

# An Unusual Case Of Mastocytoma And Liposarcoma In A Dog

Xiao-Li Chen<sup>1,2</sup>, Jia-Qi Sun<sup>3</sup> and Shi-Ning Guo<sup>1\*</sup>

1 School of Veterinary Medicine, South China Agricultural University, Guangzhou, 510642

2 Wangfu Animal Hospital, Guangzhou, 510800, China.

3 Guangzhou Baiyunshan Baoshen Animal Health Product Co., Ltd. Guangzhou, 510540

## \* Correspondence:

Shi-Ning Guo,

School of Veterinary Medicine, South China Agricultural University, Guangzhou, 510642

Wangfu Animal Hospital, Guangzhou, 510800, China.

Email: shining@scau.edu.cn, XiaoLiChen@stu.scau.edu.cn, 543566477@qq.com

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## Simple Summary

It's rare for a dog to have different types of tumors growing at the same time. In this case, a 10-year-old neutered male Labrador developed five tumors at the same time. Cytological and histopathological findings revealed that one of the five tumors was a mastocytoma and four were liposarcoma. After surgical resection, there was no sign of recurrence in half a year of follow up.

## 1. Abstract

It's rare for a dog to have different types of tumors growing at the same time. Mastocytoma (MCT) is a tumor composed of mast cells that most often form nodules or lumps on the skin, often single, and prone to rapid growth with an ulcerated surface. Canine liposarcoma is an uncommon soft tissue sarcoma, it grows slowly and varies in size, usually arising in the subcutis. A 10-year-old male Labrador retriever was presented with an increasing subcutaneous swelling lasting for 3 years. Fine-needle aspirates revealed that one of the five tumors was a mastocytoma and four were liposarcoma. A complete blood count and biochemical abnormalities were mainly globulin, gran, Lymph%, and Mon%, all other parameters were within reference limits. The owner decided to undergo

surgery, which removed the tumor and sent it to the authorities for testing, histopathological findings and the results were consistent with the previous cytological results. After six months of follow-up, there was no sign of recurrence. To the authors' knowledge, this is the first report describing a case of mastocytoma and liposarcoma in a dog

## 2. Keywords:

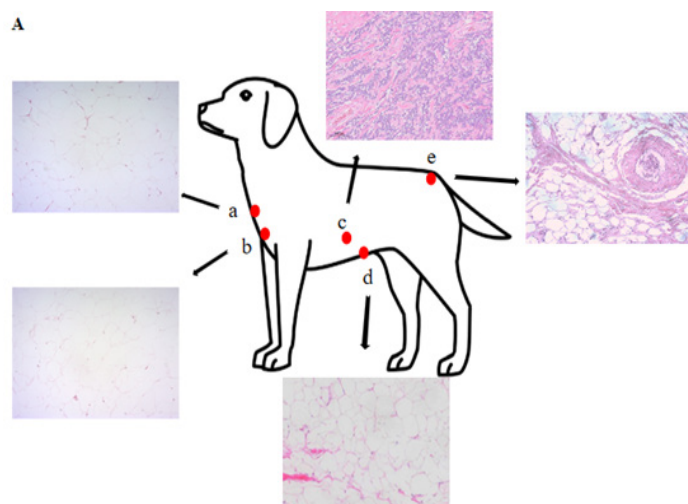
Mastocytoma, Liposarcoma, Dog, Histopathology, Ki67

## 3. Introduction

The occurrence of two or more simultaneous or successive tumors of mastocytoma and liposarcoma, in a dog is a rare clinical entity. Liposarcoma is a common soft tissue sarcoma and represents a group of neoplasms, whose genesis is in the differentiation of the primitive mesenchymal cells[1]. The World Health Organization recognizes four subtypes: well-differentiated liposarcoma, myxoid liposarcoma, pleomorphic and undifferentiated, Each type presents specific features[2]. Mastocytoma are frequently diagnosed cutaneous neoplasms in dogs. The etiology of MCT is still unknown, but well-documented breed predispositions may indicate an underlying genetic component[3]. The large breed dogs showed a higher pre-disposition risk to MCT development and lower breed dogs were associated with a lower risk [4] Labrador retriever, and Golden retriever showed high odds when compared with many lower breed dogs and/or mixed breed dogs [5]. However, the synchronous association between mastocytoma and liposarcoma is a rare clinical entity. This study aims at describing a synchronous case of a well-differentiated mastocytoma and liposarcoma in a dog.

