

Aortic Body Cell Tumor with Kidney Metastasis in a Dog^[1]

Mehmet Önder KARAYİĞİT¹ ✍️ Öznur ASLAN² Latife ÇAKIR BAYRAM¹
Duygu YAMAN¹ Ayhan DÜZLER³ İlknur KARACA BEKDİK² Görkem EKEBAŞ¹

^[1] Presented at VII. Veterinary Pathology Congress 08th-10th September 2014, Kars - TURKEY

¹ University of Erziyes, Faculty of Veterinary Medicine, Department of Pathology, TR-38039 Melikgazi, Kayseri - TURKEY

² University of Erziyes, Faculty of Veterinary Medicine, Department of Internal Medicine, TR-38039 Melikgazi, Kayseri - TURKEY

³ University of Erziyes, Faculty of Veterinary Medicine, Department of Anatomy, TR-38039 Melikgazi, Kayseri - TURKEY

KVFD-2015-13506 Received: 02.04.2015 Accepted: 02.06.2015 Published Online: 03.06.2015

Abstract

In this case, a male Terrier dog, 14-year-old evaluated with a history of cardiac arrhythmias, coughing, rhinorrhagia and exercise intolerance for six months. The dog was died upon worsening of clinical signs. At necropsy, two masses of various sizes were observed in the heart-base region. Microscopically, cells from masses were atypic and polyhedral with eosinophilic-granular cytoplasm and basophilic nucleus with round to oval shape. The neoplastic cells were divided into lobules by connective tissue forming nests. In addition to these findings, metastasis to the left kidney was observed. Immunohistochemically, the tumor cells from both primary and metastatic tissues showed immunoreactivity to monoclonal mouse anti-neuron specific enolase antibody but were negative for cytokeratin, vimentin, chromogranin A, a smooth muscle actin and S-100. Based on the clinical, histological and immunohistochemical findings, malignant aortic body tumor with left kidney metastasis was diagnosed in the present case.

Keywords: Aortic body tumor, Dog, Immunohistochemistry

Bir Köpekte Böbrek Metastazlı Aortik Body Hücre Tümörü

Özet

Bu olguda 6 aydır devam eden egzersiz intoleransı, öksürük, burun akıntısı ve kardiyak aritmi şikayeti olan ve klinik bulguların kötüye gitmesi sonucunda ölen 14 yaşında erkek terrier ırkı köpek değerlendirildi. Nekropside kalp bölgesinde iki kitleye rastlandı. Mikroskopik olarak bakıldığında kitlelerden alınan kesitlerdeki hücrelerin atipi gösterdiği ve ovalden yuvarlağa kadar değişen bazofil çekirdekli, eozinofilik-granüler sitoplazmalı ve polyhedral şekilli olduğu tespit edildi. Tümör hücrelerin etrafı sıkı bağdokuyula çevrilmişti. Bu bulgulara ilaveten sol böbrekte tümör metastazına rastlandı. İmmunohistokimyasal olarak hem primer tümör kitlesi hem de metastazlı böbrekteki neoplastik hücreler monoklonal fare anti-neuron spesifik enolaz antikoruna ile pozitif reaksiyon verirken, sitokeratin, vimentin, kromogranin A, α düz kas aktin ve S-100 antikorları ile yapılan boyamalar negatifti. Sunulan bu vaka klinik, histopatolojik ve immunohistokimyasal sonuçları ile malign aortik body tümör olarak teşhis edildi.

Anahtar sözcükler: Aortik body tümör, Köpek, İmmunohistokimya

INTRODUCTION

Chemodectoma is a tumor arising from chemoreceptor cells which regulate level of blood pH, carbon dioxide and oxygen. Chemodectoma represents both aortic body tumors and carotid body tumors^[1]. An aortic body tumor is localized in the tunica adventitia of the aortic arch whereas a carotid body tumor is arised in the carotid artery. The tumors in dogs are mostly benign but rarely malign and metastases to spleen, liver, bone, lung and myocardium^[2-5]. Immunohistochemically, aortic body tumor cells usually

stain for anti-neuron specific enolase (NSE), chromogranin A and S-100^[6-11] antibodies. To the best of our knowledge, a case of metastatic-aortic body has not been reported in veterinary literature in Turkey. The aim of this case is to evaluate diagnostic implications for this important neoplastic condition in dogs.

