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IMAGISTIC AND CYTOLOGICAL DIAGNOSIS IN A CASE OF MEDIASTINAL MESENCHIMAL NEOPLASIA IN DOG

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Abstract
This paper presents the case of a female dog with a mediastinal mass. Clinical, imagistic and cytological evaluation of the patient are presented.
A 4 years old female Rottweiler was referred to FMV Iasi Clinics with signs of respiratory distress resistent to treatment. Clinical examination of the dog revealed paroxostic, productive cough, harsh respiratory sounds, fever and regurgitation. Radiographs of the spine and thorax in right and left lateral and dorso-ventral incidence revealed a large mass occupying the cranial mediastinum and left cranial thorax, pushing the heart and the carina caudally and the esophagus and the trachea laterally, to the right. The esophagus was dilated cranially due to external mass compression and aspiration pneumonia signs were found in the lung. Small nodular mases were also seen in all the lung lobes. Endoscopy of the esophagus and trachea revealed the integrity of these organs and external compression. Ultrasound examination showed an hperechoic heterogenous mass. Ultrasound-guided fine-needle aspiration of the mass was performed. The cytological examination of the samples showed necrosis and a pleomorphic cell population with obvious malignancy criterias: macrocytosis, anisocytosis, anisocaryosis, multiple nucleoli, numerous mytosis, high N/C ratio. The pleomorphic aspect of the mesenchymal cell population prevented a clear classification of the tumour but revealed a high malignancy mesenchymal mediastinal neoplasia.
The differential was made between extra-skeletal osteosarcoma/chondrosarcoma, hemangiopericitoma and fibrosarcoma.

Keywords: *mediastinal mass, ultrasound guided aspirate, cytology, extra-skeletal osteosarcoma*

INTRODUCTION

In veterinary medicine, as in human one, the main problem about the neoplasias and their approach/therapies resides in the time that passes until a right diagnosis and prognosis is made. The later the tumour is discovered, the higher the chances are that the malignant transformation has begun or even worse, the metastatic disease has spread.

The external visible masses (skin, muscles, bony structures) are easier to see and still the patients get to a medical control usually when it's too late, with gross deformities and ulcerated growths.

The internal masses are even harder to spot in the beginning of the disease, and only when the functions of the affected organs are altered or when the paraneoplasic syndroms begin, the owners notice signs of disease on their pet-friend and they start investigating.

Rarely internal masses are discovered at routine surveys, only a small part of pet-owners have annual routine check controls of blood, abdominal ultrasound and thoracic radiographs.

Thoracic masses may affect the lung, the pleural space, the thoracic wall or the mediastinum. They may be primery tumours or metastatic disease.

Mediastinal masses may be localised in four regions (cranio-ventral mediastinum, cranio-dorsal mediastinum, caudo-ventral mediastinum and caudo-dorsal mediastinum) and, depending on that, they may or may not involve particular organs and they include different pathologies.

Cranial mediastinal masses (dorsal or ventral) include in their differential diagnosis tumours of neural or neuro-endocrine origin, paravertebral or vertebral tumours, chemodectomas, thymomas, lymphomas (thymus or lymphnodes lesions), ectopic thyroid or parathyroid masses, pericardial chyst ot teratomas. (1) They usually don't produce clinical signs at the beginning, and they remain

occult until they get big enough to produce different degrees of compression on adjacent organs.
Clinical signs depend on the organs that are affected by the mass and include coughing and wheezing – if it affects respiratory airways, dysphagia – when the affected organ is the esophagus, cardiac signs (dyspnea, mediastinal or pleural effusions, pulmonary cardiogen edema, cyanosis etc.) when it affects the heart, neurological signs when compressing on nerves etc.
Usually they are discovered on radiological examination, but the etiological diagnosis is not always easy.
This paper presents the case of a female dog with a cranial mediastinal mass. Clinical, imagistic and cytological evaluation of the patient are presented.

MATHERIALS AND METHODS

A 4 years old female Rottweiler was referred to FMV Iasi Clinics with signs of respiratory distress resistent to treatment and limping of the left front limb.
Radiographs of the thorax were taken several times, at different stages of the disease, and an intrathoracic cranial mediastinal mass was identified.
The endoscopy of the esophagus and trachea were performed, CBC and blood serum analysis, ultrasound guided fine needle aspiration (FNA) of the mass and of the mediastinal fluid and the cytology of the specimens were performed.