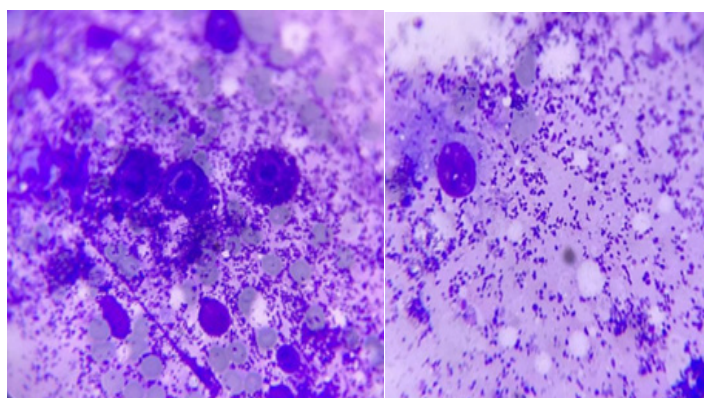
## 4. Materials and Methods

A previously healthy 10-year-old male Labrador retriever was presented with an increasing subcutaneous swelling lasting for 3 years, the pet owner found that the lump had obvious signs of enlargement in the short term, Physical exam revealed that there were 5 masses in total, including 2 in the anterior thorax and neck, 2 in the midabdomen, and 1 in the caudal back (Figures 1). Palpation revealed one hard mass in the midabdomen and other soft masses. Otherwise, the remainder of the exam was unremarkable. A complete blood count revealed Gran decline  $3.0 \times 10^9/L$  (RI: 4.0-12.6), Lymph% 52.5% (RI: 12.0-30.0) and Mon% (RI: 2.0-9.0) were increased as measured, all other CBC parameters were within reference limits. Biochemical abnormalities were mainly increased globulin 50.3 g/L (RI: 21.0-45.0g /L), all other biochemical parameters were within reference limits. A radiograph of the whole body confirmed the masses were limited to the subcutaneous tissue and did not extend into the bone.



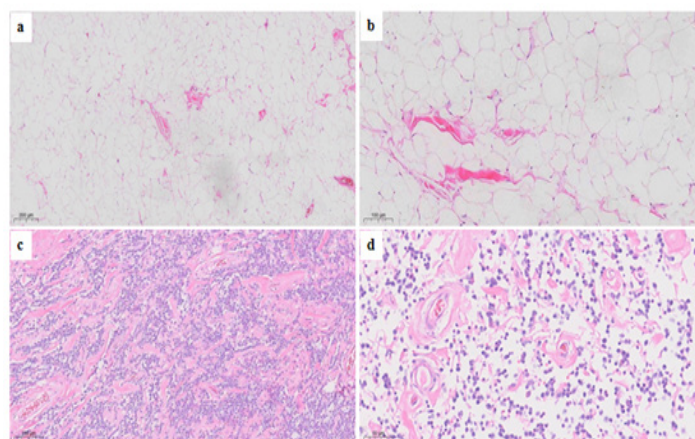
**Figures 1:** The location of each tumor in dogs and its histopathological detection by HE staining.

Fine-needle aspiration of one hard mass in the midabdomen was performed, and 2-3 smears were prepared. Smears were stained with a 3-part Diff-quick stain (G1540, Solarbio) and examined. Figures 2a showed primarily one population consisted of pleomorphic mast cells displaying marked anisocytosis, moderate anisokaryosis, round basophilic nuclei, multinucleation, and moderate to abundant cytoplasm containing few to many metachromatic granules. Figures 2b showed primarily plasma cells with presence of fewer mast cells intermingled individually. Two of the smears were predominated by large sheets of mast cells with fewer plasma cells intermingled in small sheets. Based on these findings, surgical removal of the tumor in the dog was recommended. The owner decided to accept the doctor's recommendation for surgery, HE staining and immunohistochemical detection were performed on the surgically removed tumors.