CASE HISTORY

A male Terrier dog, 14-year-old, was submitted with a history cardiac arrhythmias, coughing, rhinorrhagia and



İletişim (Correspondence)



+90 505 8180295



karayigit09@hotmail.com

exercise intolerance to University of Erciyes, Faculty of Veterinary Medicine. The dog died two weeks later. Systemic necropsy was performed. Macroscopically two neoplastic masses were observed on the heart-base region. The first one was found between pulmonary artery and aorta (20x38x32 cm diameter) (Fig. 1). The second one was located upper the first one (40x35x34 cm diameter) (Fig. 1). The walls of truncus pulmonalis, arteria subclavia sinistra and truncus brachiocephalicus which are branches of aorta were thinner by press of tumoral mass. Out of this findings, no gross lesion and metastasis was seen other organs.

The sections were fixed in neutral-buffered formalin and processed routinely. All sections were stained with Haematoxylin-Eosin and stained immunohistochemically for cytokeratin, vimentin, chromogranin A, α smooth muscle actin, S-100 and NSE antibodies. Streptavidin-biotin peroxidase (SABP) complex method with a commercial kit (Invitrogen, USA) was used for immunohistochemistry and reaction was visualized by aminoethylcarbazole chromogen (AEC, Invitrogen, USA) (Table 1). Microscopically, neoplastic cells were polyhedral with eosinophilic-granular cytoplasm and basophilic nucleus with round to oval shape (Fig. 2) and were divided into lobules by connective tissue forming nests. The cytoplasm of some tumor cells contained vacuoles and the cytoplasmic boundaries were usually indistinct but occasionally distinct. Nuclear atypia was marked, and mitotic figures were common. By careful examination of sections of other organs, it was seen metastasis in the cortex of left kidney and cells of metastatic tumor tissue were similar to primary tumor cells

(Fig. 2). The tumor cells from both primary and metastatic tissues showed immunoreactivity for NSE antibody but negative for cytokeratin, vimentin, chromogranin A, α smooth muscle actin and S-100. Immunostaining for NSE antibody was diffusely cytoplasmic of the neoplastic cells within in the tumor mass.

DISCUSSION

The malignant aortic body tumor is known to prefer local invasion of the pericardium, myocardium and walls of great vessels at the base of the heart. Metastasis is infrequent and it usually spreads to lung, liver and lymph nodes [3-5]. In this case metastasis were seen in left kidney. These tumors in animals are regarded as non functional and space- occupying lesions. Therefore, tumor may lead to cardiac functional disturbance. In the present case, exercise intolerance and limping in left leg were important symptoms. This condition may occur due to the stenosis of arteria subclavia sinistra which is supplying left leg. Additionally, the construction of truncus brachiocephalicus may lead to cough. This clinical findings were not suggestive of neoplastic formation, but may relates to the neoplastic growth that leads to decreased blood flow. Aortic body tumors have been reported various brachycephalic dog breeds with sex predisposition and tumor usually seen male and 8 years-old-age or older dog [4,12]. Some brachycephalic breeds such as boxer, boston terrier and bulldog are most often affected [4,12]. Because of stenotic nares, long soft palate and distortion of pharyngeal soft tissues in

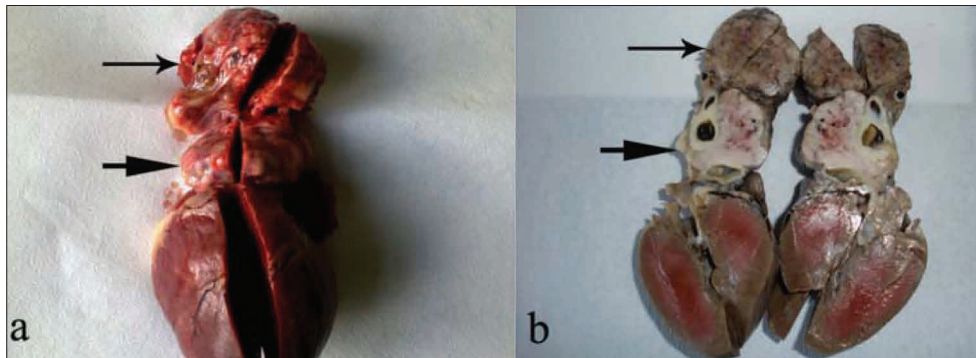


Fig 1. a- The first mass (thick arrow) and the second mass (thin arrow), **b-** The first mass that was well-circumscribed, white-grayish in colour (thick arrow), the second mass that was reddish in colour (thin arrow)

Şekil 1. a- Birinci kitle (kalın ok) ve ikinci kitle (ince ok), **b-** Beyaz-gri renkli sınırlı ilk kitle (kalın ok), kırmızımsı renkte ikinci kitle (ince ok)

