

## Malignant fibrous histiocytoma in a dog: a case report

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**ABSTRACT:** In this report, a case of malignant fibrous histiocytoma involving skin, lungs, kidneys, pancreas and mediastinal lymph node was described. Microscopically, the tumor classified as storiform-pleomorphic type malignant fibrous histiocytoma.

**Keywords:** malignant fibrous histiocytoma; pathology; dog

Malignant fibrous histiocytomas (MFH) are rare soft tissue sarcomas characterized as pleomorphic sarcoma with partial histiocytic and fibroblastic differentiation (MacEwen and Withrow, 1996). MFH has been described in dogs, cats, horses and a cow (Ford et al., 1975; Gleiser et al., 1979; Hamir 1989; Hendrick et al., 1992; Waters et al., 1994; Sartin et al., 1996; Morris et al., 2002). Findings of one report (Waters et al., 1994) indicated that MFH comprised 0.34% of all dogs evaluated for tumors. This group of sarcomas have also been called giant cell epitheloid sarcoma, malignant histiocytoma, giant cell tumor of soft parts (tissue) and reticulum cell sarcoma (Ford et al., 1975; Hamir 1989; Goldschmidt and Shofer, 1992; MacEwen and Withrow, 1996). MFH should not be confused with malignant histiocytosis or systemic histiocytosis, most commonly seen in Bernese mountain dogs and occasionally in other breeds (MacEwen and Withrow, 1996; Affolter and Moore, 2002).

In humans, there are five variants of MFH storiform-pleomorphic, giant cell, inflammatory, myxoid and angiomatoid (Hasegawa et al., 2000; Suh et al., 2000; Muler et al., 2002), and clinically, it was divided into superficial and deep forms (Guccion and Enzinger, 1972). In domestic animals, three subtypes of MFH have been reported: storiform-pleomorphic, giant cell and inflammatory (Hendrick et al., 1992; Morris et al., 2002). The histogenesis of MFH is controversial, and the cell of origin is un-

obvious (Ford et al., 1975; Suh et al., 2000). MFH is thought to arise from pluripotential mesenchymal cells (Ford et al., 1975).

In domestic animals, MFH has been described as a locally invasive tumor arising the subcutis and rarely metastasises (Ford et al., 1975; Gleiser et al., 1979; MacEwen and Withrow, 1996), but Waters et al. (1994) reported that seven of 10 dogs with MFH had widespread metastasis. This report describes a MFH with multiple organ involvement in a dog.

### CASE HISTORY

A 7-year old male German shepherd cross dog was presented with multiple subcutaneous nodules on the right abdominal and paralumbal areas. The diameter of these nodules varies from 0.4 to 3.5 cm, with ulcerated overlying skin (Figure 1). The ulcers were covered with necrotic debris.

Radiologic examination revealed cardiac hypertrophy and no radiologic changes were found in the lungs. A biopsy specimen was taken and histopathologic examinations revealed MFH. Because of condition began deteriorating, the dog was euthanatized 2 weeks after biopsy and necropsied. Necropsy revealed tumors involving skin, lungs, kidneys, pancreas and mediastinal lymph node.

Tissue specimens collected at necropsy were fixed in 10% neutral buffered formalin, processed

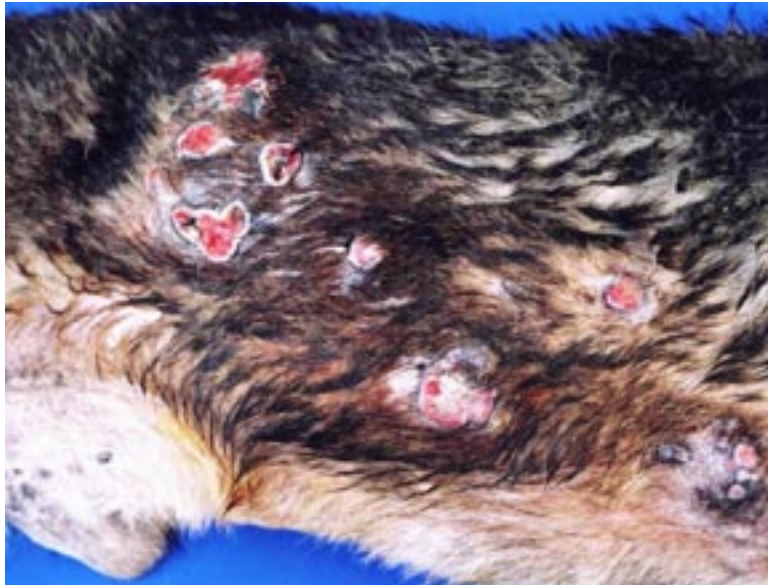


Figure 1. Malignant fibrous histiocytoma. Multiple subcutaneous nodules on abdominal and paralumbal areas. Notice the overlying skin ulcerated

routinely, embedded in paraffin, sectioned at 5 micrometers and stained with hematoxylin and eosin (H&E), van Gieson and Masson trichrome.