**Figure 2:** Photomicrograph of fine-needle aspiration of skin multiple masses was performed. (a) Hypogranulated poorly staining and multinucleated mast cells can be seen. (b) One sheet of plasma cells is seen with poorly staining hypo-granulated mast cells and fat cells. 3-part Diff-quick stain  $\times 100$  objective

the five tumors removed by surgery were fixed with 10% formalin. The five tumor samples were sent to ZOCODE (Guangdong Zhongkeda Biotechnology Service Co., LTD), in strict accordance with the SOP procedure of pathological test, samples were dehydrated, embedded, sliced, stained, sealed, and scanned for evaluation after 18 h by a trained veterinary pathologist as part of routine diagnostic procedures. For immunohistochemistry, tumor samples are sent to Servicebio (Wuhan Xavier Biotechnology Co.,) for processing. These sections were subjected to immunohistochemistry for analysis of Ki67 (Anti-Ki67 Rabbit pAb) expression.

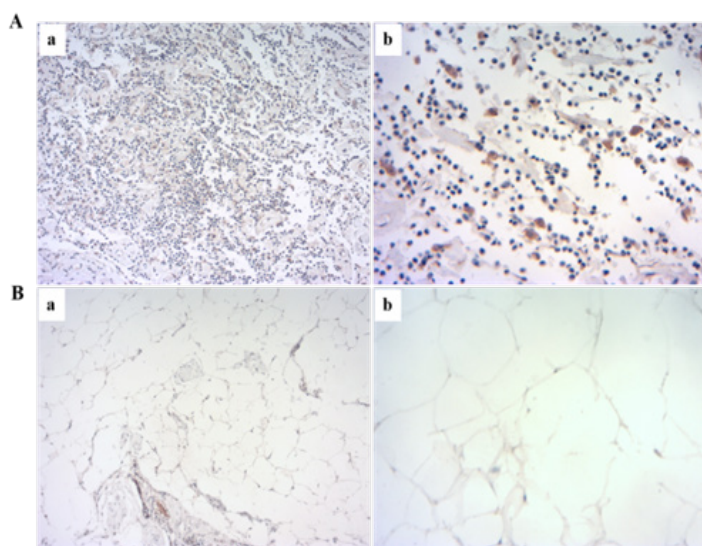


**Figure 3:** Stained with HE of tumor samples. (a,b) The diagnosis was a lipoma, (c,d) The diagnosis was mastocytoma, low grade.

## 5. Results

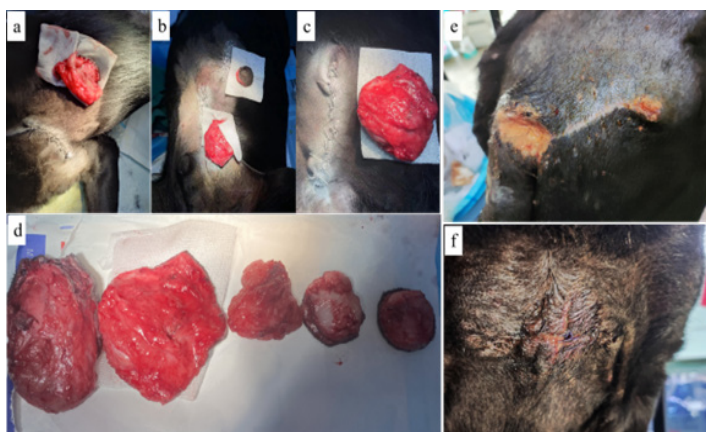
The results showed that the tumor marked c in Figure 1 tumors are composed of round cells. The cell boundary is clear and contains moderate amount of light basophilic granular cytoplasm. The nucleus is round to oval, with fine dot chromatin and distinct nucleolus. Dyscoloration of the nucleus. In 10 random 40X fields, no mitotic phases were found. A moderate amount of eosinophilic infiltration was seen in the tumor. There was a large amount of collagen fiber hyperplasia in the tumor. The diagnosis was mastocytoma, low grade [6]. Other tumors were mainly composed of mature fat cells. It is characterized by well differentiated adipocytes that form a lamellar structure with nuclei skewed to one side. In mild cases, the cell size and nuclear size were unequal, and no mitotic phase was observed, the diagnosis was a lipoma. Ki67 antigen is a protein associated with intracellular division and proliferation, which is expressed in S, G1, G2, and M phases of the cell cycle, but absent in G0 phase, and is often used as a reliable marker of tumor cell proliferation activity [7]. Immunohistochemical staining for Ki67 is a widely available and economical test with good tolerance of pre-analytical variations and staining conditions [8]. IHC analysis of ki67 (GB111141), 4% PFA (G1101) 12-24h. Antigen retrieval: Citrate buffer (pH 6.0) (G1201), pressure cooker 2min. Blocking buffer: 3% BSA in PBS (GC305010), RT, 30min. Primary antibody: 1: 750, 4 °C overnight. Secondary antibody: HRP Goat Anti-Rabbit IgG (GB23303), 1: 200 RT 1 h. The average count of Ki67-positive cells from five fields of 250  $\times$  250  $\mu$ m each ranged from

26 in mastocytoma.



