

# Pleural Effusion in a Dog with Mesothelioma

Sinem Ülgen<sup>1</sup>, Utku Bakırel<sup>1</sup>, Kutay Yıldız<sup>1</sup>, Funda Yıldırım<sup>2</sup> and İbrahim Fırat<sup>2</sup>

1. Istanbul University, Faculty of Veterinary Medicine, Dept. of Internal Medicine, Avcılar, Istanbul 34320, Turkey

2. Istanbul University, Faculty of Veterinary Medicine, Dept. of Pathology, Avcılar, Istanbul 34320, Turkey

**Abstract:** In this case; mesothelioma was likely diagnosed in 7 years old male mix breed dog which was brought to Veterinary Research and Teaching Hospital of Istanbul University with complaints of general weakness and severe dyspnea. The dog had been misdiagnosed with faryngitis and hernia diaphragmatica before it was brought to our faculty clinic. Apparent abdominal respiration was inspected and suppressed heart sounds, abnormal respiratory sounds and pleural rub were detected by auscultation of thorax. Radiographic examination and blood analysis were performed. Chest X-ray examination demonstrates both sided pleural effusion. Leukocytosis ( $WBC = 36.2 \times 10^3 \mu L$ ) was detected on blood count. By thoracocentesis, 40 mL fluid was drained and cytologic examination was performed. Numerous pleomorphic, atypical, multinuclear or multinucleolar mesothelial cells were observed and cytologic findings were pretty compatible with mesothelioma. The dog died before medication and the owner of the dog didn't give the confirmation for necropsy. In our clinical case we did not confirm any contact of the dog with asbestos or larger amount of pesticides, which are described as etiological factors of mesothelioma. As mesothelioma is a very rare health condition for dogs, it might be lead up to misdiagnosis.

**Key words:** Mesothelioma, pleuraleffusion, dog, veterinarymedicine.

## 1. Introduction

Mesotheliomas are rare neoplasms that originate from mesothelium, a lining that protects the pericardial, peritoneal and pleural cavities. It was reported that dogs aged 8 years or more predisposed to this disorder [1-3]. The clinical and pathological features of the tumor have been examined with many studies but associated etiologic or epidemiologic factors have not been described. In some studies and case reports, malignant mesotheliomas have been induced in dogs exposed to intratracheal instillation of crocidolite asbestos and cigarette smoke [2, 4]. Although some studies have been revealed that canine mesotheliomas present clinically with peritoneal effusion, most mesotheliomas have seen with pleural or pericardial effusions [5, 6]. The purpose of the present report is to describe a case of pleural mesothelioma in a dog which has not a contact with asbestos, large amount of pesticides and cigarette smoke.

## 2. Case History

Mesothelioma was likely diagnosed in 7 years old male mix breed dog which was brought to Veterinary Research and Teaching Hospital of Istanbul University with complaints of general weakness and severe dyspnea. The dog had been misdiagnosed with faryngitis and hernia diaphragmatica and no treatment has not been applied before it was brought to the faculty clinic.

Apparent abdominal respiration and signs of dyspnea were inspected and suppressed heart sounds, abnormal respiratory sounds and pleural rub were detected by auscultation of thorax. Laterolateral thoracal radiograph was demonstrated the accumulation of both sided pleural effusion (Fig. 1). In complete blood count, leucocytosis was detected (Table 1). Biochemical analysis values were in normal ranges (Table 2).

Ultrasound-guided 40 mL serosanguineous fluid was drained in pleura by thoracocentesis. No finding of pericardial fluid was detected by ultrasound and cytologic

---

**Corresponding author:** Sinem Ülgen, Ph.D., research field: internal medicine. E-mail: sinemulgen@gmail.com.



**Fig. 1** Right sided thoracal X-ray image of the dog.

**Table 1** Complete blood count results of the dog.

Complete Blood Count			
RBC (X 10 <sup>6</sup> $\mu$ l)	5.88	PLT (X 10 <sup>3</sup> $\mu$ L)	593
HGB (g/dl)	13.8	MCV (fL)	72
HCT (%)	42	MCH (pg)	23
WBC (X 10 <sup>3</sup> $\mu$ l)	36.2	MCHC (%)	33

