Korean Journal
of Veterinary Service

Kor J Vet Serv (2007) 30(4) : 539-544

Canine hemangiopericytoma in a Golden Retriever: A case report

Ha-Young Kim, Gye-Hyeong Woo*, Bum-Tae Hwang[1], Jung-Won Park, Cheong-Up Choi[2]

Animal Disease Diagnostic Center (ADDC), National Veterinary Research and Quarantine Service (NVRQS), Anyang, Korea, [1]Seoul Animal Hospital, Anyang, Korea, [2]Veterinary Biotechnology Division, National Veterinary Research and Quarantine Service (NVRQS), Anyang, Korea

(Received 13 December 2007, accepted in revised from 24 December 2007)

Abstract

A 7-year-old intact female Golden Retriever was presented for examination. The dog had large irregular subcutaneous masses in the abdomen which were ruptured or encapsulated. Those were removed surgically. Histopathologically, the masses consisted of spindle cells that often formed distinct whorls around a central capillary. Immunohistochemical anaylsis revealed that the neoplastic cells were strong diffuse cytoplasmic immunolabelling for vimentin and focal immunoreactivity for smooth muscle actin, whereas not immunoreactive for cytokeratin, desmin, von Willebrand factor, glial fibrillary acidic protein, or S-100. The neoplastic cells ultrastructurally had processes attached by desmosome-like structures, swollen mitochondria and dilated rough endoplasmic reticulum. Based on the above results, this case was diagnosed as a canine hemangiopericytoma in the abdominal subcutis of a Golden Retriever.

Key words: Hemangiopericytoma, Canine, Subcutaneous mass, Immunohistochemistry, EM

*Corresponding author
Phone: +82-31-467-1747, Fax: +82-31-467-1780
E-mail: woogh@nvrqs.go.kr

Introduction

Hemangiopericytoma (HP) is a soft tissue tumor characterized by concentric whorls of spindle cells around capillaries[1)]. HP had been reported in the dog and man. Recently, it was confirmed in the eyelid of horse[2)]. Canine hemangiopericytoma (CHP) was first described by Stout[3)] in 1949 and he reviewed a single large tumor in the subcutaneous tissues overlying the elbow region of a 7-year-old female Collie[3)].

CHPs are usually solitary, multilobulated, and fairly well circumscribed

masses with a firm or slightly fatty consistency[1,4]. The primary site of CHP is the skin and subcutaneous tissue[4]. This tumor is local-ly infiltrative and occasionally recurs but rarely meta-stasizes[5,6]. It is characterized microsco-pically by spindle-shaped cells containing cytoplasmic processes arranged in whorls around blood vessels with a 'fingerprint' pattern formed by neo-plastic cells[6,7]. In tumors lacking this pattern, it is difficult to make a differential diagnosis with other tumors such as schwannomas, fibrosarcomas, cutaneous fibrous histio-cytomas and leiomyosarcomas by he-matoxylin and eosin (HE) staining[5,6,8].

Therefore, immunohistochemical studies using markers have been used for the differential diagnosis among these tumors[6,8]. We reported here the histo-pathological, immunohistochemical and ultra-structural features of a case of heman-giopericytoma involving the abdominal subcutis of a Golden Retriever.

Case report

A 7-year-old intact female Golden Ret-riever was presented to a local animal hospital for evaluation. The various sized and ulcerated subcutaneous masses were found on the abdomen around mammary glands. Large irregular multilobulated masses had been surgically removed from the similar location for three times before being referred to our lab. The dog was anorectic and depressed. The regenerative anemia and hypoalbuminemia were revealed by the complete blood count (CBC) and serum chemistry. The physical and radiologic examination did not reveal the evidence of pulmonary metastasis or other tissue involvement around the mass.

Grossly, two of the masses had rup-tured out of the abdominal skin. As like Fig 1, one was 17.0 × 15.0 × 15.0 cm and another 10.0 × 10.0 × 8.0 cm in size. The size of unruptured masses were approximately 5.0 × 5.0 × 4.0 ㎝. There were lots of small sized masses throughout the abdominal subcutaneous area. Various degree of hemorrhage and necrosis was observed in the cut surface of those masses .