**Figure 4:** Immunohistochemical examination of tumor samples. (a,b) The diagnosis was a lipoma, (c,d) The diagnosis was mastocytoma, low grade.

The owner of the pet accepted with complete excision of the remaining tumor (Figure 5). Given the risk of recurrence, Surgical protocol using wide excision was advocated, with application of a 3 cm lateral margin and a fascial layer for the deep margin [9]. To reduce the possibility of recurrence of the tumor, the tumor-suppressing Chinese herbal medicine. According to the drug instructions, Ai Zhong Ping was taken orally, once a day, for 30 days. After surgical resection, it was found that part of the sutured wound was cracked, and pink transparent liquid oozed from the cracked wound, resulting in slow wound healing. The wound was debridement treated with antiseptic Shengji powder twice a day, and the wound healed completely on the 17th day. The occurrence of this phenomenon is consistent with the literature reports. This is related to the release of vasoactive amines and proteolytic enzymes by mast cells, which, once linked to H1 and H2 receptors, can lead to the suppression of fibroblast growth factor, reducing the fibroplasia. In addition, local bleeding can also be seen during surgical resection, probably due to coagulation deficits caused by heparin release [10]. During the six-month follow-up period, there were no signs of recurrence.



**Figure 5:** Surgical resection and recovery of whole body tumor in dogs

## 6. Discussion

It's rare for a dog to have different types of tumors growing at the same time. In this case, a 10-year-old neutered male Labrador developed five tumors at the same time. Cytological and histopathological findings revealed that one of the five tumors was a mastocytoma and four were liposarcoma. In this case, in addition to the mastocytoma, there were multiple liposarcomas. In the four liposarcomas in this case, they are not the same size, they are located under the skin, on the upper layer of the muscle, there is no sign of inward invasion, soft texture. Cytology and histopathology are the preferred methods for diagnosis and identification of both types of tumors. Before the tumor type cannot be determined, in order to avoid recurrence of the tumor due to incomplete resection, we first make a preliminary judgment with Fine-needle aspiration, and further formulate the surgical program of resection according to the results of Fine-needle aspiration. After resection, a histopathological examination is performed immediately to determine the tumor type. Ki67 staining are widely used to predict natural behavior in canine MCT. Ki67 is an antigen that is expressed during the cell cycle that can be detected by immunohistochemistry and has recently been shown to be highly associated with MCT prognosis [11]. Thus, Ki67 immunohistochemistry is a promising non-subjective, quantitative prognostic marker to accurately predict MCT behaviour [12]. KI67 histochemistry results for both types of tumors, In the Ki67 histochemistry results of both tumor types, it was evident that there were a large number of Ki67 antibody labeled cells in mastocytoma, which was not obvious in liposarcoma.

Surgical treatment is the first choice in the treatment of mastocytoma and liposarcoma. Extensive local resection is an effective measure to reduce recurrence and metastasis. Surgical protocol using wide excision was advocated, with application of a 3 cm lateral margin and a fascial layer for the deep margin. To reduce the possibility of recurrence of the tumor, the tumor-suppressing Chinese herbal medicine. This Chinese herbal medicine is commonly known as San Huang Shuang Ding tablets. Its main ingredients are: Radix curcumae, Faeces trogopterori, Rhizoma Sparganii, Rhizoma Curcumae, Radix astragali, Acanthopanax senticosus, Sarcandra glabra, Venenum Bufonis, Herba Hedyotis and Glycyrrhiza uralensis. It can promote blood circulation and remove blood stasis, improve the immune function of patients, and inhibit the growth of tumors.

## 7. Conclusion

The case described represents a rare clinical condition, through the synchronous occurrence of mastocytoma and liposarcoma. The lack of studies on this synchronous association, as well as the few reported cases in the literature, inhibits a greater clarification of the involved pathogenesis. However, future research and development are welcome to the scientific community for elucidation of the peculiarities that involve this presentation. Thus, recognition of this uncommon occurrence may help in an early and accurate diagnosis and the development of an appropriate

treatment, as soon as possible, in a manner that minimizes the possible underlying comorbidities and strengthens a promising prognosis.

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