

# Journal of Agricultural Sciences Research

Acceptance date: 16/12/2024

## MESOTHELIOMA: A CASE REPORT

---

**Escamilla GA**

Universidad de la Salle Bajío, León, Gto

**Arroyo VJ**

Universidad de la Salle Bajío, León, Gto

**Garcia MO**

Universidad de la Salle Bajío, León, Gto

**Franco DF**

Clínica Veterinaria Franco, León, Gto

**Aranda DB**

Universidad de la Salle Bajío, León, Gto

All content in this magazine is licensed under a Creative Commons Attribution License. Attribution-Non-Commercial-Non-Derivatives 4.0 International (CC BY-NC-ND 4.0).



**Abstract:** Mesothelioma is a neoplasm that starts in the mesoderm and can have a pleural, pericardial or peritoneal origin. Occasionally, it is found in the tunica vaginalis(3,5,8). There is a higher incidence in dogs, with genetic predilection in German Shepherds. Likewise, male geronts are more predisposed to present it and it is related to asbestos exposure(3,8). Effusions, whether pleural, peritoneal or pericardial, are some of the disorders related to mesothelioma(3). For diagnosis, it is recommended to perform immunohistochemical tests by means of Calretinin antibody, since it identifies neoplastic mesothelial cells and differentiates these cells with those of adenocarcinoma(9,11). Alcian blue stain is also used, because mesotheliomas present an increase in acid mucosubstances not sulfated, so it stains them(7). We describe the case of a five-year-old male German Shepherd canine that clinically presented abdominal distension, with clinical signs of anorexia and weight loss. Clinical biochemistry showed altered liver enzymes and hypoproteinemia. At abdominocentesis, an amber colored fluid was obtained, with a density of 1.031. The patient was euthanized and at necropsy, samples were taken from the diaphragm, peritoneum and small intestine for histopathology. A diagnosis of mixed mesothelioma was made based on histopathology, Calretinin immunohistochemistry and Alcian Blue Stain. Which has a rare incidence, so it is considered relevant to document this case.

**Keywords:** Mesothelioma, Effusions, Asbestos, Calretinin, Liver.

## INTRODUCTION

Mesothelioma is a tumor that has its embryological origin in the mesoderm(3), so it can be located in any organ or cavity covered by it. The malignancy of the tumor is due to its great capacity for local invasion, being able to cause multiple neoplastic growths. An indicator of malignancy is the presence of tumor

cells in lymphatic vessels, corresponding to metastasis to lymph nodes(10). In the clinical presentation, several subtypes of malignant mesotheliomas are found, which are classified according to tissue growth, whether epithelial, fibrous or mixed(4,8). In dogs, cystic, sclerosing and deciduous subtypes have been described, all of abdominal location (6) and granular of epicardial location (1). Tests have been performed, exposing them to asbestos, causing extensive mesotheliomas and pulmonary adenocarcinomas. Referring to the clinical history, the main reason for consultation is usually dyspnea or cough. Depending on the site of the neoplasm and the effusion, he may manifest acute cardiac tamponade, right heart failure, weight loss or abdominal distension(3). In the differential diagnosis, there are three types of effusions caused by increased capillary permeability, secondary to vasculitis(3), which are: pleural effusion (neoplastic effusions secondary to non-mesothelial neoplasms, pyothorax, chylothorax, CHF, hemothorax, vasculitis, etc.), pericardial effusion, pericardial effusion, and pericardial effusion (neoplastic effusions secondary to other neoplasms, idiopathic/benign sterile pericarditis, vasculitis) and abdominal effusion (neoplastic effusions secondary to other neoplasms, hypoproteinemia, peritonitis, right CHF, vasculitis) (3). In the laboratory diagnosis, Calretinin Immunohistochemistry is performed, which is a technique used to establish the presence and level of proteins, measuring the expression of these, by means of marked antibodies that bind to the cellular components of a tumor, showing different areas with adherence of the antibody (9,11). In addition, an Alcian blue staining is performed, which is a water-soluble dye that derives its color from the molecules, since it contains 4 basic groups of isothiuronium with positive charge, so this charge provides attraction to the anionic mo-

lecules, causing a blue staining in the mucin molecules. This type of mucosubstances, either sulfated or acidic, are present in mesotheliomas, and this staining is recommended for their diagnosis and differentiation(7).