Macroscopically, cutaneous masses were circumscribed, but not encapsulated. The cut surfaces of nodules were firm and yellow. At necropsy, multiple and widespread 0.1–0.5 cm sized, firm grey-translucent nodules were seen in all lobes of the



Figure 2. Malignant fibrous histiocytoma. Discrete tumor masses in the lung (thin arrows) and pancreas (thick arrow).

lungs (Figure 2). The cut surface of mediastinal lymph node showed a discrete grey-white 0.5 cm sized mass. A grey-white firm mass, 0.7 cm sized, was observed in the pancreas (Figure 2). The cut surface of both kidneys showed multiple 2–3 mm grey-white nodules in cortex. Pelvic distension and nephroliths were also observed.

Microscopically, all tumor nodules were circumscribed and unencapsulated. The tumor masses were composed of three cell populations. The first was oval or polygonal histiocytic cells characterized by oval-round vesicular nuclei with finely granular nuclear chromatin (Figure 3). The cytoplasm was abundant, slightly acidophilic and, occasionally vacuolated. The second cell type was a plump spindle shaped fibroblast-like cells. These fibroblast-like cells were arranged in interlacing bundles (storiform pattern) (Figure 4). Generally, they were mixed with histiocytic and multinucleated giant cells. In some areas, especially in the periphery of tumor nodules, they formed a fibrosarcomatous pattern. The third type was multinucleated giant cells containing 2 to 35 nuclei and abundant cytoplasm (Figure 5). Some multinucleated giant cells have dark nuclei and abundant eosinophilic cytoplasm. These cells resembled osteoclastic giant cells. Some other giant cells have round to oval vesicular nuclei and paler cytoplasm (Figure 5). Some bizarre cells with a single, lobulated nucleus and abundant cytoplasm were also noted (Figure 3). In all tumor nodules, there was a moderate to high increase in cellular pleomorphism. There were 3–4 mitotic figures at high power field (40×), some

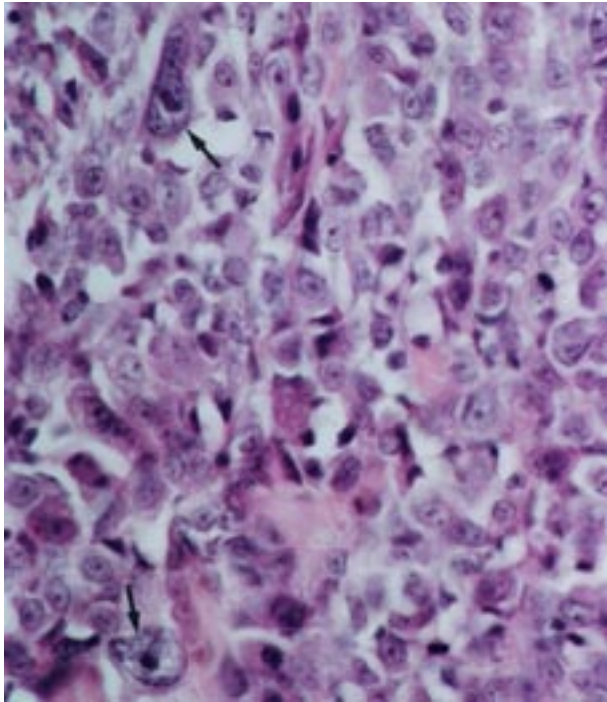


Figure 3. Section of malignant fibrous histiocytoma from subcutaneous tissue. Oval or polygonal histiocytic cells with oval-round vesicular nuclei and some bizarre cells with single nucleus (arrows); H&E  $\times$  450.