Masses removed surgically, were fixed in 10% neutral buffered formalin, routi-nely processed, embedded in paraffin, and then sectioned at 4 ㎛ for routine histologic examination. All sections were stained with HE. Serial sections from the neoplasm were examined immunohisto-chemically using the streptavidin-biotin immunoperoxidase method and following antisera: monoclonal mouse anti-human smooth muscle actin (SMA; Dako, 1:100), monoclonal mouse anti-vimentin (Dako, 1:100), monoclonal mouse anti-human cytokeratin (CK; Dako, 1:100), mo-noclonal mouse anti-human desmin (Dako, 1:100), polyclonal rabbit anti S-100 (Dako, 1:400), polyclonal rabbit anti-human von Willebrand factor (vWF; Dako, 1: 400), and polyclonal rabbit anti-glial fibrillary acidic protein (GFPA; Dako, 1: 50). Immunostaining was performed using a Ventana universal staining system (Benchmark XT, Ventana Medical Systems, Arizona, USA) with DAB map. Histo-pathologically, the inva sive mass was multilobular and com posed of pleo-morphic fusiform spindle-shaped cells

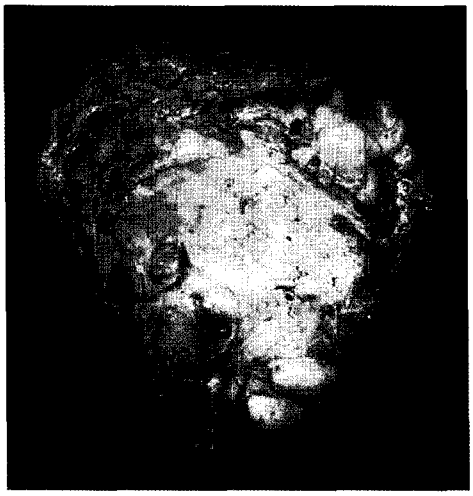

Fig 1. Canine subcutaneous mass. Note the multilobulated large irregular mass sized 17.0 × 15.0 × 15.0 ㎝

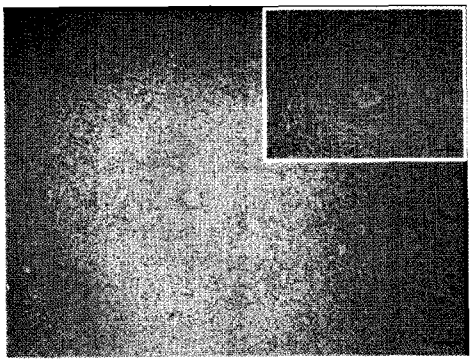

Fig 2. Canine hemangiopericytoma. Perivascular whorled pattern. Note the spindle-shaped tumor cells arranged in a concentric manner around a central lumen of a vessel. HE. Bar= 200 ㎛. *Insert* : Higher magnification of the perivascular whorled pattern. Bar= 100 ㎛

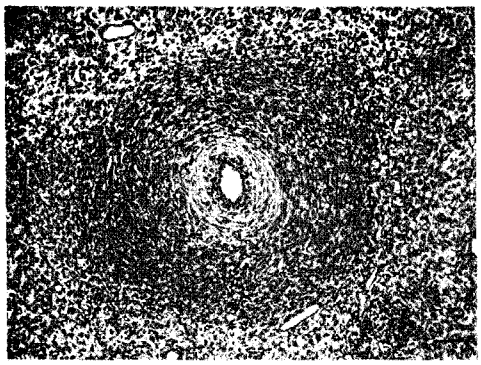

Fig 3. Canine hemangiopericytoma. Note the strong diffuse reactivity of tumor cells for vimentin. Streptavidin-biotin immunoperoxidase method. Bar= 100 ㎛

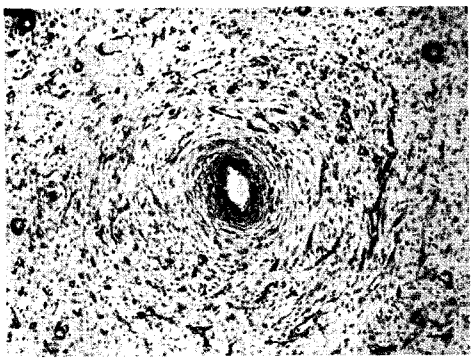

Fig 4. Canine hemangiopericytoma. Note the immunoreactivity for smooth muscle actin in tumor cells arranged in a fingerprint pattern. Streptavidin-biotin immunoperoxidase method. Bar= 100 ㎛

arranged in whorls around capillaries with a 'fingerprint' pattern (Fig 2).

