

Malignant fibrous histiocytoma (giant cell type) of soft parts in the abdominal mammary region of a female Ankara (Angora) cat

M. Özgür ÖZYİĞİT^{1,*}, Deniz NAK², Raşan YILMAZ³, Yavuz NAK¹, Gözde ŞİMŞEK¹

¹Department of Pathology, Faculty of Veterinary Medicine, Uludağ University, 16059 Görükle, Bursa - TURKEY

²Department of Obstetric and Gynecology, Uludağ University, 16059 Görükle, Bursa - TURKEY

³Department of Pathology, Faculty of Veterinary Medicine, Harran University, 63200 Campus of Eyübiye, Şanlıurfa - TURKEY

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Abstract: The present report describes a giant cell type of malignant fibrous histiocytoma (MFH), diagnosed in soft parts of the right abdominal mammary region, in an 11-year old, 8 kg, nulliparous female Ankara (Angora) cat diagnosed in soft parts of the right abdominal mammary region. The tumor, surgically excised from the abdominal region, had a flexible consistency with ulcerated overlying skin. The tumor was elliptical (8.0 cm × 7.0 cm × 5.0 cm) with a necrotic area of 3.0 cm × 1.5 cm × 1.0 cm in the middle of the cut surface. Microscopically, the tumor was subcutaneous and unencapsulated. Tumor cells were comprised of a mixture of fibroblast-like spindle and histiocytic-like cells with a pale pink cytoplasm. Cells were oval or elongated with a round, large nucleus, and small single nucleoli. In addition, an abundant number of multi-nucleated giant cells were observed. In some fields, there was a dense collagen connective tissue, foci of cartilaginous, bony metaplasia, and hemorrhage surrounding necrosis.

Key words: Giant cell tumor, malignant fibrous histiocytoma, cat, Angora

Dişi bir Ankara kedisi (Angora)'nin abdominal meme bölgesinde malign fibröz histiyositom (dev hücreli tip)

Özet: Bu rapor, 11 yaşında, 8 kg ağırlığında, hiç doğum yapmamış dişi bir Ankara kedisinin sağ abdominal meme bölgesinde bulunan dev hücreli tip malign fibröz histiyositom (MFH)'u tarif etmektedir. Cerrahi müdahale ile sağ karın bölgesinden alınan, kesit yüzünün merkezi kısmında 3 × 1.5 × 1 cm boyutlarında nekrotik alana sahip olan eliptik (8 × 7 × 5 cm) tümör'ün kıvamı esnekti ve üstü ülserli deri ile kaplıydı. Gözle görülür bir şekilde, hemen epitel katman altından başlayan, kapsülsüz tümöral alan, oval veya uzamış, yuvarlak, iri çekirdek ve küçük tek çekirdekçikten ve açık pembe sitoplazmaya sahip histiyosit benzeri hücreler ile fibroblast benzeri hücrelerin karışımından oluşmuştu. Bu hücrelerin yanı sıra, tümöral alanda çok sayıda çok hücreli dev hücrelere rastlandı. Tümöral doku içerisinde nekrozu çevreleyen yoğun kollagen bağ dokusu, kıkırdakımsı kitle, kemiksi metaplazi ve kanamalar görüldü.