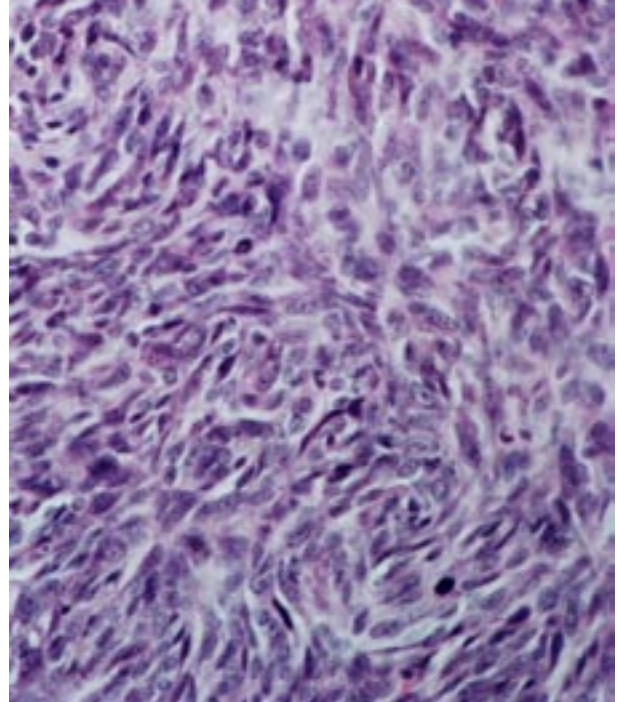


Figure 4. Section of malignant fibrous histiocytoma from pancreas. Notice the plump spindle shaped fibroblast like cells and storiform pattern; H&E  $\times$  360.

atypical. In the skin and lung sections, tumor cells were present in the lumen of some blood vessels (Figure 6).

The histologic pattern of the tumor often varied in different parts of the same tumor nodule and from the tumors in different organs. Generally, in some fields, the tumor predominantly consisted of fibroblast-like cells or storiform patterns, other parts of the same tumor showed predominantly histiocytic cell populations mixed with multinucleated giant cells. This histologic picture was observed in the tumor nodules in the skin, kidneys and lymph node. Tumors in the lungs and pancreas showed predominantly fibroblast-like cells or storiform patterns. Multinucleated giant cells were observed in tumors in all organs involved, but they formed a prominent component of the tumor in lymph node. In addition, histologic examination of a tumor nodule in the skin revealed myxomatous areas mixed with storiform patterns. This nodule resembled fibromyxosarcoma. Intercellular collagen production demonstrated with Masson trichrome and van Gieson stains. Although collagen fibrils were not a prominent feature in all sections,

there were some slight signs of these fibrils in the areas of fibroblast-like cell proliferation (storiform pattern).

Other findings showed necrosis in the centre of large tumor nodules, and cellular (lymphocyte, plasmacyte and occasional neutrophils) infiltrations in and around the tumor nodules. In addition, cardiac hypertrophy, antracosis and chronic pyelonephritis were also noted.

## DISCUSSION

Malignant fibrous histiocytomas is an uncommon tumor of older dogs (Hendrick et al., 1992; Waters et al., 1994; MacEwen and Withrow, 1996), but this tumor has been reported in a four month old puppy (Pires, 1997). The dog in present case was 7-year old German shepherd cross. Human MFH has five subtypes; storiform-pleomorphic, myxoid, giant cell, inflammatory, and angiomatoid (Hasegawa et al., 2000; Suh et al., 2000; Muler et al., 2002). In dogs, three subtypes have been reported; storiform-pleomorphic, giant cell and inflamma-

