proliferating component of this tumor type, whereas the vacuolated cells are believed to be the older and degenerating cell population derived from the stellate cells. This interpretation is supported by our study which revealed the ultrastructural features of an actively synthesizing cell in the stellate cells, while the cells with large cytoplasmic vacuoles had lost most of these features.

The nature of the material produced in the stellate cells is not clear. The fine structure of the rough endoplasmic reticulum together with the abundance of fibrils in the matrix suggest that primitive cartilaginous components are being synthesized. This interpretation is supported by recent biochemical studies which have identified the presence of chondroitin 4- and 6-sulfate, keratan sulfate and hyaluronate in a proportion similar to that found in immature intervertebral discs.1

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Request reprints from Dr. H.M. Reznik-Schüller, Office of the Deputy Chief, Laboratory of Experimental Therapeutics and Metabolism, Developmental Therapeutics Program, Division of Cancer Treatment, National Cancer Institute, NIH, Bethesda, MD 20205 (USA).

An Atypical Spinal Meningioma in a Dog

R. E. RASKIN

Meningiomas are neoplasms derived from the dura mater, arachnoid, or pia mater and characterized morphologically by the presence of a whorling or twisting pattern. The tumor is composed of various populations of two cell types: the epithelial-like meningothelium and fibroblasts. Previous reports in the dog have described the epithelioid form in terms of the following types: endotheliomatous,6 syncytial,11 psammomatous8,11 and transitional.3A,7 Tumors which primarily exhibit a fibroblastic appearance also have been described.8,13 as have cases with mixtures of the above types—these are referred to only as meningioma.11 In man, up to nine morphologically distinct types have been described with approximately 22 variant forms.6 The varied appearance has been attributed to the mesodermal origin of the meningothelial cell.

This report describes the cytologic and histologic appearance of a meningeal tumor without significant whorling patterns. In addition, the presence of a homogeneous population of histiocyte-like cells was recognized as the prominent feature of this neoplasm.

A seven-year-old female mixed breed dog was presented with a two-year history of neck pain and front leg paresis. During this time, temporary improvement resulted from dexamethasone therapy. On its last presentation to the clinic, the dog was nonambulatory in all four limbs but voluntary movements were retained. All reflexes appeared to be of an upper motor neuron nature. Myelograms were taken twice during this time and revealed a slowly progressive extradural mass on the right side of the C3-4 vertebral space.

Exploratory surgery revealed a large discrete reddish-gray, gritty mass, approximately 1 × 1.5 × 0.5 cm, compressing the spinal cord from right to left. The mass was extradural with expansive compression of the spinal cord necessitating euthanasia.
Impression smears obtained at surgery and at necropsy were similar cytologically. Both preparations were moderately cellular and consisted of a homogeneous population of large round to ovoid cells occurring singly and as multinucleated forms (figs. 1, 2). These epithelial-like cells had nuclei that were round to ovoid with a fine chromatin pattern and were placed eccentrically within an abundant, eosinophilic and finely granular cytoplasm.

At necropsy, a remnant of the neoplasm measured 0.5 × 0.5 × 0.5 cm and appeared as a gray-white firm mass attached to the right ventral surface of the dura mater and lateral vertebral periosteum. There was subdural hemorrhage along most of the length of the spinal cord.

Histologically, the neoplastic mass was located extradurally, subdurally, and within the spinal cord. It was demarcated clearly from the surrounding nervous tissues and appeared more intimately involved with the meninges (fig. 3). The trichrome staining reaction was identical for the tumor cells and the normal cells located on the inner surface of the arachnoid layer—suggesting a similar cell of origin. As the mass expanded within the spinal canal, there was protrusion dorsally from the ventral surface into the center of the spinal cord with associated hemorrhage and malacia. The neoplasm was composed of trabeculae, clusters, and occasional sheets of cells which were supported by a loose connective tissue stroma that contained scant reticulin fibers. The neoplastic cells were individualized or in syncytium with a polygonal to elongated shape. The more numerous single cells resembled epithelioid macrophages with an abundant granular and frequently vacuolated eosinophilic cytoplasm. The vacuolation often was diffuse and gave the cell a “signet ring” appearance (fig. 4). The nuclei of these cells were round to ovoid, vesicular, occasionally vacuolated and near the periphery of the cell. Subtle whorling patterns could be detected, but only one area of concentrically placed cells was found in the multiple sections of this neoplasm. Mitotic figures were present rarely and no psammomatous bodies were observed.

The differential diagnosis included inflammation or neoplasia. The monomorphic population without the presence of other inflammatory cells led to the conclusion that the mass was neoplastic. Tumors considered included neoplastic reticulosis, chordoma, astrocytoma and a variant form of meningioma. This case lacked the features of neoplastic reticulosis which involve a rapid course of disease, perivascular location, anaplasia with a high mitotic index and abundant reticulin fibers. Histochemical analysis of the cells revealed that cytoplasmic vacuoles were periodic acid-Schiff negative. This eliminated the diagnosis of chordoma since these tumors usually contain significant amounts of glycogen. In contrast, a stain to detect iron absorption by acid mucopolysaccharides had a positive reaction suggesting the presence of a connective tissue mucus. A gemistocytic astrocytoma with meningeal involvement also was ruled out by an immunoperoxidase stain for glial fibrillary acidic protein which was negative for the neoplastic cells but positive for reactive astrocytes within the spinal cord.

An atypical spinal meningioma composed of cells with a histiocytic appearance exhibiting mucoid degeneration was described. This parallels a variant form of meningioma noted in human literature. This pattern has not been reported previously in the dog.

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Request reprints from Rose E. Raskin, D.V.M., Department of Pathology, College of Veterinary Medicine, Michigan State University, East Lansing, MI 48824-1314 (USA).

Chondrosarcoma of the Mitral Leaflet in a Dog

P. G. Greenlee and S.K. Liu

Primary tumors of the heart valves are rare. Primary chondrosarcoma involving the heart or heart valves has not been reported in the dog.

A 13-year-old intact mixed-breed female dog was examined because of a three-week history of lethargy, decreased appetite, weight loss, and coughing. Thoracic radiographs revealed an interstitial and peribronchial pattern in the lungs. The heart rate was 160 beats/minute; the pulse was weak, and the heart pounding, but no murmur could be auscultated. An electrocardiograph revealed sinus tachycardia, but otherwise was normal. Treatment with furosemide (2 mg/kg, three times a day, orally) was begun and initially the dog responded well, but died three days after examination.

On necropsy, a large (5 cm in diameter), firm, smooth, multilobulated, white mass was seen attached to the septal leaflet of the mitral valve (fig. 1). The left atrium was dilated moderately, and there was marked, focal, endocardial fibrosis. The lungs were uniformly bronze, heavy, wet, and meaty. Clear fluid exuded from the cut surface. There were a few 1-cm patches of pulmonary hemorrhage associated with thrombosed vessels, and multiple, pinpoint, gritty foci of subpleural mineralization. Numerous hyperplastic nodules were seen scattered throughout all liver lobes. The left adrenal gland contained a large (3 cm in diameter) mass that extended through the wall and into the lumen of the posterior vena cava.

Histologically, a mass composed of cartilage, large areas of which were undergoing necrosis and mineralization, was seen adjacent and attached to the leaflet (fig. 2). The cartilaginous cells varied in size and shape, and contained nuclei in lacunae within the chondroid ground substance. The nuclei were irregular, deeply basophilic, and occasionally plump and multiple, with irregular and variably prominent nucleoli (fig. 3). No mitotic figures were seen. The leaflet was thickened by...