Primary Extranodal Lymphosarcoma of the Trachea in a Cat

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ABSTRACT. A primary extranodal lymphosarcoma causing recurrent episodes of dyspnea and exercise intolerance is described in a 13-year-old cat. The affected segment of the tracheal wall was markedly thickened due to transmural infiltration of monomorphic neoplastic lymphoid cells and the lumen was severely compressed. The diagnosis was based on light microscopic studies, positive immunostaining for feline IgA, and special stains. — KEY WORDS: feline, lymphosarcoma, trachea.

Feline lymphosarcomas (FLSA) are the most common type of hematolymphatic tumor in cats and account for about 60 to 90% of all hematolymphatic tumors and about 30% of all tumors in this species [4, 8]. The majority of FLSA are known to be caused by feline leukemia virus (FeLV) or possibly by feline immurodeficiency virus (FIV) alone [2, 9, 10]. FLSA are classified into mediastinal (thymic), alimentary, multicentric, or miscellaneous (extranodal) forms according to the anatomical location [4, 8]. The common sites of feline extranodal lymphosarcomas are central nervous system, eye and kidney [4, 8]. Prevalence of the extranodal lymphosarcomas in cats is considered to be less than 10% of all feline lymphosarcoma cases [4]. This report describes a case of extranodal primary lymphosarcoma in the trachea of a 13-year-old Siamese cat.

A 13-year-old spayed female Siamese cat was admitted to the Louisiana State University Veterinary Teaching Hospital because of a 3-month history of recurring episodes of dyspnea, cyanosis, and exercise intolerance. The cat was negative for FeLV on ELISA test. Symptomatic dexamethasone and antibiotic therapy during that period was unsuccessful. Thoracic radiographs revealed a mass which appear to encroach upon the trachea in the cranial mediastinum (Fig. 1). Benign or malignant bone, cartilage or smooth muscle tumor were considered as differential diagnoses by the clinician. Thoracic radiographs also revealed a moderately enlarged right cardiac ventricle (Fig. 1). Euthanasia was elected due to a poor prognosis and the animal was submitted for postmortem examination.

At necropsy, a firm, homogeneous tan, encircling mass, 1–2 cm in thickness and 2.5 cm in length, was found around the trachea approximately 3 cm cranial to the tracheal bifurcation. On cross section, the mass infiltrated the entire thickness of the tracheal wall and the tracheal lumen as markedly narrowed but patent. The right ventricle of the heart was moderately dilated. The lung and liver were diffusely congested and the liver had an accentuated lobular pattern. Impression smears of the tumor mass revealed monomorphic round cells with mild degrees of anisocytosis and anisokaryosis.

The tracheal tumor mass and other representative organ specimens were fixed in phosphate buffered 10% formalin and routinely processed. 5 μm paraffin sections were stained with hematoxylin and eosin for light microscopy. Replicate sections of the tracheal mass were also stained with Toluidine blue, Giemsa, and periodic acid-Schiff (PAS) methods. For immunohistochemical detection of feline IgG or IgA production from the tumor cells, commercially available anti-feline IgG and IgA rabbit polyclonal antibodies (Bethyl Laboratories, Montgomery, Texas, U.S.A.) were used as primary antibodies at a dilution of 1:2,000. Immunoreactivity was detected by standard avidin-biotin immunoperoxidase methodology according to the manufacturer's protocol (ABC Elite Kit, Vector Laboratories, Burlingame, California, U.S.A.). Normal feline mesenteric lymph node was used as positive control. Formalin-fixed tumor tissue was minced and further fixed in 2% glutaraldehyde and subsequently in osmium tetroxide. Fixed specimens were epon-araldite embedded and ultrathin sections were stained with 1% lead citrate and uranyl acetate and examined under a transmission electron microscope (Zeiss model 109).

Microscopically, the tumor was characterized by an infiltrative, transmural growth that extended from the mucosa to the tunica adventitia destroying and isolating the submucosal glands and narrowing the tracheal lumen (Fig. 2). The mass consisted of a sheet of lymphoid cells with a mild degree of anisocytosis (Fig. 3). The neoplastic cells had round hyperchromatic nuclei and small to moderate amounts of basophilic cytoplasm and occasionally showed plasmacytoid differentiation. The frequency of mitotic figures were low (0 to 2 in high power field). No neoplastic lymphocytic foci were found elsewhere including lymph nodes and bone marrow. Diffuse sinusoidal congestion and deposition of yellowish brown pigments in the hepatocytes were observed in the liver. The alveolar capillaries were congested. A parafollicular cell adenoma in the thyroid gland was regarded as an incidental finding.

