



CASE REPORT

Management of Ovarian Dysgerminoma Associated with Pseudo-Meigs's Syndrome in a Dog

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ABSTRACT

A ten-year old intact female Chihuahua dog was referred for evaluation of abdominal distension and cough. On presentation, mild difficulty in breathing was noted and abdominal mass was palpated. Radiographic and computed tomography findings were of pleural effusions, ascites and abdominal mass in the left caudal region of abdomen. Malignant ovarian or uterine tumor was suspected. Further diagnostic tests and surgical intervention were suggested, but were declined by the owner. Palliative chemotherapy with carboplatin was well-tolerated in this dog. No other abnormalities except abdominal discomfort, panting and pollakiuria were seen. The dog received 13 times of chemotherapy (every 4 to 6 weeks) during 431 days. At necropsy, significantly enlarged right ovary along with sternal lymph node enlargement was found. The histopathological examination of the ovarian mass revealed cords of mitotically active round or polygonal cells, and a diagnosis of ovarian dysgerminoma was made.

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INTRODUCTION

Ovarian tumors have been classified as epithelial tumors, germ cell tumors and sex cord-stromal tumors depending on its cell of origin (Bertazzolo *et al.*, 2012). Dysgerminoma belong to the ovarian germ-cell tumors and is considered rare in domestic species (Sforna *et al.*, 2003). In dogs, the prevalence varies between 6 to 12 % of all ovarian tumors (McEntee, 2002). Different from humans, most dogs are affected over 10 years with a range of 2 to 16 years (Fernández *et al.*, 2001). There is no breed predilection and unilateral ovary (left side) is commonly affected (McEntee, 2002). Clinical signs are variable depending on the origin of the tumor tissue, tumor size, and presence of distance metastasis. According to the literature described previously (Novotny *et al.*, 2011; Bertazzolo *et al.*, 2012), metastasis to regional, mesenteric and mediastinal lymph nodes, liver, kidney, adrenal glands, omentum, and lungs occurs in approximately 10 % to 20 % dogs. Recently, one study reported central nervous system metastasis of canine ovarian dysgerminoma (Fernández *et al.*, 2001). Approaches for malignant ovarian tumors are not well established due to the limited number of literature evidence (Olsen *et al.*, 1994).

We report a case of a malignant ovarian dysgerminoma associated with pleural and abdominal effusions. Palliative

chemotherapy with carboplatin was well-tolerated and the dog lived 431 days.

Case history and findings: A 10-year-old female Chihuahua dog was presented with progressive abdominal distension and cough. The dog had not been showing any clinical sign other than cough started one week prior to presentation. The last estrus was approximately 4 months ago. Physical examination revealed markedly enlarged abdomen, mild generalized muscle weakness, dyspnea, and crackle lung sound. Hematologic abnormalities included mild leukocytosis ($20.89 \times 10^3/\mu\text{l}$; reference interval, $6-17 \times 10^3/\mu\text{l}$) and a decreased packed cell volume (PCV 30%; reference interval, 37-55%). Serum chemistry showed elevated alanine aminotransferase (157U/L; reference interval, 17-44U/L), elevated lactate dehydrogenase (569U/L; reference interval, 20-109U/L), elevated creatinine kinase (261U/L; reference interval, 49-166U/L) and hyperglycemia. Radiographic examination findings included pleural effusion of right side and abdominal mass. Abdominal ultrasonographic examination also revealed a large abdominal mass with multiple cysts and abdominal fluid. Thoracocentesis and abdominocentesis were performed to relieve dyspnea, and flow-by oxygen was provided to help stabilized the dog. Red-colored, cloudy fluid was removed from both the cavities characterized as

modified transudate. After stabilization, computed tomography (CT) (Asteion 4[®], Toshiba, Japan) with angiography was performed to evaluate accurate anatomy and metastasis of the abdominal mass. CT scan revealed large abdominal mass (9.7 x 7.2 x 6.5 cm) in the left caudal region of abdomen (Fig. 1A). And because of the mass, stomach, liver, kidney, small intestine and spleen were dislocated. Pleural effusions were noted; however, distinct pulmonary metastasis was not noticed (Fig. 1B). Due to the anatomic location and mass size, malignant ovarian or uterine tumor was suspected.

The client refused surgical resection and instead selected chemotherapeutic treatment. Palliative chemotherapy with carboplatin (10mg/kg, IV, every 4 weeks) was started, and the dog was well-tolerated. Follow-up CT scans were performed 6 months after the treatment. Although the size of the mass increased gradually during chemotherapy (Fig. 1C & D), the pleural and abdominal effusions did not reoccur. Metastasis was not detected. The duration of administration of the carboplatin was prolonged up to 6 weeks depending on the condition of the dog. One year after the treatment, exercise intolerance and panting was marked. Tortuous left side caudal superficial epigastric artery was observed at this time (Fig. 2A). The patient received thirteen times of intravenous carboplatin and lived for 431 days.

