# DIAGNOSTIC AND THERAPEUTIC APPROACH TO CARDIAC HAEMANGIOSARCOMA IN DOG

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**ABSTRACT**

Haemagiosarcoma, presenting as a cardiac tumour is extremely rare, few cases of cardiac haemagiosarcoma have been reported in veterinary patients. In our patient, a 9-year-old Golden retriever was referred for the evaluation of a history of abdominal distension, anaemia, lethargy and weakness. Mass was palpated in the cranioventral abdomen during physical examination. Diagnostic imaging including radiography and ultrasonography revealed the presence of a mass in the spleen. Thoracic radiograph showed cardiac enlargement and pulmonary oedema. Electrocardiography examination revealed alternate beat variation of QRS complex amplitude. Pericardial effusion and intracardiac masses in both right and left ventricular wall were visualized by echocardiography. Magnetic resonance imaging was performed to evaluate the malignancy of the intra-cardiac masses. Clinical symptoms were resolved after treatment including pericardiocentesis, complete splenectomy and blood transfusion. Histopathological evaluation of the mass confirmed the diagnosis of haemangiosarcoma.

***Key words**:* Cardiac tumours, dog, MRI

## Introduction

Canine haemangiosarcoma is a progressive malignant tumour that originated from the vascular endothelium. Breeds predisposition of haemangiosarcoma in dogs including German shepherds, Golden retrievers, Labrador retrievers, Boxers, and Doberman. The common sites of haemangiosarcoma in dog include spleen, skin and heart. Other sites have been reported such as pericardium, liver, lung and kidney (Brown *et al*., 1985). Haemangiosarcoma is the most frequently diagnosed heart tumour in dog. Cardiac haemangiosarcoma can locate in any heart chamber such as pericardium, endocardium or myocardium and frequently present as a diffuse infiltrative tumour in the heart chamber, right atrium is a common site for cardiac haemangiosarcoma in human and animal (Yamamoto *et al*., 2013; Kojima *et al*., 2003; Pigato *et al*., 1998). Haemangiosarcoma in a heart chamber can cause severe clinical symptoms such as sign of congestive heart failure, left ventricular outflow tract obstruction, arrhythmias and sudden death (Aoki *et al*., 2015; Tomizawa *et al*., 2001).

Noninvasive approaches have been applied to evaluate a tumour by many advance imaging modalities, including echocardiography and magnetic resonance imaging (MRI). Transthoracic echocardiography is the first-line diagnostic tool for cardiac tumours. However, echocardiography contains some limitations such as a restrict field of view in mediastinal and the right heart. Cardiac MRI can be used for the second line tool to establish the accurate diagnostic and to predict the malignancy of a cardiac mass. Histopathological evaluation of the isolated mass is considered to be a good diagnostic tool for a definitive diagnosis (Day *et al*., 1995). Recently, there is no effective treatment for canine haemangiosarcoma. Chemotherapy and radiation therapy might use in combination with surgical excision in the penetrated tumour. However, surgical excision such as spleen removal is a common surgical treatment to prevent complication from splenic rupture and bleeding (Clifford *et al*., 2000; Spangler *et al*., 1997).

## Case history

A 9-year-old male Golden retriever, weighting 38.6 kg, was referred to Kasetsart Veterinary Teaching Hospital Hua-Hin, Thailand, with signs of anemia, abdominal distension and tachypnoea. On physical examination, the body temperature was 37°C, the heart rate was 129 bpm, and the respiration rate was increased (40/min). Systolic blood pressure was measured using a Doppler ultrasound device was 240 mmHg. Electrocardiography revealed low voltage of QRS complex and electrical alternans. A mass in abdomen was palpated, abdominal ultrasonography showed ascites and a splenic mass with a 10-cm diameter.

