostic imaging tool: only histology can provide a definitive diagnosis (Figure 1). As all three conditions can present as a ruptured mass with haemorrhage, it is important to communicate all three differentials to owners.

**The "2/3 -2/3" Rule**

Johnson et al. (1989) reported that 2/3rd of splenic masses are malignant tumours and 2/3rd of those will be haemangiosarcomas. That means that roughly 45% of all splenic masses will be haemangiosarcomas, but also that the rest of the splenic masses presented might be benign tumours, hematomas or another type of tumour with a more favourable prognosis. This is key information to communicate to clients who might be more inclined to pursue surgery knowing that a splenic mass does not necessarily mean cancer.

**The Bigger, The Better Rule**

In a study by Mallinckrodt et al. (1989) 65 dogs with a splenic mass who underwent splenectomy were compared. There was an association between the mass dimensions and clinical behaviour, with larger masses (in proportion to bodyweight) being more likely to be benign lesions rather than haemangiosarcoma. This is also important information to discuss with clients when considering whether to proceed to surgery.

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** Clients present in shock require quick and effective stabilisation, which may include blood transfusion and pericardiocentesis as indicated, followed by pericardiectomy and/or removal of the bleeding mass (Box 2).**

Grossly, haemangiosarcomas are of variable size, pale grey to dark red or purple in colour and feel soft or gelatinous. They often contain blood-filled or necrotic areas on the cut surfaces of the mass. They are extremely friable, poorly circumscribed, non-encapsulated, and are often adherent to adjacent organs (Figure 2). Histologically, lesions consist of immature, pleomorphic, organised endothelial cells forming vascular spaces containing blood and thrombi. The fragility of the neoplastic vessels predisposes to rupture, causing haemorrhage (Bertazzolo et al. 2005). Indeed, haemobdome is the most frequent complication and it represents a surgical emergency.

Unfortunately, HSA has a high metastatic rate and both infiltration to adjacent organs and distant metastases are often present at the time of diagnosis. Up to 25% of splenic tumours have a corresponding cardiac tumour in the right atrial or auricle (Waters et al. 1988). The most frequent sites for metastasis are the lungs, omentum and liver. In some cases, at the time of diagnosis, several sites are affected by a primary haemangiosarcoma (e.g. spleen and auricle). This is not considered metastatic but is termed “synchronous disease” (Waters et al. 1988). The presence of metastatic disease should not discourage the clinician from attempting surgical resection of the bleeding mass, primarily as this would be considered a life-saving emergency procedure, but also because the presence of metastasis does not necessarily change the prognosis.

**Diagnosis**

**Cytology and Histology**

Haemangiosarcoma cells appear extremely heterogeneous, with the typical spindle form, mid-large size, eccentric nuclei, vacuolated cytoplasm and irregular margins (Figure 3). However, cytology is often non-diagnostic due to haemodilution and the poor exfoliative capacity of sarcomas. Cytological examination of cavity effusion samples is very rarely diagnostic. Obtaining aspirates for cytology or histologic biopsies of a visceral mass carries a high risk of iatrogenic haemorrhage and therefore this procedure is often declined. However,