At necropsy, hemorrhagic abdominal fluid and significantly enlarged right ovary was found (14.5 x 12.7 x 8.2 cm) (Fig. 2B). Also, sternal lymph node was enlarged. Sternal lymph node impression cytology showed numerous epithelioid cells, with anisocytosis, anisokaryosis, prominent multiple nucleoli, and variable nuclear-to-cytoplasmic ratio (Fig. 3). The histopathological examination of the ovarian mass revealed cords of round or polygonal cells (Fig. 4). These cells had large vesicular nuclei and prominent nucleoli with scant cytoplasm. Mitotic figures were common. Large histiocytes with clear cytoplasm were scattered throughout the tumor. Fibrous tissues were also observed. Occasionally multifocal hemorrhage and necrosis were observed. A diagnosis of ovarian dysgerminoma was made.

DISCUSSION

Although 10-20% of the canine dysgerminoma are considered malignant, the majority of the dysgerminomas are clinically benign (asymptomatic) (Novotny *et al.*, 2011). Most common clinical signs were palpable abdominal masses and systemic signs caused by hormonal disturbances included polyuria, polydipsia, alopecia, bloody vaginal discharge, persistent estrus cycle, pyometra and cystic endometrial hyperplasia (McEntee, 2002; Sforna *et al.*, 2003). In this case, the dog also showed enlarged abdomen with palpable abdominal masses compatible with previous literature. Clinical signs related to alteration of the hormonal function were not shown in this dog during long-term management periods. Pollakiuria was seen in the late stage in this dog. However, which was not related to the polyuria and/or polydipsia and seemed to relate to physical pressure of the bladder due to the enlarged mass (mass effect).

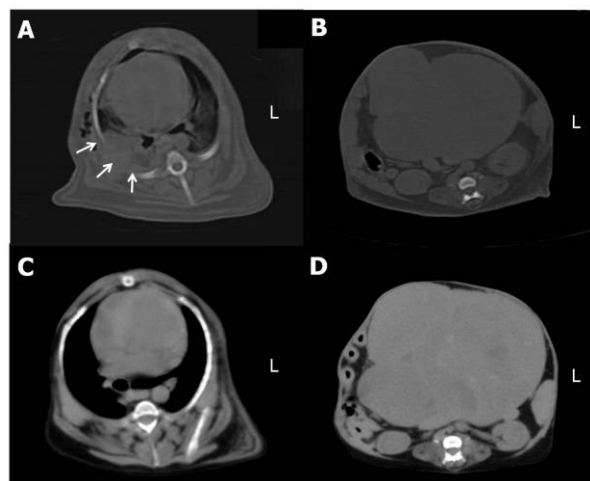


Fig. 1: Computed tomography scan of the thorax and abdomen with large ovarian mass in a dog. (A) Transverse computed tomography (CT) images of thorax at the level of heart showing a moderate right pleural effusion (arrows). (B) CT scan of the abdomen revealed large mass (9.7 x 7.2 cm) in the caudal abdomen. (C and D) Pleural and abdominal effusion was disappeared during chemotherapy and follow-up CT scans revealed increased mass size without metastasis.

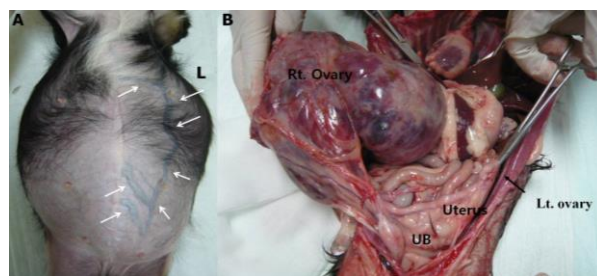


Fig. 2: A) Tortuous left side caudal superficial epigastric artery (arrows) was observed after one year of treatment. B) Macroscopic appearance of massive right side ovarian tumor in this dog.

Other than this, the dog had cough and dyspnea caused by pleural and abdominal effusions. Ovarian tumors associated with pleural effusion and ascites are referred to as Meigs' syndrome in humans (Gücer *et al.*, 2005). The triad symptoms (presence of ovarian tumor, ascites and pleural effusion) are associated most commonly with the benign ovarian tumors such as fibroma and Brenner tumor. However, other malignant ovarian tumors can present similar clinical symptoms and documented as pseudo-Meigs' syndrome (Miyoshi *et al.*, 2015). The exact etiology of the pleural effusion and ascites in this syndrome is poorly understood, and several theories such as direct peritoneal irritation, compression or obstruction of lymphatic vessels and veins, fluid secretion from tumor, torsion, and release of inflammatory mediators have been proposed for the source of ascites (Gücer *et al.*, 2005; Miyoshi *et al.*, 2015). Pleural effusion in pseudo-Meigs' syndrome is thought to be caused by two primary reasons; the mechanical transfer of ascites through the anatomic defects and/or lymphatic channels in the diaphragm (Miyoshi *et al.*, 2015). Usually such effusions are benign and disappear after removal of the tumor (Gücer *et al.*, 2005). In this case, the mass was not surgically removed. However, pleural effusion and ascites were spontaneously disappeared after the chemotherapy and did not reoccur.