## Clinical evaluations

Dog's owner was provided consent form to approve the surgical procedure. Routine laboratory evaluations were performed included haematology, serum biochemistry and electrolyte levels analysis as shown in Table 1. Pericardiocentesis was performed and 100 ml of serosanguineous pericardial fluid was removed from the pericardial cavity to alleviate a sign of cardiac tamponade. After pericardiocentesis, no effusion fluid was observed in the pericardial sac. A full cardiac examination was performed as shown in Table 2, including electrocardiography, 2-Dimensional, M-Mode and colour flow Doppler echocardiography (vivid s5, USA). Echocardiography was performed in parasternal long, short axis views and apical

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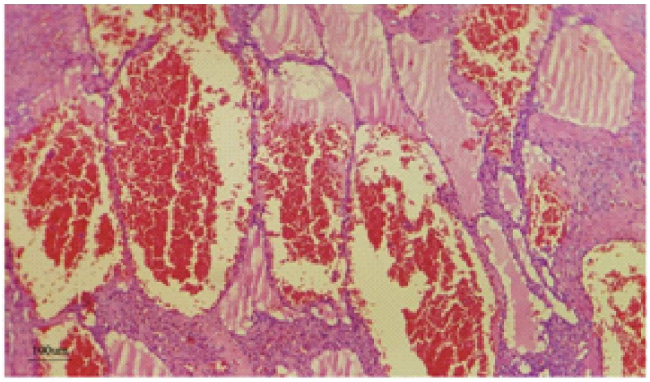

Fig. 1: Analysis of neoplastic mass in spleen, H&E image revealed multiple cavernous blood channels were formed by tumour cells.


Fig. 2: Electrocardiography before (a) and after pericardiocentesis (b)

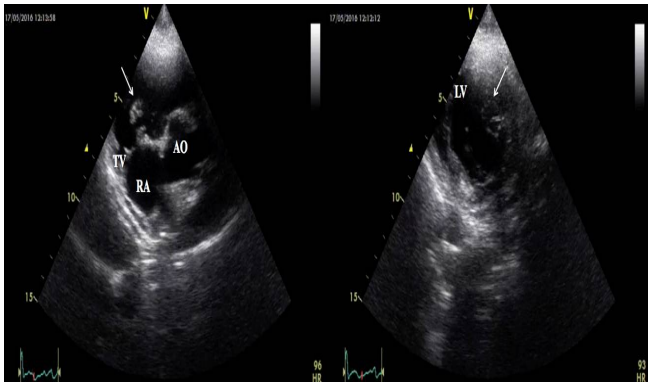


Fig. 3: Echocardiographic of transverse image of heart base (left) and transverse image of the left ventricle (right) during diastole. Images showing the irregular shape of mass approximately 0.8x0.5 cm are located in the right and left ventricle wall (white arrow). AO= Aorta, RA = right atrium, TV=Tricuspid valve, and LV=left ventricle.

four-chamber view in right and left parasternal position with no sedation. Echocardiographic images were captured and stored for offline analysis. Left ventricular wall structure and function were calculated by measuring the images from two-dimensional plane (Fig. 3). MRI scan of the heart was performed using a 1.5-Tesla magnetic resonance unit (Magnetom Essenza, Siemens, Munich, Germany). The thickness of the slices for all sequences was 5 mm and bright-blood balanced contrast, black-blood T2 weighted MRI (double IR T2 FS), black-blood T1 weighted MRI (double IR T1 FS), and phase contrast images were obtained. Several tumour masses arose in right and left ventricular chambers, the cardiac mass had high signal intensity on all images and showed contrast enhancement in the phase contrast images (Fig. 4).