Anahtar sözcükler: Dev hücreli tümör, malign fibröz histiyositom, kedi, Angora

* E-mail: ozyigit@uludag.edu.tr

Introduction

Malignant fibrous histiocytoma (MFH) refers to a group of soft tissue tumors characterized by a dual population of histiocytic and fibroblastic cells (1,2). In humans, MFH has been divided into 5 types, depending on the predominant cell types and the amount of intercellular materials. These include storiform-pleomorphic, myxoid, xanthogranulomatous (or inflammatory), giant cells, and angiomatoid (1,3). Only 3 types of these tumors have been reported in domestic animals (4): storiform-pleomorphic, inflammatory, and giant cell. MFHs are occasionally reported in dog, cattle, pig, and cat (4-7). The giant cell type is the most frequently observed form of MFH in cats and is termed as the giant cell tumor of soft parts (GCT-SP). GCT-SP is also reported in dog, horse, baboon, and hamster (3-8). No sex or breed predilection has been reported and the tumor is most commonly seen in middle-aged or older animals (4,5,9). The causes of the tumor are not well understood, although the tumors in cats have been linked to vaccine injections (4). The tumor can be seen in domestic animals' dermal or subcutaneous extraskkeletal areas including dorsal thoracic and scapular area, neck, flank, abdomen, muzzle, and hind (4,5,6,10), forelimbs (5,11,12), and costal abdominal region (13). In humans, the most common location is in the lower extremities, head, and neck regions (14). Macroscopically the tumor is well circumscribed, small, firm, solitary, nodular, and encapsulated or unencapsulated with ulcerated overlying skin (5,12,14,15). On the cut surface, the tumor consists of multiple nodules and is often gray/white and firm with small red mottled areas of hemorrhage and necrosis (4,5,14). The tumor consists of abundant osteoclast-like multinucleate giant cells, histiocytic cells, and fibroblasts with hemorrhage and necrosis (4,10,13,14,16). Multinuclear giant cells, also described as giant cell forms in humans, are a distinctive feature for this tumor (3). The behavior of this tumor varies among individual animals. Metastasis of the tumoral cells has been reported to the lymph node in some cases (11), and the tumor is generally invasive with a high recurrence rate (3,4,12,13). The present report describes a giant cell type of MFH on the abdominal region of a domestic short-hair Ankara (Angora) cat.

Case history

The intact, neutered 6 years before, 11-year old domestic short-hair Ankara queen with a mass in the right abdominal mammary region (Figure 1A) was presented to the clinics of obstetrics and gynecology of Uludağ University. A private veterinary clinic had operated twice on similar masses in the same region of the animal over the past 6 years without sending the mass to a pathology laboratory. The cat was referred to the obstetrics and gynecology department of Uludağ University with the same complaint. On clinical examination, heart rate, respiratory rate, mucous membrane color, capillary refill time, and temperature were all within normal ranges. Haematologic parameters were determined using an Abbott Cell-Dyn 3500 hematologic analyzer (Gml Inc, Ramsey, Minnesota, USA). Erythrocyte (7.93 M/mL), hemoglobin (14.0 g/dL), HCT (40.6%), MCV (51.2 fL), MCH (17.7 pg), MCHC (34.5 g/dL), total leukocyte count (WBC) (8.50 K/mL), and platelet (328 K/mL) counts were within normal limits. Transabdominal ultrasonography was performed using a B-mode real-time 7.5 MHz linear array transducer (Terason Portable Ultrasonography System, Teratech Corporation, Burlington, USA). In the present case, ultrasonography of the abdomen did not reveal any pathologic structures in the abdominal organs. Ultrasonography of the mass in the right abdominal mammary region revealed regular shape, well-defined borders, homogenous hypoechoic internal echogenicity except centre area, and anechoic in the centre of tumor mass (Figure 2). The mass was removed using a mastectomy technique and submitted to the department of pathology for diagnosis.

Results and discussion

The elliptical (8 × 7 × 5 cm) tumor mass was covered with ulcerated skin, and had a flexible consistency. A necrotic area of 3 × 1.5 × 1 cm and hemorrhage were observed in the middle of a cut surface of the tumor (Figure 1B). Microscopically, the tumor was subcutaneous and unencapsulated. Tumor cells were comprised of a mixture of fibroblast-like spindle and histiocytic-like cells with a pale pink cytoplasm (Figure 3A), and were oval or elongated



Figure 1A. Tumoral mass on abdominal mammary region with ulcerative skin.



Figure 1B. Necrosis and hemorrhage in the middle of cut surface of the tumor.



Figure 2. Ultrasonographic image of the mass in the right abdominal mammary region (arrow).

with a round, large nucleus with a small and single nucleoli. Besides these cells, abundant, randomly scattered, eosinophilic, multinucleated giant cells with a finely granular cytoplasm and shapes that varied from round to oval or irregular were observed. The number of nuclei in giant cells ranged from 2 to more than 20 (Figure 3B). Nuclei had a vesicular appearance with a uniform size. There were a few mitotic figures and extensive necrosis. Moreover, in the tumor field, there was dense collagen connective tissue, foci of cartilaginous, bony metaplasia, and hemorrhage. Thoracic radiography and abdominal radiography were performed to investigate any

evidence of metastatic disease and no specific pathologic findings related with metastasis were found.

