



## Multiple Metastases of Observed Osteosarcoma Case in A Belgian Malinois Race Female Dog

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Received: 09.04.2019

Accepted: 18.10.2019

### ABSTRACT

In this study, we aimed to evaluate histopathologically the case of osteosarcoma detected in an Belgian Malinois race dog. The material of the study consisted of a 8.5-year-old Belgian Malinois race female dog weighing 30 kg. With the complaints of abdominal distention, difficulty in breathing, loss of appetite, fatigue, the dog brought to the Veterinary Faculty of Kafkas University Animal Hospital died on the way and was sent to the Department of Pathology for necropsy. In the follow-up, some of the tissue samples taken from the systemic necropsy animal were determined in the decalcified solution and another part in the buffered formaldehyde solution. Following routine procedures, 5 µm thick sections were taken from the prepared paraffin blocks for Hematoxylin Eosin staining. To determine the histopathological changes, the sections were examined by light microscope. In the light of the histopathological findings, osteosarcoma was diagnosed in the brain and lung metastatic foci.

**Keywords:** *Histopathology, Dog, Metastasis, Osteosarcoma*

### öz

## Belçika Malinois Irkı Dişi Bir Köpekte Gözlenen Osteosarkom Vakasına Ait Çoklu Metastazlar

Bu çalışmamızda, Belçika Malinois ırkı bir köpekte saptanan osteosarkom vakasının histopatolojik açıdan değerlendirilmesi amaçlanmıştır. Çalışmanın materyalini 8.5 yaşında 30 kg ağırlığında Belçika Malinois ırkı dişi bir köpek oluşturdu. Abdominal şişkinlik, solunum güçlüğü, iştahsızlık, halsizlik şikâyetleri ile Kafkas Üniversitesi Veteriner Fakültesi Hayvan hastanesine getirilen köpek yolda ölmüş ve nekropsisi yapılmak üzere Patoloji Anabilim Dalına gönderilmiştir. Takibinde sistemik nekropsisi gerçekleştirilen hayvandan alınan doku örneklerinin bir kısmı dekalsifiye solüsyonunda diğer bir kısmı ise tamponlu formaldehit solüsyonunda tespit edildi. Rutin işlemlerin ardından hazırlanan parafin bloklardan, Hematoksilen Eozin boyaması için 5 µm kalınlığında kesitler alındı. Histopatolojik değişikliklerin belirlenmesi amacıyla kesitler ışık mikroskopunda incelendi. Elde edilen histopatolojik bulgular ışığında beyin ve akciğerdeki metastatik odaklara osteosarkom tanısı konuldu.

**Anahtar Kelimeler:** *Histopatoloji, Köpek, Metastaz, Osteosarkom*

### INTRODUCTION

Osteosarcoma is the most common primary bone tumor in dogs (Wehrle-Martinez et al. 2016). It constitutes 85% of skeletal malignancies and 4% of all malignancies in dogs (Wolfesberger et al. 2006; Milanta et al. 2012). This tumor with mesenchymal origin has very aggressive effects locally; It causes lysis or bone production; or causes both of these (McNeill et al. 2007; Petty et al. 2008). Metastasis is very common, continues usually subclinically and occurs early in tumor formation (Ohta et al. 2004; Fan et al. 2008; Shoeneman et al. 2012). Even osteosarcomas originating from long bones can metastasize to the lung even in the early period when the diagnosis of primary tumor cannot

be established (Sagartz et al. 1996). Lung metastasis occurs by hematogenous route and has been seen in 90% of all cases (Fieten et al. 2009; Piskun et al. 2011). Most of the dogs die due to lung metastasis (Gebhard et al. 2016). The prognosis of osteosarcoma is very poor, the recurrence rate is quite high; and less than 20% of the affected dogs do not live for more than 2 years (Wilson et al. 2008; Leonardo et al. 2018; Withers et al. 2019). Osteosarcoma is frequently observed in middle or old, male and large race dogs (Kirpensteijn et al. 2002; Hoenerhoff et al. 2004; Mullins et al. 2004; Selvarajah et al. 2012). Osteosarcomas are seen in high rate in races such as especially Doberman Pinscher, Golden Retriever, Great Dane, German Shepherd, St Bernard, Irish Setter, Boxer,