Table 1. Commercial name and dilution rate of the antibody

Tablo 1. Antikorların ticari ismi ve sulandırma oranları

Specificity	Company that Antibody Purchased	Dilution and Incubation	Positivity
Vimentin (MS-129-P0)	Thermo	1/100-1 hour	-
Cytokeratin (SC81714)	Santa Cruz	1/100-1 hour	-
S-100 (PA5-16586)	Thermo	1/50-Over night	-
ChromograninA (PA1-37445)	Thermo	1/200-1 hour	-
Neuron spesific enolase (LS-C43890-1000)	Thermo	1/100-1 hour	+
α -smooth-muscle actin (MS-113-P0)	Thermo	1/200-1 hour	-

Only NSE antibody positivity was detected in primer and metastatic tumoral cells

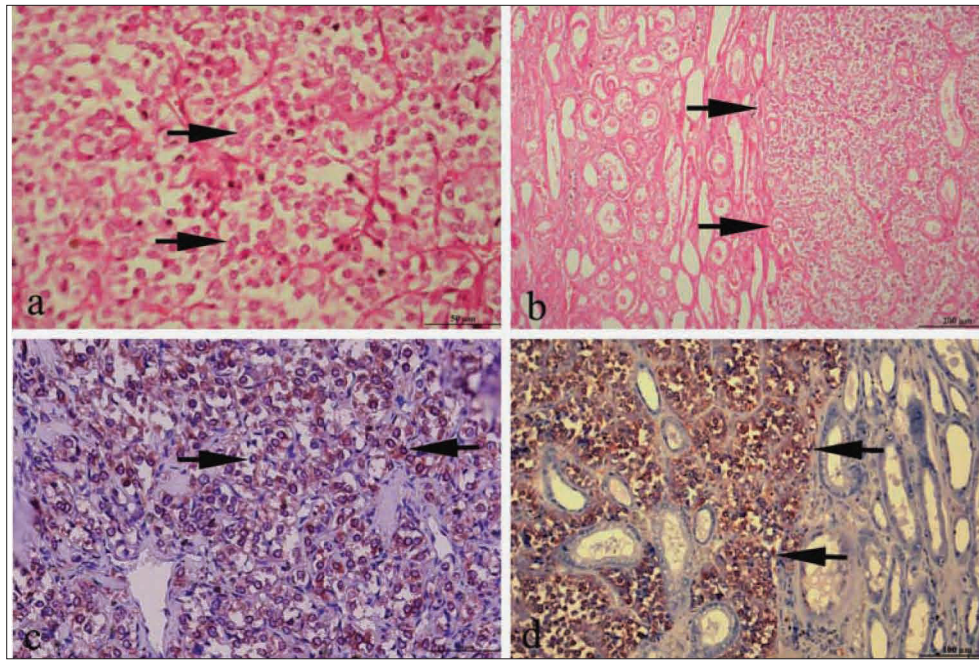


Fig 2. a- Polyhedral with eosinophilic-granular cytoplasm tumoral cells (arrows), HE, x50 μ , b- Metastatic tumor cells in the cortex of kidney (arrows), HE, x200 μ , c- Immunolabelling for NSE in the primer tumoral cells (arrows), SABP-AEC, x100 μ , d- Immunolabelling for NSE in the metastatic tumoral cells (arrows), SABP-AEC x100 μ

Şekil 2. a- Poliheral ve eozinofilik-granüler sitoplazmalı tümör hücreleri (oklar), HE, x50 μ , b- Böbrek korteksinde metastatik tümör hücreler (oklar), HE, x200 μ , c- NSE immun-pozitif primer tümör hücreleri (oklar), SABP-AEC. x100 μ , d- NSE immun-pozitif metastatik tümör hücreleri (oklar), SABP-AEC, x100 μ