The nuclei were round to oval with a single prominent nucleolus. The mitotic figures were frequently observed. The large areas of necrosis, hemorrhage, vascular thrombi, and proliferation of connective tissue were observed. Aggregates of lymphocytes scattered within some tumors were usually most prominent along the periphery. Immunohistochemically, the tumor cells showed strong cytoplasmic positivity for vimentin (Fig 3). Occasionally, the neoplastic cells around whorled patterns were focal cytoplasmic positive for SMA (Fig 4). Whereas, CK, desmin, vWF, GFAP, and S-100 were immunoreactively negative (data not shown).

For electron microscopy, small pieces of mass were fixed in 2% glutaraldehyde in 0.1M phosphate buffer (pH 7.4),

transferred to 1% osmium tetroxide in the same buffer, and then embedded in epoxy resin (Ted pella, Inc, CA, USA). Ultra-thin sections of selected areas were double-stained with uranyl acetate and lead citrate and then observed under an electron microscope (Hitachi H-7100FA, Tokyo, Japan). The neoplastic cells arranged around a central endothelium-lined capillary (Fig 5), had processes attached by desmosome-like structures, swollen mitochondria and dilated rough endoplasmic reticulum (Fig 6).

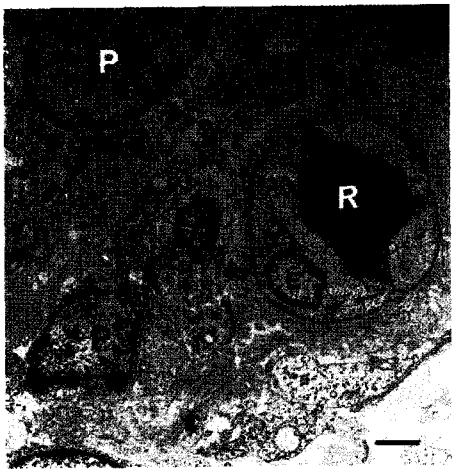

Fig 5. Canine hemangiopericytoma. Note the pericytes (P) surrounded endothelial cell-lined capillary (E) with red blood cell (R). Bar = 2 ㎛

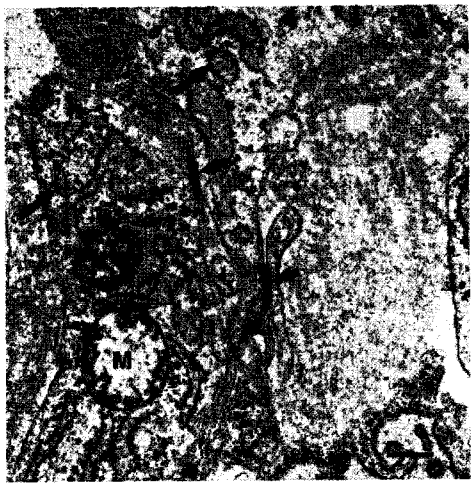

Fig 6. Canine hemangiopericytoma. Note the pericyte processes attached by desmosome-like structures (short arrows), swollen mitochondria (M) and dilated rough endoplasmic reticulum (long arrows). Bar = 500 ㎚

Discussion

Although the name of hemangiopericytoma (HP) suggested pericyte origin, the actual histogenesis is still uncertain because the tumor cell originated from the pericytes has not been definitively confirmed[1,8,10].

Human HPs have also been found in noncutaneous locations, whereas in dogs it is exclusively considered a tumor of skin and subcutaneous tissue[6].

Canine hemangiopericytomas (CHPs) were usually solitary, multilobulated, and infiltrative cutaneous tumors that were often found in the hindlimb and appeared as a well circumscribed round nodule[1,10]. Mazzei et al[6] also reported that most primary tumors were located on the limbs (67.8%) and over the trunk (16.1 %). Whereas CHPs in head, orbit, oral cavity and pelvic cavity were rare to develop[11].

The tumors frequently recurred following excision owing to difficulty in identifying tumor margins and inability to perform wide surgical excision because of anatomic constraints. To prevent recurrence, in human surgery, a wide excision without rupture of the capsule, if present, or excisional margins free of neoplastic cells, is considered essential[2]. In the present case, the surgical procedure was performed after the masses had been ruptured. Therefore it may be considered

that this case could recur repeatedly.

The present case matched with the previous studies in which CHP predisposed in older and large-breed femal dogs. Mills and Nielsen[12] reviewed 200 cases of CHP and noted that the age range of affected dogs was from 6 to 14 years. The large breed dogs including Boxer, German Shepherd, and Cocker and Springer Spaniel were in general at greater risk[4,12]. A 2:1 female to male predominance was observed[4].