RESULTS AND DISCUSSIONS

Clinical examination of the dog revealed, apart from the limping of the left front limb – which had no visible orthopedic cause – paroxistic productive cough, harsh respiratory sounds, intermittent fever and ocasionally regurgitation. Later, on more detailed phisical examination, small nodular masses were found in cervical, abdominal and brachial muscles.
Blood biochemistry and CBC showed normal parameters, the only changed value was ALKP = 298 U/L (normal ALKP = 23-212).
Because of the mixed respiratory, digestive and neurological signs, radiographs of the spine and thorax in right and left lateral and dorso-ventral view were taken. They revealed a large mass ocupying the cranial mediastinum and left cranial thorax, pushing the heart and the carina caudally and the esophagus and the trachea laterally and to the right. The mass that measured more than 9 cm in diameter had a mineralised core measuring 3/4 cm. The trachea was narrowed and the esophagus was dilated cranially due to external mass compression. The mass was invading the cervical muscles through the thoracic inlet, which was the point of maximum compression.

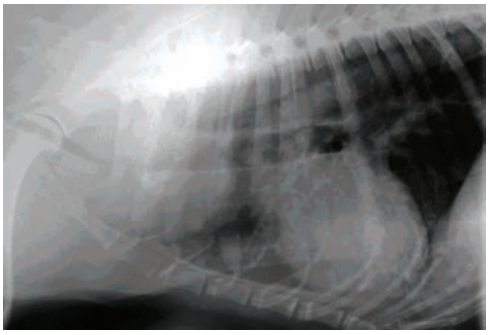

Fig. 1 – Dog, F, 4 years. L lateral view. Cranial mediastinal mass of soft tissue opacity, measuring 9 cm diameter with mineral opacity core of 3/4 cm width. Superposed on the trachea there are a few well marginated soft tissue opacities, also in the cranial left lobe, measuring betwen 0,5-1,5 cm. The esophagus is dilated, revealing the tracheal stripe sign and the trachea is compressed.

At this point the origin of the mass was to be checked, so the integrity of the mediastinal organs was investigated. Endoscopy of the esophagus and trachea revealed the integrity of these organs and external compression, so they were excluded as origin of the mass.

Fig. 2 – Dog, F, 4 years. Left intercostal view through the heart base. Mediastinal effusion, pericardial mass measuring 3 X 2,5 cm and ultrasound guided FNA of the effusion.

Ultrasound examination using intercostal windows showed a large, hiperechoic heterogenous mass with narrow hipoechoic spaces, mediastinal effusion and small, nodular, hiperechoic structures adherent to the pericardium. Ultrasound-guided fine-needle aspiration of the main mediastinal mass and of the mediastinal fluid were performed, using separate 22 GA 3,5 inches spinal needles and 5 ml seringes.

Smeares were made from the aspirate and from the mediastinal fluid, and they were stained MGG.

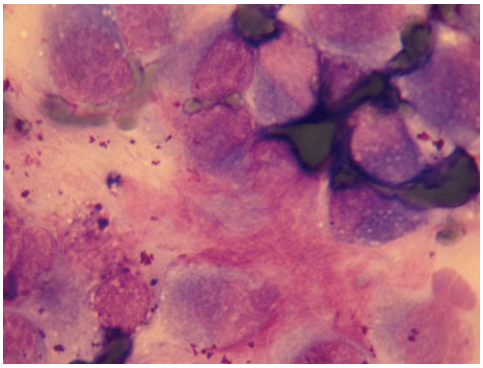

Fig.3 — Neoplasic osteoblasts with obvious aizocytosis and anisocariosis, vesiculous nucleai with multiple nucleoli, vacuolised cytoplasma. Pink , fibrilar, osteoid matrix (MGG, x 1000).

The cytological examination of the samples showed a proteic granular font with numerous erithrocites, neutrophils, macrophags, isolated mesenchimal cells and pleiomorphic cell populations. Some mesenchimal cells are gigantic, multinucleate and have basophile, vacuolised cytoplasm or metacromatic inclusions, others are small, spindle cells and very small cytoplasm.

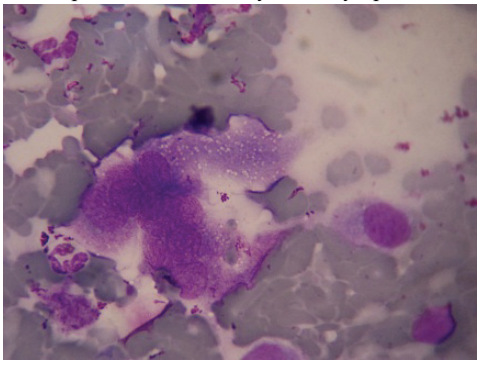

Fig. 4 – Giant multinucleate cell with morphological features resembling an osteoclast (MGG, x 1000).

The pleomorphic cell population had obvious malignancy criterias: macrocytosis, anisocytosis, anisocaryosis, multiple nucleoli (3-6 variable size nucleoli), numerous mytosis including atypical ones and high N/C ratio.