The giant cell type of MFH is an uncommon malignant tumor of the superficial and deep connective tissue in humans and animals. It is characterized as primitive sarcoma with partial fibroblastic and histiocytic differentiation (1-3,8). This tumor has been expressed as the soft tissue variant of the giant cell tumor of bone (3,14,17), and has been considered as an extraskeletal giant cell tumor in humans and a giant cell tumor of soft parts in horses and cats (3,6,8,13). Although the giant cell variant of MFH was observed only in cats (6,12) and occasionally in dogs, this tumor type is probably the same tumor seen in other species (3, 7,8,13,18). The giant cell type is the most common sub-type seen in cats (4,6,19). The origin of GCT-SP is unknown (8,20); however, immunohistochemical analysis demonstrates 2 distinct cells subtypes: vimentin expressing mesenchymal cells and CD-18 expressing multinucleated giant cells (5). These results suggest that both fibroblastic and histiocytic cells may be derived from undifferentiated stem cells or from primitive cells (pluripotent mesenchymal cells) with a heterogeneous nature undergoing fibrohistiocytic differentiation (2,5,8,11,13). The giant cell type of MFH is considered relatively rare in cats (11,13,21). Only 2 out of 85 amputated digits, due to the tumors from cats, were associated with MFH (21).

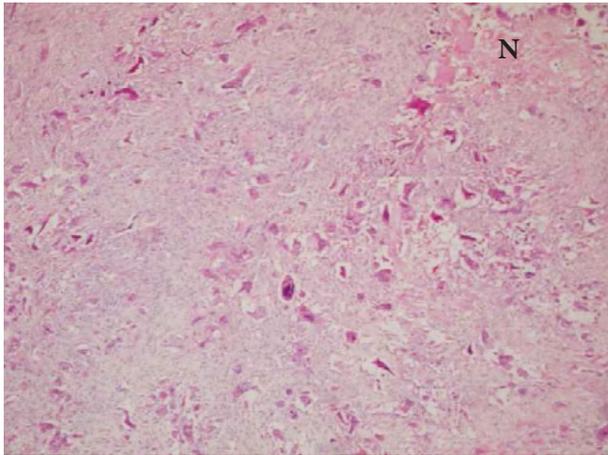


Figure 3A. General appearance of the tumoral cells comprised of various mixture of fibroblast and histiocytic-like cells and giant cells with necrotic area (N). Original magnification 10 \times , (H&E).

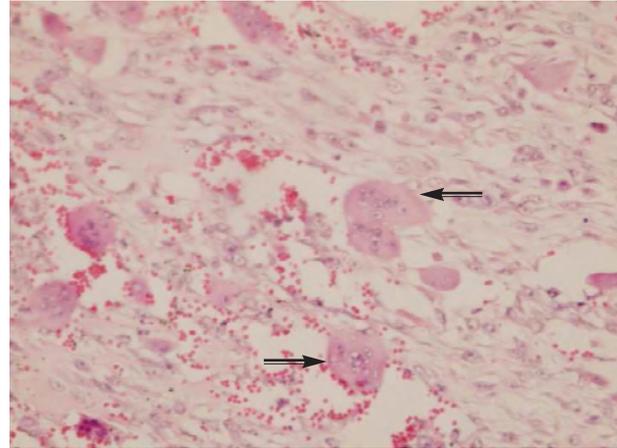


Figure 3B. Giant cells in various shapes with round, large nucleus with small and single nucleoli (arrows). Original magnification 40 \times , (H&E).