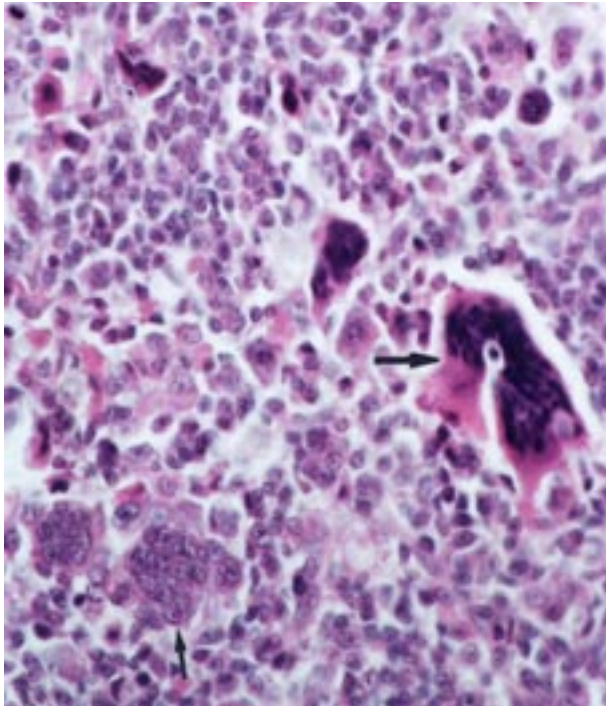


Figure 5. Section of MFH from the lymph node. Notice numerous multinucleated giant cells resembling osteoclastic giant cells (thick arrow) and giant cells with oval vesicular nuclei and paler cytoplasm (thin arrow) and histiocytic cells; H&E  $\times 360$ .

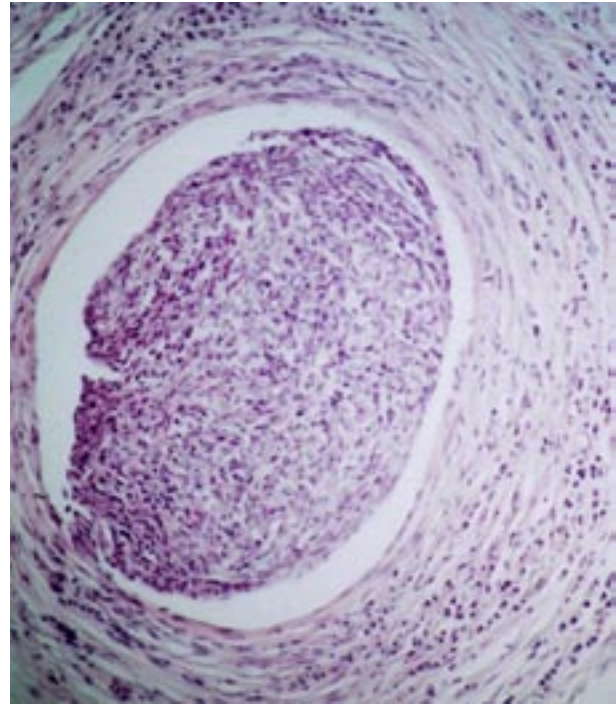


Figure 6. Section of MFH from the skin. A large tumor embolus is present in the lumen of blood vessel; H&E  $\times 145$ .

tory (Hendrick et al., 1992; Morris et al., 2002). Various subtypes may be found in one tumor: however, tumors are classified by their predominant feature(s). In the present case, the tumor consisted of a mixture of fibroblast-like cells, histiocytic cells and multinucleated giant cells. However, the histologic pattern of the tumor varied in different parts of the one nodule and from the tumor nodules in different organs. Thus, the tumor described in this report was classified as storiform-pleomorphic type MFH. Histologically, numerous osteoclast-like giant cells were present. However, there was no osseous and chondroid elements. This finding helped to differentiate this tumor from the giant cell tumor of bone. Multinucleated giant cells may be of histiocytic origin (Ford et al., 1975).

In dogs, MFH may be a primary tumor in subcutaneous tissues, spleen, kidney, salivary gland and bone (Gleiser et al., 1979; Thomas, 1988; Hendrick et al., 1992; Vilafranca et al., 1995; Perez-Martinez et al., 2000), but the dorsal thoracic and scapular areas are the most common sites for this tumor (MacEwen and Withrow, 1996). In the present case,

large nodules were found in the skin (subcutaneous tissues), which was presumed to be the primary site of the tumor.

MFH is generally considered as locally invasive, but not highly metastatic tumor (Gleiser et al., 1979; Hendrick et al., 1992; Waters et al., 1994). In the present case, there was no evidence of metastasis of the lungs in radiologic examination at the time of the initial diagnosis (biopsy), but two weeks later the dog was euthanatized because his condition began to deteriorate, and multiple 0.1–0.5 cm sized nodules were seen in the lungs. Probably, this was due to the small size of the tumor masses in the lungs, which may have escaped radiologic detection.

Necropsy revealed tumor involvement in the lungs, kidneys, pancreas and lymph node. Microscopically, the presence of tumor cells in the lumen of blood vessels in the skin and lung section may also indicate metastatic potential of the tumor presented in this report. Thus, in the present case we suggested that the metastatic potential of MFH is higher than usual for this neoplasm, as stated by some workers (Waters et al., 1994; Morris et al., 2002).

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