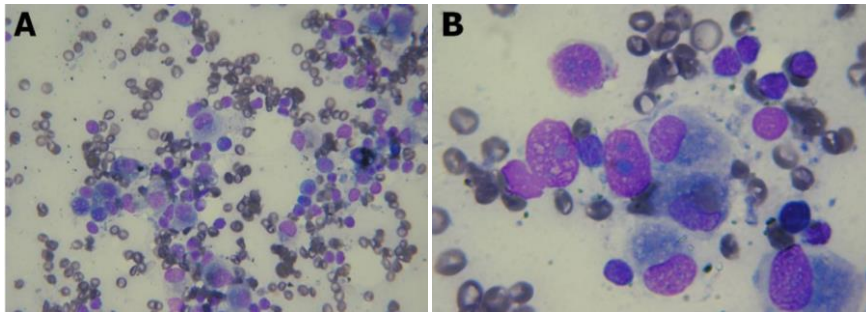


Fig. 3: Impression cytology of sternal lymph node showed numerous epithelioid cells with moderate anisocytosis and anisokaryosis (A, x 400). Presence of multiple, prominent nucleoli, and high nuclear-to-cytoplasmic ratio were also detected (B, x 1000).

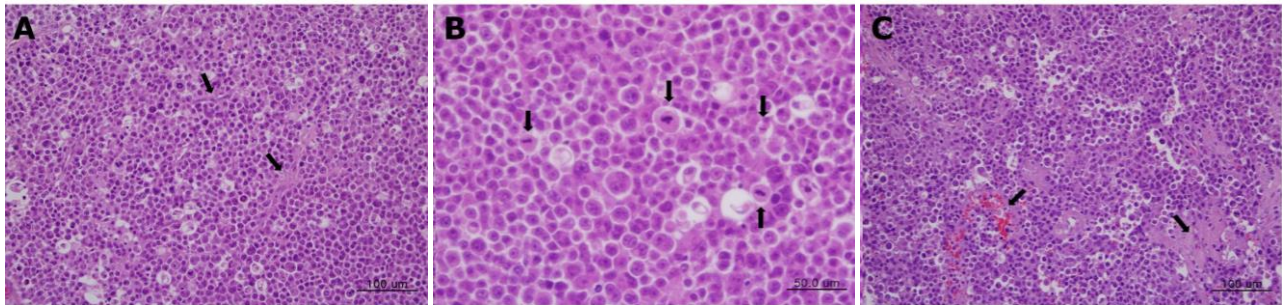


Fig. 4: Histological examination of large ovarian tumor in this dog. (A) The tumor mass is composed of cords of round or polygonal cells. Large histiocytes with clear cytoplasm are scattered throughout the tumor. Fibrous tissues (arrows) are also observed (bar=100 µm). (B) The neoplastic cells have large vesicular nuclei and prominent nucleoli with scant cytoplasm. Mitotic figures (arrows) are common (bar=50 µm). (C) Occasionally, multifocal hemorrhage and necrosis (arrows) are observed (bar=100 µm).

Surgical resection such as ovariectomy or ovariectomy is the treatment of choice for most ovarian tumors in animals (McEntee, 2002). However, treatment for metastatic ovarian tumors was limited due to lack of literature evidence. The therapeutic response of dysgerminomas is very good with chemotherapy and radiation therapy in humans (Gücer *et al.*, 2005), but the therapeutic options are not widely investigated in animals. Intracavitary instillation of cisplatin or a combination of surgery with chemotherapy were tried in limited cases and the prognosis were poor (Moore *et al.*, 1991; Olsen *et al.*, 1994; McEntee, 2002). In the presently reported case, surgical resection was not attempted and the dog was managed only with palliative chemotherapy for 431 days.

Conclusions: The presence of pleural effusions and ascites associated with tumor may be considered more serious disease. However, those signs can also develop without metastasis like pseudo-Meigs's syndrome. Thus, thorough investigation is warranted in a bitch with ovarian tumor. To the best of our knowledge, this is the first case of ovarian dysgerminoma complicated by pseudo-Meigs' syndrome in a dog.

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Authors contribution: KMH took part in the care of the patient and contributed in preparation of the manuscript. CYK carried out and advised on histopathological examination. The manuscript was prepared by KMH and MSH under the supervision of PHM. All authors critically revised the manuscript and approved the final manuscript.

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