Histologically, the hallmark of CHP is the presence of perivascular whorls of the fusiform cells. Although this feature may be present in other sarcomas, it is known to be usually dominant in HPs. Recently, Mazzei et al[6] analyzed the histological spectrum and determined the reactivity for various immunohistochemical markers of CHP. They confirmed that the perivascular whorled pattern observed was the most prevalent histotype, followed by the storiform pattern, whereas the epithelioid pattern seemed to be rare and associated with a poor prognosis[6]. The present case showed the perivascular whorled pattern observed from layers of the spindle to plump fusiform cells arranged in a concentric fashion around the central lumen. It has been suggested that the cellular pleomorphism and mitotic activity of this tumor was uaually low in primary tumors, but those histologic features could be increased with each recurrence[4,9]. It is considered that the moderate pleomorphism and the frequent mitotic activity were observed in this case because it was the recurrent case.

If the tumors lack of histologic patterns above, it is difficult to make a differential diagnosis with other vascular neoplasms or mesenchymal tumors by HE staining[5,6,8]. Hence, the diagnosis of HP should be made if extensive immunohistochemistry has ruled out another cell of origin[4]. Immunohistochemical staining for vimentin, desmin, CK, lysozyme, vWF, S-100 and GFAP was used to characterize the immunophenotype of canine spindle cell tumors[8]. Perez et al[8] suggested that the muscle actin, desmin, vimentin and lysozyme could be useful for the differential diagnosis of these tumors. In the present case, neoplastic cells were positive for SMA and vimentin, but negative for CK, desmin, S-100, vWF, and GFAP. This results were similar to the findings by other workers in CHP[6,8,11].

Histologically and behaviorally, HPs might be difficult to be differentiated from the peripheral nerve sheath tumors (PNSTs, schwannomas)[4,10]. In contrast to HPs, the whorls in PNSTs were less prominent, and most whorls encircle sclerotic collagen rather than capillaries[9]. Moreover, the neural tumors expressed the S-100 and GFAP, whereas the other more common cutaneous tumors did not[2,4,10].

On the base of the histological, immunohistochemical and ultrastructual results, this primary neoplasm was diagnosed as a CHP in the abdominal subcutis.

References

1. Hendrick MJ, Mahaffey EA, Moore FM, et al. 1998. *Histological classification of mesenchymal tumors of skin*

and soft tissues of domestic animals. Second series, vol 2. Armed Forces Institute of Pathology, American registry of pathology, Washington, D.C : 32.
2. Serena A, Joiner KS, Schumacher J. 2006. Hemangiopericytoma in the eyelid of a horse. *Vet Pathol* 43: 576-578.
3. Stout AP. 1949. Hemangiopericytoma; a study of 25 new cases. *Cancer* 2: 1027-1054.
4. Gross TL, Ihrke PJ, Walder EJ, et al. 2005. Skin diseases of the dog and cat, clinical and histopathologic diagnosis. 2 Eds. Blackwell Publishing: 762-765.
5. Richardson RC, Render JA, Rudd RG, et al. 1983. Metastatic canine hemangiopericytoma. *JAVMA* 182: 705-706.
6. Mazzei M, Millanta F, Citi S, et al. 2002. Haemangiopericytoma: histological spectrum, immunohistochemical characterization and prognosis. *Vet Dermatol* 13: 15-21.
7. Graves GM, Bjorling DE, Mahaffey E. 1988. Canine hemangiopericytoma: 23 cases (1967-1984). *JAVMA* 192: 99-102.
8. Perez J, Bautista MJ, Rollon E, et al. 1996. Immunohistochemical characterization of hemangiopericytomas and other spindle cell tumors in dog. *Vet Pathol* 33: 391-397.
9. Goldschmidt MH, Hendrick MJ. 2002. *Tumors of the skin and soft tissues.* In: Meuten DJ. Tumors in domestic animals. 4th ed. Iowa State University Press: 94-95.
10. Ginn PE, Mansell JEKL, Rakich PM. 2007. *Skin and appendages.* In: Maxie MG. Pathology of domestic animals. 5th ed. Saunders Elsevier: 762-763.
11. Cho HS, Park NY. 2006. Primary haemangiopericytoma in the pelvic cavity of a dog. *J Vet Med A* 53: 198-201.
12. Mills JHL, Nielsen SW. 1967. Canine hemangiopericytomas. A survey of 200 tumors. *J Small Anim Pract* 8: 599-604.