The neoplastic cells did not stain with toluidine blue, Giemsa, or PAS methods. Immunohistochemical staining of the neoplastic cells revealed scattered patchy aggregates of cells that stained positive for feline IgA but failed to stain for feline IgG. No mast cell granules or membrane-bound dense core granules typical of neuroendocrine cells were identified ultrastructurally. The neoplastic cells lacked desmosomes or other kinds of junctional complexes.
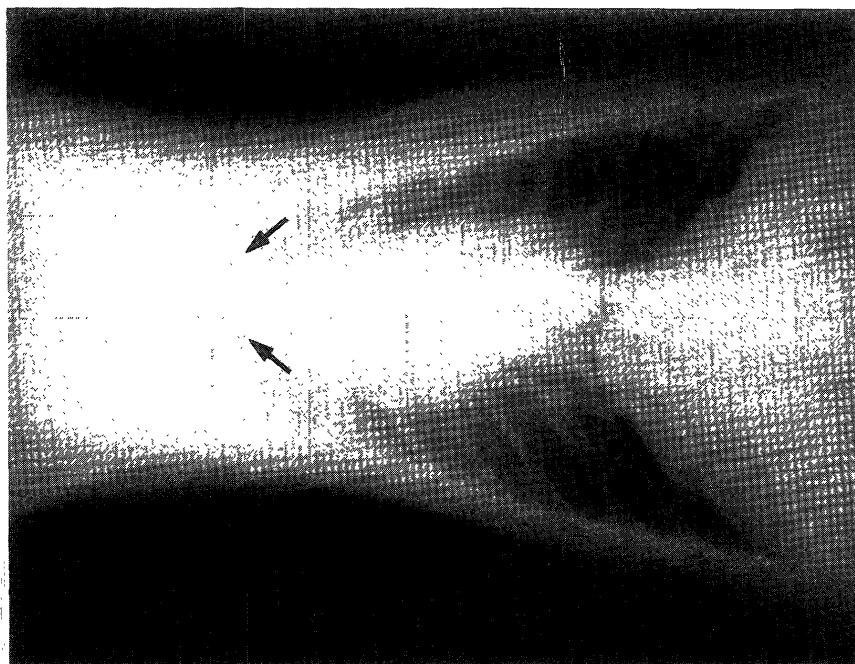
Fig. 1. Thoracic cavity. Thoracic radiograph reveals the mass which appears to encircle the trachea (arrow heads). Also note the enlarged heart.
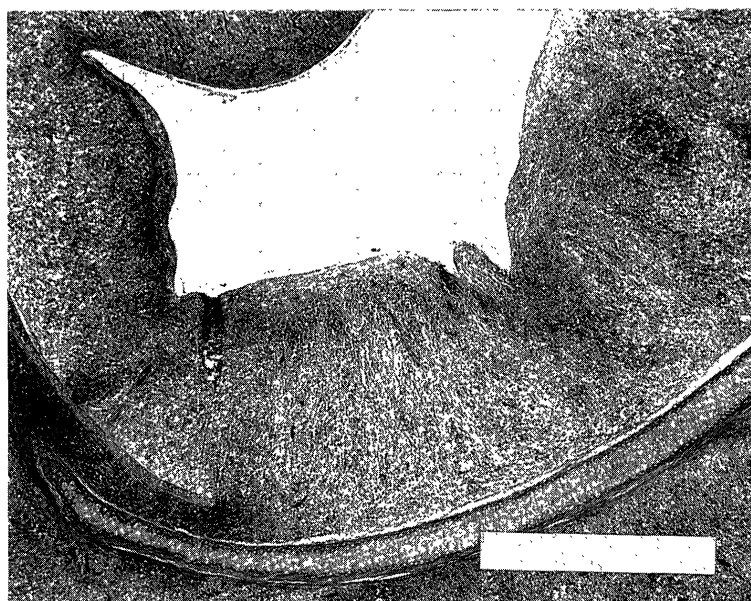

Fig. 2. Trachea. Note the transmural, infiltrative growth of tumor which destroys the normal architecture of the trachea and compresses the tracheal lumen. HE. Bar = 570 μm.

The tumor was diagnosed as a primary extranodal B-cell lymphosarcoma in the trachea on the basis of histopathology, special stains, immunohistochemistry and electron microscopy, which ruled out mast cells and neuroendocrine cells.