Additionally, in a retrospective study, 16 of 195 vaccinations associated with feline sarcomas were diagnosed with MFH (22). Previous feline case reports indicate that there is no sex or breed predilection. However, it has been postulated that domestic short haired cats are the most affected breed (12,13,21). This tumor was seen in middle age or older animals (3,12,13,21) and affected cats range from 4 to 12 years of age (9,12,13,21). The tumor is associated with vaccination; however, it can be seen in nonvaccine sites in the dermis or subcutis (3). The giant cell type of MFH is more settled on different anatomical areas of extraskeletal extremities in cats and horses (5,6,11-13). The tumor has been observed on the flank, abdomen (5,13), muzzle, thorax (5,6), shoulder (3), neck (3,5,12), and the interscapular area (12). Typically, the tumor presents as a well-circumscribed, but not encapsulated, solitary or multinodular mass in the skin or subcutaneous tissue with red-brown or gray-white color, and can have hemorrhage and necrosis on cut surfaces (4,14,23,24). The principal histological feature of the present tumor is the various mixture of fibroblast, histiocytes and giant cells with numerous nuclei and foci of hemorrhage and necrosis (5,11-14,22-24). Besides, inflammatory cells, foci of cartilaginous and bone metaplasia, collagenous connective tissue were observed (12,24). Histologically, the predominant features of the giant cell type of osteosarcoma and

fibrosarcoma are similar to the giant cell type of MFH and include dispersed giant cells in stroma (4,5,23). Nevertheless, the giant cell is not the predominant cell type of fibrosarcoma and osteosarcoma (4,23). Further, the anatomical site of the tumor is important in differentiating between osteosarcoma and the giant cell type of MFH. Extraskeletal osteosarcomas rarely affect the skin and usually display bone or osteoid production in stroma (14,24). The tumor is sometimes confused with other lesions and can be mistreated (12). The tumor in this cat had been treated as a mammary tumor due to its location and the cat was presented to the obstetrics and gynecology department for treatment. Typically, the giant cell type of MFH is a locally aggressive neoplasm that recurs frequently. If it is not removed properly, however, distant metastasis may be seen (4,11-13,22,24). Recurrences are more commonly observed than distant metastases in both humans and animals (12-15). If the tumor is dermal or subcutaneous (superficial or locally invasive) in humans, it is seen to recur after excision and distant metastasis is seldom reported. Nonetheless, if the tumor is located in deep tissues, metastasis is more commonly observed (12,22). The metastatic potential of a tumor may be related to its multicentric nature (4). In the present case, the tumor was located subcutaneously and there were no specific pathologic findings related with metastasis according to the thoracic and abdominal

radiography although local recurrences were observed 3 times within 6 years in the same area. Because of the difficulty of identifying a tumor based

only on location and gross examination, excision with morphologic assessment is the only reliable diagnostic tool for diagnosis of the giant cell type of MFH.