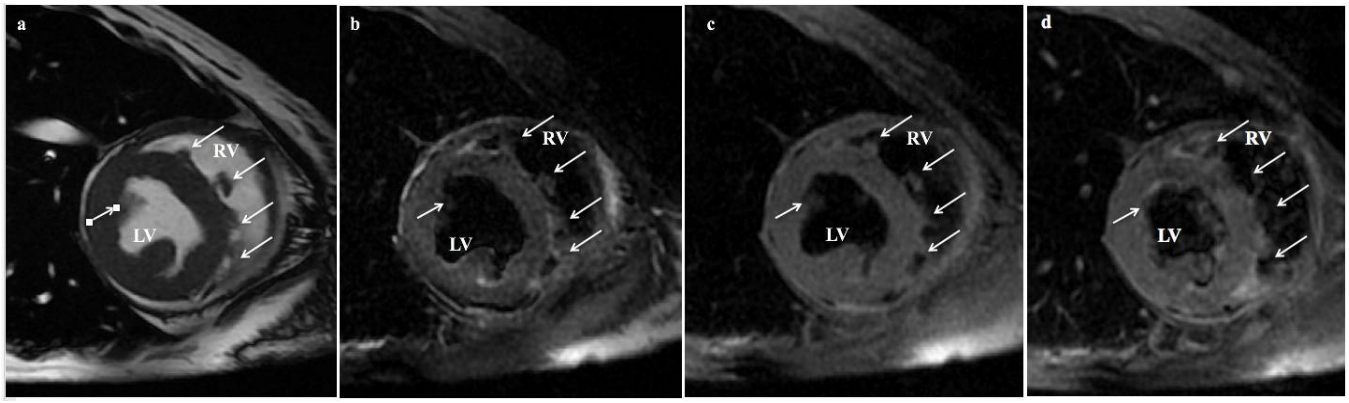


Fig. 4: Cardiac MRI images of normal short axis view. Cardiac MRI revealed multiple irregular shape of mass are located in right and left ventricle (white arrow). a; bright-blood balanced contrast, b; black-blood T2 weighted MRI (double IR T2 FS), c; black-blood T1 weighted MRI (double IR T1 FS), and d; phase contrast MRI. RV=Right ventricle and LV=Left ventricle

**Surgical treatment**

Dog was preoperatively received a blood transfusion to stabilize an anaemic condition. Dog underwent a complete splenectomy to remove the neoplastic splenic mass and the surgical ultrasonic cutting (SonoSurg®, Olympus, Tokyo, Japan) was used to minimize blood loss during surgery. The abdominal cavity was lavaged with warm sterile normal saline solution.

**Histopathological analysis**

Histopathology section of the splenic mass showed multiple variably sized of blood filled channels lined by endothelium of the tumour and various sized band of pleomorphic tumour cells which confirm splenic haemangiosarcoma (Fig. 1).

**Results and Discussion**

Complete blood counts and serum biochemistry evaluations were performed; haematology results were compatible with anaemia, thrombocytopenia and leukocytosis. No sign of cardiac tamponade was observed after

Table 1: Blood profiles before, 30 days and 120 days after complete splenectomy

| Parameters | Reference range | Before | After | |
|---|---|---|---|---|
| | | | 30 Days | 120 Days |
| WBC ($x10^3$/ul) | 6-17 | 30.28 | 12.12 | 21.45 |
| RBC ($x10^6$/ul) | 5-9 | 4.16 | 4.89 | 4.54 |
| HGB (g/dL) | 12-18 | 7.3 | 9.8 | 9.9 |
| HCT (%) | 30-35 | 24.0 | 30.9 | 29 |
| PLT ($x10^3$/ul) | 200-900 | 208 | 138 | 604 |
| Creatinine (mg%) | 0.8-1.8 | 1.25 | 1.02 | 1.29 |
| ALT (IU/L) | <89 | 17.2 | 12.9 | 18.4 |
| Albumin (gm%) | 2.3-3.2 | 1.8 | 2.1 | 2.3 |
| Globulin (gm%) | 1.5-3.9 | 4.5 | 4.8 | 5.6 |

Table 2: Echocardiagraphic parameters in dog with cardiac haemangiosarcoma.

| Parameters | Patient | Reference range |
|---|---|---|
| IVSd (cm) | 1.1 | 0.7-1.4 |
| LVIDd (cm) | 4.8 | 3.7-5.4 |
| LVPWd (cm) | 1.3 | 0.7-1.4 |
| IVSs (cm) | 1.5 | 1.0-1.9 |
| LVIDs (cm) | 3.2 | 2.3-4.0 |
| LVPWs (cm) | 1.5 | 1.1-2.0 |
| EF (%) | 61 | 49-81 |
| FS (%) | 33 | 25-45 |
| LA/Ao Ratio | 1.21 | 1.0-1.5 |
| EPSS (cm) | 0.6 | 0.4-0.75 |

IVSd; diastolic interventricular septum thickness, IVSs; systolic interventricular septum thickness, LVIDd; left ventricular end diastolic diameter, LVIDs; left ventricular end systolic diameter, LVPWd; left ventricular wall diastolic thickness, and LVPWs; left ventricular wall systolic thickness. The left ventricular ejection fraction (EF); EPSS, E point of septum separation.