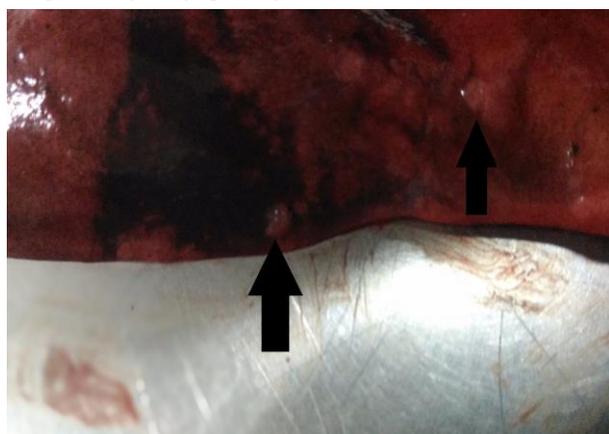
Rottweiler and Greyhound (McNeill et al. 2007; Cristo et al. 2017). 20-25% of skeletal osteosarcomas in dogs are caused by axial skeletal bones. Approximately 50% of these cases have axial skeletal osteosarcoma in head and in the other 50%; ribs, vertebrae and pelvis. Osteosarcoma observed in the head region is a rare tumor that is localized in the mandibula maxilla, skull and paranasal sinuses in dogs. The appendix skeleton is affected 3 to 4 times more than the axial skeleton (Nagamine et al. 2015; Murphy et al. 2017). Osteosarcoma is usually occurs in the metaphyseal region of the long bones (Sanches et al. 2009). The proximal humerus, distal radius, distal femur, proximal and distal tibia are the most common sites of appendicular osteosarcoma (Hoenerhoff et al. 2004). Amputation and chemotherapy are the best treatment options; untreated lesions; It has a tendency to progress rapidly and causes lameness and pathological fractures (Farese et al. 2004).

In this study, we aimed to evaluate histopathologically the case of osteosarcoma detected in a Belgian Malinois race dog.

### CASE HISTORY

The material of the study consisted of an 8.5-year-old Belgian Malinois race female dog weighing 30 kg. With the complaints of abdominal distension, difficulty in breathing, loss of appetite and fatigue, the dog who was brought to the Veterinary Faculty Animal Hospital of Kafkas University died on the way and was sent to the Department of Pathology for necropsy.

In the follow-up, some of the tissue samples taken from the systemic necropsy animal were determined in decalcified solution and another part was detected in buffered formaldehyde solution. Following the routine procedures, 5 µm thick sections were taken from the paraffin blocks prepared for Hematoxylin&Eosin staining. To determine the histopathological changes, the sections were examined by light microscope. At the lower left part of the mandible, a mass of 4\*4\*3 cm fluctuated content was found. It was observed that the torsion around the long axis of the stomach was excessive and tympanic. Growing up in the spleen was seen. The examination of the intestine revealed that jejunum was hyperemic. The lungs were hyperemic and hard structures with a size of 1-3 mm were found in the parenchyma (Figure 1).



**Figure 1.** Lung tissue, hard structures with a size of 1-3 mm in the parenchyma (arrows)

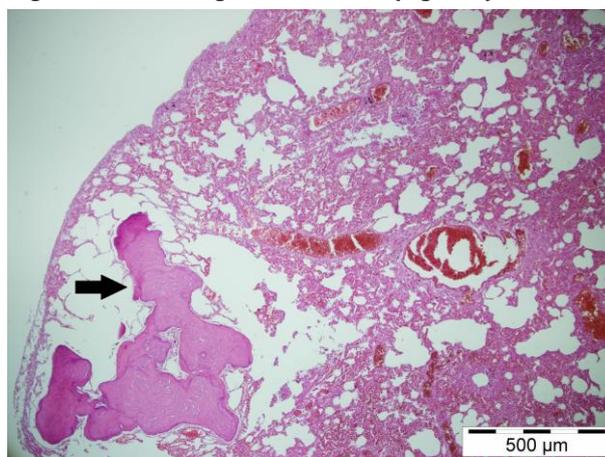
The presence of white foci in the meninges was observed (Figure 2). The liver was mildly icteric. No other macroscopic findings were observed in the other organs and they showed normal anatomical structure. Although

the lung and brain metastasis sites were observed, primary tumor focus (anterior and posterior extremities, ribs and skull bones) could not be detected despite the detailed examinations.



**Figure 2.** Brain tissue, white foci in meninges (arrows)

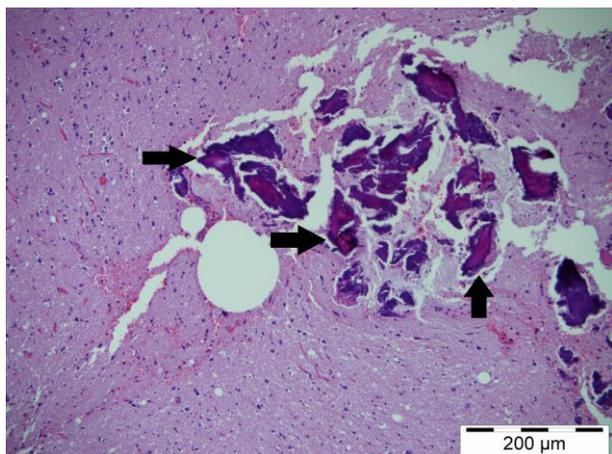
Histopathological examination of tissue samples taken; degeneration of neurons, gliosis and osteosarcoma metastasis areas were observed in the brain. Dilatation of the sinusoids, dissociation in the remark cords, bilirubin pigment were common in hepatocytes. Hyperemia, atelectatic areas, spillage in bronchial and bronchiolar epithelium and anthracosis were observed in the lungs. Osteosarcoma metastasis sites were detected in the regions near the lung serosal surface (Figure 3).