**Table 2** Biochemical blood analysis results of the dog.

Biochemical Analysis			
Glucose (mg/dl)	127	ALT (IU/L)	68
Urea (mg/dl)	20	ALP (IU/L)	73
Creatinin (mg/dl)	0.6	$\gamma$ -GT (IU/L)	5
AST (IU/L)	42	Cholesterol (g/dL)	169
Ca (mg/dl)	10.6	P (mg/dL)	6.0

examination was performed with MayGrünwald-Giemsa staining. In cytologic examination, there were numerous singly or in clusters or rafts large cells which were diagnosed as mesothelial cells. This pleomorphic, hyperchromatic and atypical neoplastic cells had marked cytoplasmic and nuclear vacuolisation, increased nuclear/cytoplasmic ratio and bizarre multinucleated structure. Beside these atypical cells, degenerated and necrotic cell clusters and erythrocytes and a few neutrophils were observed in cytological aspect (Fig. 2).

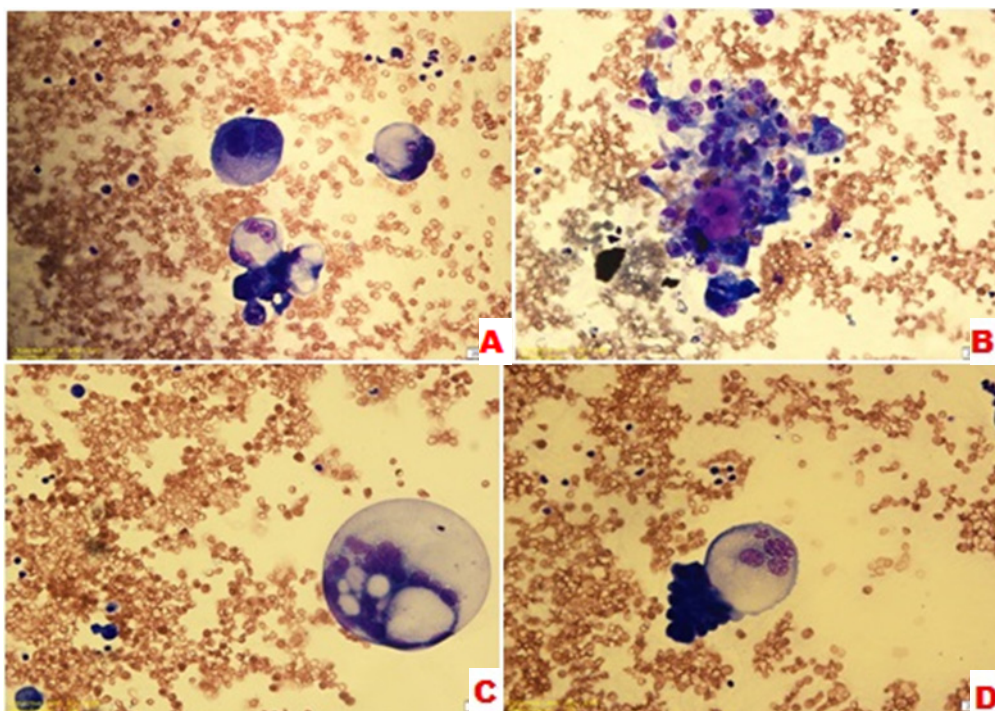
Oxygen supplement was applied to the dog. Treatment was included sefalosporine and furosemide but before the treatment was showed its effect, the dog had been died. The owner of the dog didn't give

confirmation for postmortem examination.

### 3. Discussion

The primary cause of death was the pleural effusion which was occurred by pleural mesothelioma. Although most studies described that canine mesotheliomas have been seen with both pleural and pericardial effusion [2, 4, 5, 7, 8], in our case we did not determine any evidence of pericardial effusion and even effusion in abdominal cavity.