pericardiocentesis and the electrocardiography showed normal sinus rhythm (Fig. 2). The pericardial effusion fluid contained red blood cells and reactive mesothelial cells with pH 9.0. After splenectomy, the blood profiles showed gradual improvement of PCV and the number of leukocytes as shown in Table 1. Abdominal ultrasonography showed ascites and inhomogeneous enlarged mass located in the left cranial part of the abdomen. No metastasis of other abdominal organs such as liver and kidney was visualized. Cardiac MRI revealed infiltration of tumour masses into the right and left ventricle, no thrombus and ventricular outflow tract obstruction was observed (Fig. 4). The use of MRI to visualize heart in veterinary medicine is limited by availability, expense and long procedure duration. In this case, echocardiography result was highly suspicious for cardiac tumour. According to our knowledge, echocardiographic imaging contained a limitation to visualize the right side of the heart. Cardiac MRI was used to evaluate the tumour mass in the heart. Short TR image planes were used in this study to decrease the scan duration and black-blood T2 weighted MRI to provide an accurate diagnosis. In this study, cardiac MRI provided a prediction of the malignancy of the cardiac tumour and a proper treatment in confirmed tumour. Compared with echocardiography, MRI imagings present a higher resolution and additional tissue characterization (Puntman *et al*., 2013). In our study, cardiac biopsy could perform to confirm the type of tumour in the heart chamber. However, the location of the tumour, breed disposition and the type of the tumour in spleen might be used to diagnose the type of tumour in the heart and this is a limitation of this study. Complete splenectomy was successfully performed in this case without any major postoperative complications. 30 days postoperatively, the dog was discharged with normal general condition with ongoing administration of antibiotic and albumin and recommendation for further follow-up. The dog was presented again 4 months after the first visit with good appearance. The venous flow obstruction was not observed and no systemic signs and evidence of metastasis of the haemangiosarcoma to other organs.

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**References**

Aoki T, Sunahara H, Sugimoto K, Ito T, Kanai E, Neo S, Fujii Y, and Wakao Y (2015) Dynamic left ventricular outflow tract obstruction secondary to hypovolemia in German Shepard dog with splenic haemangiosarcoma. *J. Vet. Med. Sci*. **77**(9): 1187-1190.

Brown NO, Patnaik AR, and MacEwen EG (1985) Canine haemangiosarcoma: retrospective analysis of 104 cases. *J. Am. Vet. Med. Assoc*. **186**: 56-58.

Clifford CA, Mackin, AJ and Henry, CJ (2000) Treatment of canine haemangiosarcoma: 2000 and beyond. *J. Vet. Intern. Med*. **14**: 479-485.

Day MJ, Lucke VM and Pearson H (1995) A review of pathological diagnoses made from 87 canine splenic biopsies. *J. Small. Anim. Prac*. **36**: 426-433.

Kojima S, Sumiyoshi M, Suwa S (2003) Cardiac haemangioma: a report of two cases and review of the literature. *Heart Vessels*. **18**: 153-156.

Pigato JB, Subramanian VA, McCaba JC (1998) Cardiac haemangioma: a case report and discussion. *Tex. Heart Inst. J*. **25**: 83-85.

Puntman VO, Voigt T, Chen Z, Mayr M, Karim R, Rhode K (2013) T1 mapping in differentiation of normal myocardium from diffuse disease in hypertrophic and dilated cardiomyopathy. *JACC Cardiovasc Imaging* **6**(4): 475-484.

Spangler WL, and Kass PH (1997) Pathologic factors affecting post splenectomy survival in dogs. *J. Vet. Intern. Med*. **11**: 166-171.

Tomizawa Y, Endo M, Nishida H, Kikuchi C, Koyanagi H (2001) Reconstruction of the left ventricle in a patient with cardiac haemangioma at the apex. *Ann. Thorac. Surg*. **71**:2032-2034.

Yamamoto S, Hoshi K, Hirakawa A, Chimura S, Kobayashi M, Machida N (2013) Epidemiological, clinical and pathological features of primary cardiac haemangiosarcoma in dogs: a review of 51 cases. *J. Vet. Med. Sci*. **75**: 1433-1441.