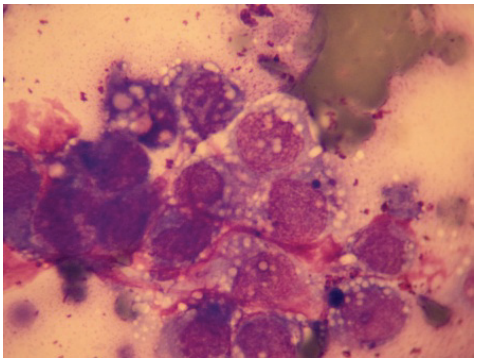

Fig.5 – Neoplasic cell group, with nuclear hipercromatic, hardly visible nucleoli, intranuclear and cytoplasmatic vacuolization, high N/C ratio. Pink amorphous, osteoid matrix.(MGG, x 100).

The pleomorphic aspect of the mesenchymal cell population prevented a clear classification of the tumour but revealed a high malignancy mesenchymal mediastinal neoplasia, the cytological diagnosis being undifferentiated sarcoma (extraskelethal osteosarcoma or chondrosarcoma). (2)

Cytostatic therapy was attempted but three weeks later the respiratory signs had worsened. The dog had continuously lost weight and the appetite almost disappeared.

On recheck radiographs aspiration pneumonia signs were found and the small nodular masses had disseminated through all the lungs, cranial and caudal lobes.

The mediastinal and pleural effusion were now easily visible within the thorax. The trachea was now even more deviated downwards and to the right with an area of lateral narrowing at the thoracic inlet.

The esophagus was now very dilated cranially to the mass and filled with air. On the DV becomes very visible the way the mass invades the cervical region through the cervical muscles. The left front lobe is displaced and the pleural effusion is seen around it. The mineral core is seen on the left side, between the first and the second rib.

Given the width of the mass and of the bony core it is reasonable to assume the mass was very old.

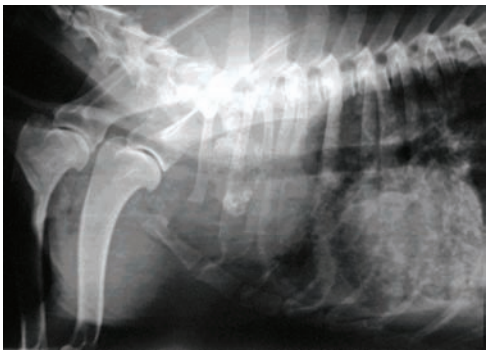

Fig. 6 – Dog, 4 years, LL. Radiographs taken one month later—cranial mediastinal mass and central mineral (bone) opacity, dilated esophagus and displaced trachea. Nodular opacities in the lung field, pleural and mediastinal effusion.

Fig 7 — Dog, F, 4 years, DV view. The mass is compressing the trachea to the right, extending through the thoracic inlet into the cervical area. The pleural effusion displaces the lung lobes from the thoracic wall. The mineral core of the mass is seen between first and second rib.

The nodular methastasis within the lungs that weren't visible at the first radiological examination had grown within this period with at least 1-2 cm, the high multiplication rate was consistent with the high malignancy cytological diagnosis.

One week later, the dog's status altered, convulsions started, so it was euthanasiated and the necropsic examination was performed. It revealed an enormous mediastinal mass adherent to the costal wall (second and third rib), larger than it was seen on radiographs, compressing the trachea and the esophagus and invading the thoracic inlet and caudal cervical muscles.

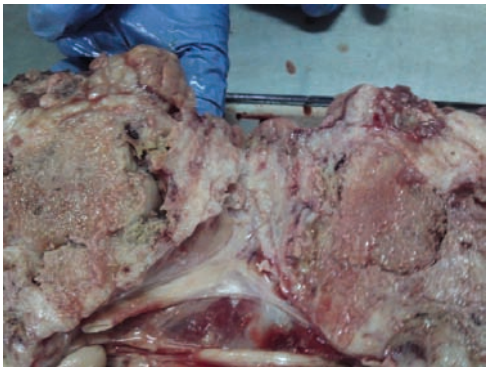

Fig. 8 – Macroscopic aspects. Section through the main mass—bony structure with cartilaginous smooth margins, well differentiated from the rest of the tumour

The mass had high consistency. The mineral core had a bony structure with smooth chondral tissue surface, very well differentiated from the rest of the mass. It had methastasied into the local limphnodes, the lung, pericardium, miocard, parietal and visceral pleura and peritoneum, diaphragm, liver, kidneys and body muscles.

CONCLUSIONS

The imagistic diagnosis showed the location, dimension and density of the mass, but it couldn't reveal its origin and nature.

The cytology of the FNA was the safest and the most reliable tool in the live ethiological diagnosis and it was extreamelly helpful for the prognosis of the patient and for the chimiotherapy.

The necropsy proved the accuracy of the imagistic and cytologic diagnosis.

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