Aggressive Fibromatosis in a Cat

Akihiko MOTOZAWA, Hitoshi YAMAZAKI1), and Koichi KADOTA2)*

 Motozawa Animal Hospital, 3–13 Sengokumachi, Takaoka 933, 1)Seibu Livestock Hygiene Service Centre, 939–13 Tonami, Saburoumaru, Toyama 343, and 2)National Institute of Animal Health, 3–1–1 Kannondai, Tsukuba 305, Japan

(Received 22 August 1991/Accepted 7 January 1992)

ABSTRACT. A case of aggressive fibromatosis (extra-abdominal desmoid) found in a 9-month-old male mixed breed cat is described. The right forearm was almost completely effaced by fibrous tissue and there were some tumours in the area from the shoulders to the mandible. These tumour-like tissues were composed of abundant collagen fibres and sparse numbers of well-differentiated fibroblasts, whereas their growing pattern was aggressive and non-encapsulated. There was dense growth of immature fibroblasts and multinucleated giant cells in some areas. Vimentin immunohistochemistry and electron microscopy suggested that the giant cells had close relation to the fibroblasts, and such areas may be the sites of cell proliferation. This case is different from nodular fasciitis and may be a proliferative disorder induced by feline oncogenic retrovirus.—KEY WORDS: aggressive fibromatosis, cat, extra-abdominal desmoid, feline leukaemia virus.


Aggressive fibromatosis (extra-abdominal desmoid) is a non-metastasizing tumour-like fibroblastic growth of unknown pathogenesis involving voluntary muscle as well as aponeurotic and fascial structures. It has a strong tendency to local recurrence and aggressive, infiltrating growth. In contrast, nodular fasciitis is a benign and probably reactive fibroblast growth extending as a solitary nodule from the superficial fascia into the subcutaneous fat, or less frequently into the subjacent muscle [2]. In animals, most fibroblastic tumours are fibromas or fibrosarcomas and several cases of nodular fasciitis have been reported as a synonym of aggressive fibromatosis in the dog and cat [6]. Here we describe a case of feline aggressive fibromatosis, which is distinguishable from other fibroblastic tumours or tumour-like conditions including nodular fasciitis.

MATERIALS AND METHODS

Feline leukaemia virus specific antigens were examined using enzyme-linked immunosorbent assay (Pitman-Moore, Inc., Washington Crossing, NJ, U.S.A.).

Excised tissues were fixed in 10% buffered formalin and embedded in paraffin. Sections were stained with haematoxylin and cosin (HE) and phosphotungstic acid haematoxylin (PTAH). The immunoperoxidase method for myoglobin, desmin and vimentin was applied to paraffin sections. Primary rabbit antisera against myoglobin and desmin were purchased from Lipshaw Corporation, Detroit, MI, U.S.A., and mouse monoclonal antibody to vimentin was obtained from Dako Corporation, Carpinteria, CA, U.S.A. StrAviGen biotin-streptavidin universal kits (BioGenex Laboratories, Dublin, CA, U.S.A.) were used in the subsequent processes. For electron microscopy, formalin-fixed tissues were also utilized. After postfixation in 1% osmium tetroxide, dehydration in ethanol and epoxy resin embedding, thin sections were cut and stained with uranyl acetate and lead citrate. Electron micrographs were made with a JEM-100CX electron microscope.

RESULTS

A 9-month-old male cat of mixed breeding was examined because of a swelling of the right forelimb, which had been induced by being bitten probably by a cat two months previously. He was non-weightbearing on the right forelimb, inappetent and depressed. The swollen area ranged from the toes to the shoulder joint, although predominant in the forearm (Fig. 1), and was tender on pressure. A round ulcerative lesion, 2 cm in diameter, was present inside the forearm with a purulent exudate. There were tumours, 3 cm in diameter, on the right cervix and on the dorsal portion of the right shoulder. Radiographic examination revealed that the ulna and radius were mostly absent (Fig. 2). Feline leukaemia virus antigen was demonstrated in the blood.