## **MEDICAL HISTORY**

### **FIRST CONSULTATION**

On March 25, 2017, "Milo", a male German Shepherd canine, 5 years old, weighing 30 kg. and with no previous illness, presented himself for consultation at the "Franco" Veterinary Clinic in Leon, Gto. The owner commented that the dog was guarding a welding workshop in Comanjilla, Gto.

The owner reported that the patient had several days of anorexia and weight loss and indicated a bulge in the abdomen. On general physical examination his physiological constants were found to be in range, alert, responsive, with good mood and a body condition of 2/5. On inspection, abdominal distension was observed, suggestive of ascites, abdominocentesis was performed, resulting in a density of 1.031 (serous exudate) in amber color, suggesting the presence of a neoplasm. Likewise, a complete blood count was performed, with no alterations, and a clinical biochemistry, with altered liver enzymes and hypoproteinemia.

The patient was not jaundiced, so he was sent home with Lasix (4mg/kg) and antibiotic (enrofloxacin tabs P.O. (10mg/kg)).

### **SECOND CONSULTATION**

The patient presented on April 10, 2017, the owner commented that he persisted the same signology. He was found with increased weight loss and was treated with Enalapril (0.5mg/kg), Lasix (4mg/kg) and deoxycholic ac. (15mg/kg).

## **THIRD CONSULTATION**

The patient presented on April 26, 2017, without any improvement, with further weight loss. On performing another abdominocentesis, an amber colored fluid was obtained obtaining the same density (1.031) as obtained in the first consultation, reiterating a neoplastic problem. The owner did not authorize the cytology of the exudate and decided to euthanize him with sodium pentobarbital (20ml).

## **COMPLEMENTARY TESTS**

### **HEMOGRAM**

No apparent clinical changes.

### **CLINICAL BIOCHEMISTRY**

Hypoglycemia. Elevated AST. Hypoproteinemia due to hypoalbuminemia. Hypophosphatemia. Elevated GGT. Elevated lactate dehydrogenase.

### **ABDOMINOCENTESIS**

Amber colored fluid. Density 1.031. Diagnosis: serous exudate.

### **MACROSCOPIC FINDINGS AT NECROPSY**

The thoracic cavity was observed with abundant liquid (hydrothorax) contaminated with erythrocytes (approx. 500 ml). The lungs were found with hemorrhagic and fibrinous areas, as well as congested areas in the airways. Necrosis and metastasis were also observed in the lungs, with the presence of general hemorrhagic nodulations (0.1 to 0.3 cm in diameter). The abdomen was found with presence of fluid (ascites) (approx. 2.5 lts). In the stomach there were nodulations (approx. 0.2 cm in diameter) in the serous layer of the greater curvature of the stomach. The small intestine showed multiple nodulations (0.1 cm of day. approx.) at the level of the serosa of the

curvature of the intestinal loops. The pancreas presented a nodulation (2.5 cm x 5 cm) in the free portion. Samples were taken from the different nodules observed for their inclusion in conventional technique and hematoxylin and eosin (H&E) staining.

### **MICROSCOPIC DIAGNOSIS**

Sections of neoplastic nodules are reviewed showing proliferation of polyhedral cells arranged in sheets and sometimes in a solid pattern, with a round nucleus, lax chromatin and a nucleolus. The cytoplasm is abundant and sometimes with fine vacuoles. There are 1 to 2 mitoses per 40x random field. There are also spindle cells in intertwined bundles with oval nuclei, lax chromatin and a nucleolus. The cytoplasm is abundant with poorly defined borders. Alcian blue staining is performed where the cytoplasm is moderately blue. Immunohistochemistry with Calretinin marker was also performed, showing immunopositivity in the cytoplasm.

### **DIAGNOSTIC CRITERION**

Based on the lesions found at necropsy and the results obtained from the immunohistochemical tests with Calretinin marker and Alcian blue stain, it is concluded that the patient presented a mixed malignant mesothelioma.

### **DIFFERENTIAL DIAGNOSIS**

According to the clinical signs presented by the patient and the results of the clinical biochemistry and the abdominocentesis, a cholangiohepatocellular or hepatocellular carcinoma was initially suspected. Based on the histologic findings, lymphoma was suggested as the main differential diagnosis.