**Figure 3.** Lung tissue, metastatic area (arrow), 500 µm , H&E

Purple-pink metastatic areas were found in the brain, similar to the foci in the lungs (Figure 4-5). Haemorrhagic areas of the spleen were found. Severe hyperemia in the jejunum, spillage in the mucosa epithelium and mononuclear cell infiltration in the lamina propria were determined.

Connective tissue increase in renal interstitium; hyaline cylinders in tubules; atrophy in glomeruli; edema fluid in the bowman capsule, andd chronic nonpurulent nephritis was detected. In the upper 1/3 of the lamina propria in the stomach lamina epithelials, necrosis was lost in severe hyperemia, mucosa and gland epithelium. It was determined that the mass taken under the mandible was cystic dilatation covered by a very folded epithelium. No histopathological findings were observed in the other organs and normal histological structure was observed.



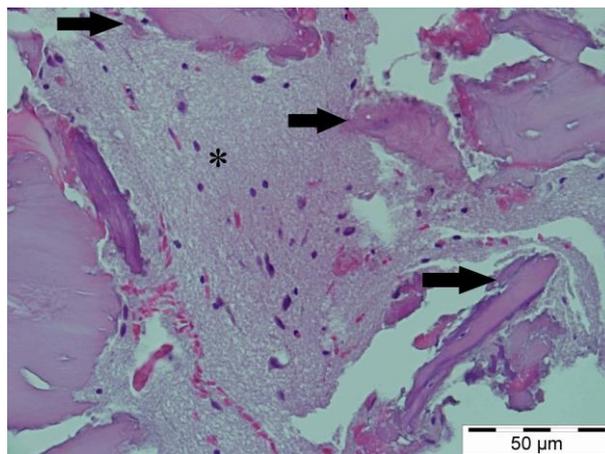
**Figure 4.** Brain tissue (not decalcified), metastatic foci (arrows), 200  $\mu$ m, H&E

## DISCUSSION and CONCLUSION

Osteosarcoma is often observed in males and large race dogs (Kirpensteijn et al. 2002; Hoenerhoff et al. 2004; Mullins et al. 2004; Selvarajah et al. 2012). The average age of the tumor is 7-8 years. Osteosarcomas in races such as Doberman, Pinscher, Golden Retriever, Great Dane, German Shepherd, St. Bernard, Irish Setter, Boxer, Rottweiler and Greyhounds are highly prevalent (McNeill et al. 2007; Cristo et al. 2017). There are only 5 studies in the Belgian Malinois in the diagnosis of osteosarcoma (Peterson et al. 2000; Selvarajah et al. 2009; Sivacolundhu et al. 2013, Moore et al. 2000, Pagano et al. 2016). In this study, we observed that a female dog of males having a males age of 8.5 years old with a weight of 30 kg was observed. The gender of the dog is different from the literature data indicating that this tumor is usually in male dogs. In this study, we observed that the osteosarcoma was detected in an 8.5-year-old-age Belgium Malinois race female dog weighing 30 kg; Although the age range and race data are consistent with the literature, being female of the dog is different from the literature data indicating that this tumor is usually in male dogs.

Osteosarcoma usually occurs in the metaphyseal region of the long bones (Sanches et al. 2009). The proximal humerus, distal radius, distal femur, proximal and distal tibia are the most common sites of appendicular osteosarcoma (Hoenerhoff et al. 2004). Cases originating from long bones in dogs usually cause lung, regional lymph nodes, liver and kidney organs (Kutsal et al. 2003; Murphy et al. 2017; Thompson and Dittmer 2017). It has rarely been reported to metastasize to the central nervous system, especially to the brain tissue (McNeill et al. 2007; Pazzi et al. 2013; Cristo et al. 2017). In our study, although there were metastases in the lung and brain similar to the literature data; In spite of the detailed examinations, primary tumor focus (anterior and posterior extremities, ribs and skull bones) could not be detected.

Based on the histopathological findings, osteosarcoma was diagnosed in the metastatic foci of the brain and lung tissue. In the literature search, it was observed that there were very few cases of osteosarcoma observed in the Belgian Malinois race. In addition, the material of the study material animal is female and the presence of metastatic foci in the brain, except for the lung tissue, makes the findings even more remarkable. Cerebral metastases of osteosarcoma cases observed in dogs are very rare and there are few literature studies on the subject. In Belgium



**Figure 5.** Brain tissue (decalcified), \* means brain tissue, trabecular structures (arrows), 50  $\mu$ m, H&E

Malinois race dog, it is the first osteosarcoma study in which brain metastases have been shown. It is thought that this case report will make a significant contribution to the literature data.

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