* CORRESPONDENCE TO: KADOTA, K., National Institute of Animal Health, 3–1–1 Kannondai, Tsukuba 305, Japan.
After antibiotic treatment, his condition improved, but the swelling remained unchanged. Nine days later, the right forelimb was amputated from the shoulder joint and the skin tumours were excised. Although the postoperative course was satisfactory, afterwards tumours were newly formed: one ranged from the right cervix to the mandible and the other was located on the left shoulder. Seventy-five days after the first surgery, these tumours were excised surgically. Four days
after the second surgery the animal died suddenly and the necropsy was not permitted.

Macroscopically, there was a columnar swelling from the forearm to the toes, associated with the proliferation of greyish-white, hard, fibrous tissue in the subcutis. The forearm was severely involved and the fibrous tissue extended from the subcutis to the bone marrow. A 3 × 3 × 5 cm-tumour in the tendon of the elbow joint showed a similar appearance and the epiphysis of the upper arm was slightly involved. The tumour from the right cervix to the mandible measured 4 × 5 × 7 cm and the tumour on the left shoulder measured 1 × 2 × 3 cm. All tumours present in the area from the shoulders to the mandible were composed of subcutaneous fibrous tissue, adhered to the fascia and were not associated with bones.

Histologically, the lesion of the forearm was composed of large amounts of collagen and sparse numbers of well-differentiated fibroblasts showing a slender spindle shape (Fig. 3). Although mitotic figures in these cells were inconspicuous, the fibrous growth was aggressive and infiltrative. The fibrous tissue invaded the surrounding muscular tissue and in parts there were residual myocytes showing atrophy or degeneration (Fig. 4) and some small bony tissues. Haemorrhage and infiltration of lymphocytes or neutrophils were extremely rare. In addition to such tissues, highly cellular areas comprising multinucleated giant cells and immature fibroblasts, large plump or spindle-shaped, were present near the muscular tissues or merged with them (Fig. 5). These cells showed occasional mitotic figures. The residual myocytes, some of which had multiple nuclei, displayed intense positive reactivity for myoglobin and desmin, while giant cells and all spindle cells were unstained for them. Almost all fibroblasts were positive for vimentin (Fig. 6) and giant cells showed occasional positive reactivity for it (Fig. 7). The other tumours were located in the subcutis and showed histological findings similar to those of the forearm. The fibrous tissues invaded the musculatures but the epidermis and corium were intact. Lymph node metastases were absent.

Ultrastructurally, the well-differentiated fibroblasts had elongated nuclei, abundant euchromatin and small nucleoli. The cytoplasm contained moderate to large quantities of rough endoplasmic reticulum (RER), several lysosomes, intracytoplasmic filaments, pinocytotic vesicles, and rare desmosome-like structures (Fig. 8). Some cells showed a myofibroblastoid appearance characterized by subplasmalemmal densities and microfilaments with focal densities. The immature fibroblasts had fusiform to ovoid nuclei and similar cytoplasmic ultrastructures to those of the mature fibroblasts. The giant cells had multiple indented nuclei with slightly condensed chromatin and moderately prominent nucleoli, and there were small, electron-dense mitochondria and smooth endoplasmic reticulum (SER) or vesicles throughout the cytoplasm. These cells revealed a confined distribution of rough endoplasmic reticulum (RER), and occasional findings were vacuoles with or without scattering filamentous structures, microvillus cytoplasmic processes, complicated invagination of cell membranes with subplasmalemmal amorphous substances, and intracytoplasmic filaments. Multiple centrioles and intranuclear fibrillary inclusions were very rare. The giant cells frequently adhered to the large fibroblasts (Fig. 9).

DISCUSSION

The tumours in the present case exhibited clinically relatively malignant behaviour and histologically non-encapsulated, aggressive growths, while their
components were abundant collagen fibres and sparse numbers of well-differentiated fibroblasts. Such tissues are different from fibromas characterized by a benign, well-circumscribed growth of mature fibrous connective tissue [1, 2, 8].