The clinical signs of the cases with mesothelioma were not pathognomic. Fluid accumulation is the major sign [6]. Many studies has been described that the complete blood count was normal [1, 6, 7] but in our case the patient has moderate leucocytosis. Compatible with our case remarkable leucocytosis



**Fig. 2** Microscopic view of cytologic examination A) Malignant mesothelial cells showing nuclear pleomorphism, hyperchromasia and increase in nuclear to cytoplasmic ratio; B-C) Multinucleated malignant mesothelial cells showing marked vacuolization; D) Prominent nuclear pleomorphism in a multinucleated mesothelial cell. May Grünwald-Giemsa Staining.

( $30.5 \times 10^9/L$ ) was also found in a six year old male crossbred dog with pericardial mesothelioma.

Cytologic evaluation of the fluid can be diagnostic for other disease processes such as infection or lymphoma but will not conclusively diagnose mesothelioma. The diagnosis of mesothelioma is based primarily on gross and microscopic appearance. Additional immunohistochemical and electron microscopic examinations may be applied to confirm the diagnosis [6]. The limitation of this report is that cytologic examination doesn't provide a definite diagnosis for mesothelioma. Because of the owner's rejection for necropsy, further examinations couldn't be applied. However microscopic findings of the fluid and the clinical signs fulfill all criteria for the diagnosis of mesothelioma.

Genetic factors in the etiology were also suggested as the cause of the neoplasm in one case report of a juvenile dog [3]. On the other hand, mesothelioma was associated with exposure of asbestos in humans

and animals [2-4, 9]. In our clinical case we did not confirm any contact of the dog with asbestos or larger amount of pesticides, which are described as etiological factors of mesothelioma. As mesothelioma is a very rare health condition for dogs, it might be lead up to misdiagnosis.

## References

- [1] Raflo, C. P., Nuernberger, S. P. 1978. "Abdominal Mesothelioma in a Cat." *Vet. Pathol.* 15: 781-783.
- [2] Harbison, M. L., Godleski, J. J. 1983. "Malignant Mesothelioma in Urban Dogs." *Vet. Pathol.* 20: 531-540.
- [3] Kim, J. H., Choi, Y. K., Yoon, H. Y., Kweon, O. K., Kim, D. Y. 2002. "Juvenile Malignant Mesothelioma in a Dog." *J. Vet. Med. Sci.* 64 (3): 269-271.
- [4] Humphrey, E. W., MD, Ewing, S. L., MD, Wrigley, J. V., MD, Northrup, W. F., III, MD, Kersten, T., MD, Mayer, J. E., MD, Varco, R. L., MD 1981. "The Production of Malignant Tumors of the Lung and Pleura in Dogs from Intratracheal Asbestos Instillation and Cigarette Smoking." *Cancer* 47: 1994-1999.
- [5] Avakian, A., Alroy, J., Rozanski, E., Keating, J., Rosenberg, A. 2008. "Lipid-rich pleural mesothelioma in

- a dog." *J. Vet. Diagn. Invest.* 20: 665-667.
- [6] Geninet, C., Bernex, F., Rakotovo, F., Crespeau, F. L., Parodi, A. L., Fontaine, J. J. 2003: "Sclerosing Peritoneal Mesothelioma in a Dog—A Case Report." *J. Vet. Med. A* 50: 402-405.
- [7] Closa, J. M., Font, A., Mascort, J. 1999. "Pericardial Mesothelioma in a Dog: Long-term Survival after Pericardiectomy in Combination with Chemotherapy." *Journal of Small Animal Practice* 40: 383-386.
- [8] Machida, N., Tanaka, R., Takemura, N., Fujii, Y., Ueno, A., Mitsumori, K. 2004. "Development of Pericardial Mesothelioma in Golden Retrievers with a Long-term History of Idiopathic Haemorrhagic Pericardial Effusion." *J. Comp. Path.* 131: 166-175.
- [9] Glickman, L. T., Domanski, L. M., Maguire, T. G. et al. 1983. "Mesothelioma in Pet Dogs Associated with Exposure of Their Own Asbestos." *Environ. Res.* 32: 305-313.