### **DISCUSSION**

Mesothelioma is a rare tumor that is directly related to asbestos exposure among some other substances such as aluminum oxide mentioned above(3,5,8), which is why we took on the task of reporting this case since the patient lived in a welding workshop with frequent exposure to asbestos and a number of solvents predisposing to mesothelioma. Primarily, because of the clinical signs and clinical biochemistry that the patient presented, a primary liver tumor (adenocarcinoma, lymphoma etc) was thought to be present, since the liver enzymes AST, GGT, alkaline phosphatase and albumin were found to be altered(2), and the fluid obtained in the abdominocentesis was amber in color with a density of 1.031 (serous exudate), indicating as primary cause some process of hepatic origin, suggesting to opt for the cytology of the abdominocentesis for a correct diagnosis in this case the owner of the canine did not authorize it so it was assumed only a hepatic problem. At the time of necropsy, the cavities (pericardium, thorax, abdomen) were observed with the presence of fluid and diffuse micronodulations in the diaphragm, peritoneum and serosa of the small intestine, consistent with the lesions described for mesothelioma. The liver presented without macroscopic changes, so the primary tumor in this organ was ruled out.

### **CONCLUSION**

Due to the frequency of mesothelioma cases presented by exposure to asbestos and substances such as aluminum oxide, it is important to collect adequate anamnesis, general physical examination and laboratory tests, as well as blood biometry, clinical biochemistry and evaluation of body effusions to obtain the diagnosis, as well as its confirmation at necropsy and relevant studies (Calretinite immunohistochemistry and Alcian Blue Stain) which are specific evaluations for this neoplasm.

## REFERENCES

1. Brower A, Herold LV, Kirby BM. Canine cardiac mesothelioma with granular cell morphology. *Vet Pathol*, 2006, 43:3
2. B.M. Bush. *Interpretación de los análisis de laboratorio para clínicos de pequeños animales*. Madrid, España Ed. Harcourt. 1999.
3. Coté, E. *Clinical Veterinary Advisor. Dogs and Cats*. Editorial MOSBY Elsevier. 2007. P: 701-702.
4. Head, K.; Cullen, J.; Dubielzig, R.; Else, R.; Misdorp, W.; Patnaik, A.; Tateyama, S. & Van Der Gaag, I. *Histological classification of tumors of the alimentary system of domestic Animals*. Armed Forces Institute of Pathology and the World Health Organization Collaborating Center for Worldwide Reference on Comparative Oncology, Washington, DC, Second Series. V. X, 2003.
5. Meuten, D. *Tumors in Domestic Animals*. Iowa, E.E.U.U. 4ta Edición. Editorial Iowa State Press. 2002. P: 477-478.
6. Morini M, Bettini G, Morandi F, Burdisso R, Marcato PS. *Deciduoid peritoneal mesothelioma in a dog*. *Vet Pathol* 2006, 43:2,
7. Myers, R. *Special Stain Techniques for the Evaluation of Mucins*. [Internet] Pathology Leaders. Leyca Biosystems. Consultado el día: 17/05/17. Disponible en: <http://www.leicabiosystems.com/pathologyleaders/special-stain-techniques-for-the-evaluation-of-mucins/>
8. Ochoa, J. Hernández, G. Mesotelioma Invasivo de un Canino: Citología, Clínica y Hallazgos Patológicos. *Int. J. Morphol.* [Internet]. 2008 Consultado el 16/05/17;26(1):103-112. Disponible en: [https://scielo.conicyt.cl/scielo.php?script=sci\\_arttext&pid=S0717-95022008000100018&lng=es](https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0717-95022008000100018&lng=es). <http://dx.doi.org/10.4067/S0717-95022008000100018>.
9. Ortiz, S., García de Palazzo, I., Lega, A., Sánchez, G y Berrotarán, N. *La Inmunohistoquímica en el diagnóstico diferencial de mesotelioma versus carcinoma*. VI Congreso Virtual Hispanoamericano de Anatomía Patológica. Cuba. CONGANAT. 2004.
10. Peters, M.; Tenhundfeld, I.; Stephan, I. & Hewicker, T. *Embolized mesothelial cells within mediastinal lymph nodes of three dogs with idiopathic haemorrhagic pericardial effusion*. *J. Comp. Path.*, 2002, P:107-112.
11. Sin autor. Calretinin (Polyclonal) [Internet]. Italia. A.Menarini Diagnostics S.r.l. Consultado el día: 16/05/17. P:1,2. Disponible en: [http://www.menariniagnostics.com/var/diagnostic\\_division/storage/import/force-download.php?fn=Calretinin%20\(Polyclonal\)\\_MEN\\_ES\\_IVD\\_0.0.pdf](http://www.menariniagnostics.com/var/diagnostic_division/storage/import/force-download.php?fn=Calretinin%20(Polyclonal)_MEN_ES_IVD_0.0.pdf)