Fig. 6. Tumour from the right cervix to the mandible. Fibroblasts display positive cytoplasmic reactivity for vimentin, while muscle fibres are negative (upper left). \( \times 200 \).

Fig. 7. Tumour from the right cervix to the mandible. Almost all fibroblasts and a few giant cells (arrows) stain positively for vimentin. \( \times 200 \).

Fig. 8. Forelimb tumour. A fibroblast has an irregularly contoured nucleus and is well endowed with rough endoplasmic reticulum. Abundant collagen fibrils are present in the matrix. \( \times 5,100 \).

Fig. 9. Forelimb tumour. A multinucleated giant cell has well-developed organelles and a large vacuole. Giant cells are in contact with a fibroblast (arrows). \( \times 2,700 \).

Fibrosarcoma is a malignant tumour composed of immature fibroblasts with obvious mitotic activity and relatively scanty collagen. The tumour is highly cellular and the neoplastic fibroblasts may reveal atypia and some variation in size [3–6]. These
Histological features are different from those of our case. Fibrosarcomas usually metastasize through the blood stream with secondary tumours found first in the lungs, although a few have metastasized through the lymphatic vessels to the lymph nodes [3–6]. In the present case, the tumours except the forelimb tumour existed in the subcutaneous and muscular tissues without involvement of the neighbouring lymph nodes. The subcutis and musculature are not common sites where embolic metastasis occurs. The multicentric lesions may be a result of multiple primaries, although it is probable that the subsequent cervical lesion is a recurrence of the first one.

Although the highly cellular areas with multinucleated giant cells and fusiform cells in the present case resembled the lesions of giant cell tumours, the areas were not extensive compared with the richly collagenous fibrous tissues. The areas were always located near the muscular tissues and their component cells were often admixed with residual myocytes. The giant cells, however, were stained negatively for myoglobin and desmin and positively for vimentin, and were in contact with the immature fibroblasts. These findings suggested that the giant cells were closely related to the immature fibroblasts, and such areas may be the site of cell proliferation. Although mitotic figures were not so numerous even in the cellular areas, the disease course was relatively acute and malignant. The fibroblasts with well-developed RER may have produced large amounts of collagen and may have caused rapid increase of the tumour size.

In animals nodular fasciitis is a term used to describe a non-neoplastic lesion having many features of inflammation, clinically exhibiting aggressive behaviour suggestive of a locally invasive neoplasm. This disorder has been reported in the dog and cat and was considered to be synonymous with aggressive fibromatosis [6]. On the other hand, aggressive fibromatosis in man, a non-metastasizing tumour-like fibroblastic growth has a strong tendency to local recurrence and aggressive, infiltrating growth and is quite different from nodular fasciitis which is a benign and probably reactive fibroblastic growth [2]. The term, nodular fasciitis in animals presumably contains two disease entities and should be divided into true nodular fasciitis and aggressive fibromatosis. Histologically the present case was characterized by non-encapsulated, aggressive growths of mature fibrous tissues composed of abundant collagen fibres and sparse numbers of fibroblasts and may be situated between benign and malignant tumours judging from a clinical aspect. Such a disease bears a close resemblance to aggressive fibromatosis defined in human medicine and does not correspond to nodular fasciitis or aggressive fibromatosis defined in animals [6].

Feline fibrosarcoma is seen with moderate frequency in domestic cats and approximately one third of these cats are infected with a "defective" feline sarcoma virus (FeSV) and "helper" feline leukaemia virus (FeLV) [7]. Cats with multiple fibrosarcoma are usually younger than ones with solitary fibrosarcoma and are closely associated with the retrovirus infection [3, 7]. These retroviruses can cause cats various oncogenic diseases and proliferative disorders and may be associated with the present tumour-like condition, which occurred multicentrically in a relatively young cat and showed positivity for FeLV group-specific antigens.

Acknowledgements. We thank Mr. Y. Ando and Mr. T. F. Watanabe for their help with this work.

References