Primary tracheal tumors are rare in both animals and human. Only 21 cases of tracheal tumors have been reported in dogs and 9 cases have been reported in cats [3]. Twenty-one tumors reported in dogs were composed of 13 benign and malignant bone and cartilage tumors, 3 mast cell tumors, 2 leiomyomas, and 3 adenocarcinomas. Among 9 feline tracheal tumors, 7 were adenocarcinomas and squamous cell carcinomas and the remaining 2 were FLSA. Of the 2 feline tracheal lymphosarcomas 1 was a primary histiocytic lymphosarcoma which was treated successfully by a combination therapy [11]. The other was a lymphoblastic
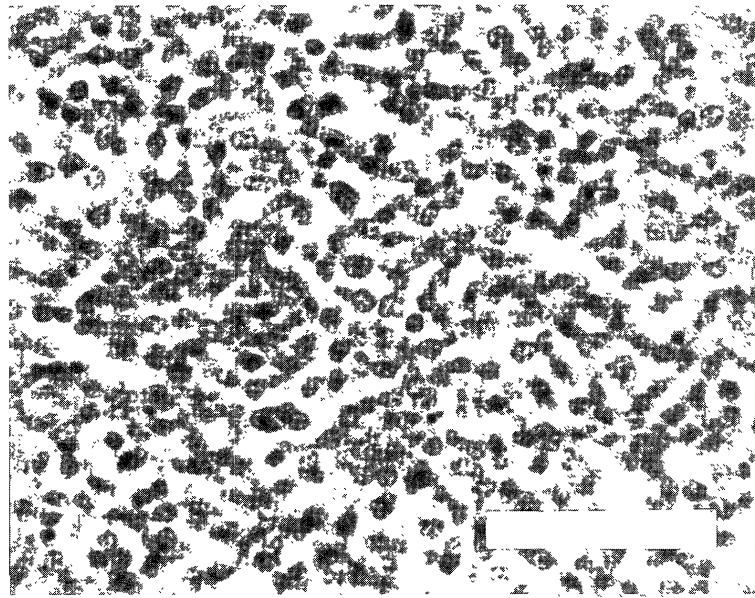
Fig. 3. Trachea. Higher magnification of Fig. 2 showing densely packed populations of round lymphoid cells. Note some cells with plasmacytoid differentiation. HE. Bar = 34 μm.

lymphosarcoma which was removed successfully by surgery but the cat was euthanized 4 months later due to dissemination [1]. As opposed to occurrence in the trachea, lymphosarcomas are known to be the most common laryngeal tumor of the cat [3]. Among 23 cases of laryngeal tumors reported in cats, 10 cases were diagnosed as lymphosarcoma. Although it is very uncommon, the trachea can be involved as part of multicentric form or as a primary site for the extranodal form of feline lymphosarcomas.

The thymic and multicentric forms of FLSA are known to originate from T-lymphocytes (T-cell), whereas the alimentary form is primarily B-lymphocyte (B-cell) in origin [8]. It has been demonstrated that lymphosarcomas of B-cell origin usually occur in cats older than 7 years old and are often negative for FeLV, whereas those of T-cell origin are often positive for FeLV and occur in young cats less than 7 years old [5]. About 10 to 30% of cats with naturally acquired FLSA are negative for FeLV [7]; however some of those cases do have FeLV-related antigens or integrated provirus [6, 7]. The neoplastic cells in this cat were likely B-cell in origin as evidenced by the result of immunohistochemistry. This cat was negative for FeLV on ELISA test and no viral particle was found on electron microscopy.

Recently, several documented cases of FLSA associated with FIV in FeLV negative cats have been reported [2, 9, 10]. It is interesting that FIV-induced FLSA are usually extranodal and solitary in nature, B-cell in origin, and are more common in male cats older than 6 years old [9]. FIV status of this cat was unknown. The risk of developing FLSA is significantly higher in cats infected with single FIV or dual FeLV and FIV compared to that of single FeLV infection [12].

The extranodal form of FLSA can occur any organ or tissue throughout the body. It is likely that the neoplastic cells in this cat were derived from primed B-cells which normally present in the submucosa of the trachea as a part of the normal mucosa-associated lymphoid tissue since neoplastic foci were not found in any other organs inspected. It is possible that the solitary extranodal FLSA may arise from pre-existing B-cells which probably have a long course of antigenic stimulation prior to development of lymphoma [9]. Common sites for feline extranodal lymphosarcomas are kidney, CNS, and eye [4]. Although it is rare, lymphosarcoma should be included in the differential consideration of tracheal neoplasia in cats.

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