References

1. Hamlat, A., Adn, M., Caulet-Maugendre, S., Guegan, Y.: Cerebellar malignant fibrous histiocytoma: case report and literature review. *Neurosurgery*, 2004; 54: 751-752.
2. Yamate, J., Fumimoto, S., Kuwamura, M., Kotani, T., Lamarre, J.: Characterization of a rat subcutaneous malignant fibrous histiocytoma and its tumor lines, with reference to histiocytic features. *Vet. Pathol.*, 2007; 44: 151-160.
3. Pool, R.R., Thompson, K.G.: Tumor of joints. In: Meuten, D.J. ed., *Tumors in Domestic Animals*. 4th edn., Iowa State Press, Ames, Iowa. 2002: 199-243.
4. Goldschmidt, M.H., Hendrick, M.J.: Tumors of the skin of soft tissues. In: Meuten, D.J. ed., *Tumors in Domestic Animals*. 4th edn., Iowa State Press, Ames, Iowa. 2002: 45-117.
5. Bush, J.M., Powers, B.E.: Equine giant cell tumor of soft parts: a series of 21 cases (2000-2007). *J. Vet. Diagn. Invest.*, 2008; 20: 513-516.
6. Aydın, Y., Atalay Vural, S., Öznur, N.: Malignant fibrous histiocytoma of the giant-cell type in a cat. *Ankara Üniv. Vet. Fak. Derg.*, 2003; 50: 247-249. (article in Turkish with an abstract in English)
7. Pérez-Martínez, C., García-Fernández, R.A., Reyes Avila, L.E., Pérez-Pérez, V., González N., García-Iglesias, M.J.: Malignant fibrous histiocytoma (giant cell type) associated with a malignant mixed tumor in the salivary gland of a dog. *Vet. Pathol.*, 2000; 37: 350-353.
8. Pace, L.W., Kreeger, J.M., Miller, M.A., Turk, J.R., Fischer, J.R.: Immunohistochemical staining of feline malignant fibrous histiocytomas. *Vet. Pathol.*, 1994; 31: 168-172.
9. Confer, A.W., Enright, F.M., Beard, G.B.: Ultrastructure of a feline extraskeletal giant cell tumor (malignant fibrous histiocytoma). *Vet. Pathol.*, 1981; 18: 738-744.
10. Ford, G.H., Empson, R.N. Jr., Plopper, C.G., Brown, P.H.: Giant cell tumor of soft parts. A report of an equine and a feline case. *Vet. Pathol.*, 1975; 12: 428-433.
11. Gibson, K.L., Blass, C.E., Simpson, M., Gaunt, S.D.: Malignant fibrous histiocytoma in a cat. *J. Am. Vet. Med. Assoc.*, 1989; 194: 1443-1445.
12. Gleiser, C.A., Raulston, G.L., Jardine, J.H., Gray, K.N.: Malignant fibrous histiocytoma in dogs and cats. *Vet. Pathol.*, 1979; 16: 199-208.
13. Garma-Aviña, A.: Malignant fibrous histiocytoma of the giant cell type in a cat. *J. Comp. Pathol.*, 1987; 97: 551-557.
14. Boneschi, V., Parafioriti, A., Armiraglio, E., Gaiani, F., Brambilla, L.: Primary giant cell tumor of soft tissue of the groin - a case of 46 years duration. *J. Cutan. Pathol.*, 2009; 36 (Suppl. 1): 20-24.
15. Kiran, M.M., Karaman, M., Hatipoğlu, F., Koç, Y.: Malignant fibrous histiocytoma in a dog: a case report. *Vet. Med. Czech*, 2005; 50: 553-557.
16. Oda, Y., Tamiya, S., Oshiro, Y., Hachitanda, Y., Kinukawa, N., Iwamoto, Y., Tsuneyoshi, M.: Reassessment and clinicopathological prognostic factors of malignant fibrous histiocytoma of soft parts. *Pathol. Int.*, 2002; 52: 595-606.
17. Ichikawa, K., Tanino, R.: Soft tissue giant cell tumor of low malignant potential. *Tokai J. Exp. Clin. Med.*, 2004; 29: 91-95.
18. Hazirolu, R., Kul, O., Tunca, R., Güvenç, T.: Osteoclast-like giant cell tumour arising from the kidney in a dog. *Acta Vet. Hung.*, 2005; 53: 225-230.
19. Pires, M.A.: Malignant fibrous histiocytoma in a puppy. *Vet. Rec.*, 1997; 140: 234-235.
20. Morris, J.S., McInnes, E.F., Bostock, D.E., Hoather, T.M., Dobson, J.M.: Immunohistochemical and histopathologic features of 14 malignant fibrous histiocytomas from flat-coated retrievers. *Vet. Pathol.*, 2002; 39: 473-479.
21. Wobeser, B.K., Kidney, B.A., Powers, B.E., Withrow, S.J., Mayer, M.N., Spinato, M.T., Allen, A.L.: Diagnoses and clinical outcomes associated with surgically amputated feline digits submitted to multiple veterinary diagnostic laboratories. *Vet. Pathol.*, 2007; 44: 362-365.
22. Doddy, F.D., Glickman, L.T., Glickman, N.W., Janovitz, E.B.: Feline fibrosarcomas at vaccination sites and non-vaccination sites. *J. Comp. Pathol.*, 1996; 114: 165-174.
23. Tuluc, M., Zhang, X., Inniss, S.: Giant cell tumor of the nasal cavity: case report. *Eur. Arch. Otorhinolaryngol.*, 2007; 264: 205-208.
24. Guo, H., Garcia, R.A., Perle, M.A., Amodio, J., Greco, M.A.: Giant cell tumor of soft tissue with pulmonary metastases: pathologic and cytogenetic study. *Pediatr. Dev. Pathol.*, 2005; 8: 718-724.