brachycephalic dog breeds may be seen chronic hypoxia and this condition possibility causes hyperplasia and afterwards, tumors of aortic body cells [13]. In the present case, 14-year-old male dog was a terrier, which was not a brachycephalic breed but morphologic, anatomic and histologic findings of this case consistent with previous descriptions of diagnosed aortic body cell tumors [8,9]. In this study, immunohistochemically, NSE, chromogranin A and S-100 antibodies were applied for aortic body tumor. On the other hand, cytokeratin, vimentin, α smooth muscle actin antibodies were used selectively to eliminate tumors which may be originated from mesenchymal, epithelial and other nervous system tumors. Both primer tumoral cells and metastatic cells were strongly positive for NSE but negative for S 100, chromogranin A, cytokeratin, vimentin and α smooth muscle actin. But previously some studies was reported that aortic body tumoral cells were commonly positive for NSE, chromogranin A and S-100 antibodies [7-9]. The variability in negative staining for chromogranin A and S-100 may be related to grade of the neoplasia [14]. Previous studies also indicated that neuropeptides rate decreased in high grade tumors and chromogranin A and S-100 antibodies were positive staining in benign tumors while negative in high grade tumors [6,10,14]. In the present case, malignancy of tumor was high grade because of metastasis, high mitotic figure rate and pleomorphism. The findings of our study are consistent with conclusions of the previous reports. In this case, as a result of tumor localization with histopathological and

immunohistochemical findings led us to diagnose aortic body tumor.

REFERENCES

1. Hayes HM, Sass B: Chemoreceptor neoplasia: A study of the epidemiological features of 357 canine cases. *J Vet Med A*, 35, 401-408, 1998. DOI: 10.1111/j.1439-0442.1988.tb00052.x
2. Cho KO, Park NY, Park IC, Kang BK, Onuma M: Metastatic intracavitary cardiac aortic body tumor in a dog. *J Vet Med Sci*, 60, 1251-1253, 1998. DOI: 10.1292/jvms.60.1251
3. Gliatto JM, Crawford MA, Snider TG, Pechman R: Multiple organ metastasis of an aortic body tumor in a Boxer. *J Am Vet Med Assoc*, 191 (9): 1110-1112, 1987.
4. Jubb KV, Kennedy PC: Tumors of the nonchromaffin paraganglia in dogs. *Cancer*, 10, 89-99, 1957. DOI: 10.1002/1097-0142(195701/02)10:1<89::AID-CNCR2820100112>3.0.CO;2-K
5. Montgomery DL, Bendeler, Storts RW: Malignant aortic body tumor with metastasis to bone in a dog. *Vet Pathol*, 17 (2): 241-244, 1980.
6. Aresu L, Tursi M, Iussich S, Guarda F, Valenza F: Use of S-100 and chromogranin A antibodies as immunohistochemical markers on detection of malignancy in aortic body tumors in dog. *J Vet Med Sci*, 68, 1229-1233, 2006. DOI: 10.1292/jvms.68.1229
7. Brown PJ, Rema A, Gartner F: Immunohistochemical characteristics of canine aortic and carotid body tumors. *J Vet Med Sci*, 50, 140-144, 2003. DOI: 10.1046/j.1439-0442.2003.00498.x
8. Cooley AJ, Fox LE, Duncan ID, England DM: Malignant jugulotympanic paraganglioma in a dog. *J Comp Pathol*, 102, 375-383, 1990. DOI: 10.1016/S0021-9975(08)80159-4
9. Davis WP, Watson GL, Koehler LK, Brown CA: Malignant cauda equina paraganglioma in a cat. *Vet Pathol*, 34, 243-246, 1997. DOI: 10.1177/030098589703400313

-
- 10. Noszczyk-Nowak A, Nowak M, Paslawska U, Atamaniuk W, Nicpon J:** Cases with manifestation of chemodectoma diagnosed in dogs in Department of Internal Diseases with Horses, Dogs and Cats Clinic, Veterinary Medicine Faculty, University of Environmental and Life Sciences, Wrocław, Poland. *Acta Vet Scand*, 52, 35, 2010. DOI: 10.1186/1751-0147-52-35
- 11. Yamamoto S, Fukushima R, Hirakawa A, Abe M, Kobayashi M, Machida N:** Histopathological and immunohistochemical evaluation of malignant potential in canine aortic body tumors. *J Comp Pathol*, 149, 182-191, 2013. DOI: 10.1016/j.jcpa.2012.12.007
- 12. Saldana MJ, Salem LE, Travezan R:** High altitude hypoxia and chemodectomas. *Hum Pathol*, 4, 251-263, 1973. DOI: 10.1016/S0046-8177(73)80012-7
- 13. Yates WD, Lester SJ, Mills H:** Chemoreceptor tumors diagnosed at Western College of Veterinary Medicine 1967-1979. *Can Vet J*, 21 (4): 124-129, 1980.
- 14. Linnoila RI, Lack EE, Steinberg SM, Keiser HR:** Decreased expression of neuropeptides in malignant paragangliomas: An immunohistochemical study. *Hum Pathol*, 19, 41-50, 1998. DOI: 10.1016/S0046-8177(88)80314-9