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A Report On Brain Neoplasms in Two Canine Patients

by

Robert Froehlich*

During the past year two canine patients afflicted by brain neoplasms were admitted into the small animal clinic. These two particular neoplasms are representative of the brain tumors most commonly seen in the dog, namely the meningioma and the astrocytoma.

Milks observed that brain tumors are common, but not frequently reported in the dog (10). He states that ten cases were reported at necropsy in a four and one-half year period. Thrasher reports only one neurological tumor out of 145 neoplasms studied in 127 dogs (19). McGrath feels that boxers and Boston terriers have a higher incidence of brain tumors than other breeds (9). Other reports also indicate a high incidence in these two particular breeds.

In a study of human cases it was found that out of 191 intracranial tumors, 148 were meningiomas (6). Moulton states that this tumor is rare in the common domestic animals and that it is usually a tumor of the adult (12). He does not report any breed or sex disposition. It is interesting to note that in one study eight meningiomas were found at necropsy in 155 cats (8). These brains were, however, examined microscopically by multiple sagittal sections and several of these tumors were exceedingly small, grossly resembling brain tissue. This is suggestive of the presence of small, potentially neoplastic foci even in normal meningeal tissue. In this report all of the cats were free of clinical manifestations of neurological lesions.

The other rather common brain neoplasm is the astrocytoma. As Moulton points out, the poor classification and inadequate histopathological description of these neoplasms has led to a great deal of confusion and is certainly no aid in trying to evaluate the incidence of this tumor. He states that it occurs in most of the domestic animals—usually in adults and without sex preference (12). Jackson points out that although the fowl is afflicted by gliomas, the true astrocytoma is probably non-existent in that species (7).

Rubin says that the most common primary intracranial neoplasms are meningiomas and gliomas (16). He adds that the meningiomas are slower in their growth and cause fewer clinical signs than gliomas.

The clinical signs of brain tumors are often confused with other brain and neurological disorders. Because the symptoms are not distinctive one must make
Figure 1. Astrocytoma of the cerebellum. Low power view showing general morphology, X205.

Figure 2. Astrocytoma of the cerebellum: (a) Mitotic figure, (b) Nuclei of astrocytes. The cytoplasm stains poorly, X512.

every attempt to rule out any infectious process before making a diagnosis—especially distemper, rabies, and meningitis. Cerebral vascular accident can also be confused with neoplasm but its occurrence is rare in the dog and cat (10).

When neoplasms are present the patient usually has a normal temperature and mentality but often exhibits muscular incoordination (10). Other symptoms include periodic convulsions, blindness, nystagmus, pupillary dilatation, circling, limb paresis (12), paralysis or stiffness, unequal pupillary dilatation or constriction (10), and sensitivity about the head (9).

The signs observed are dependent upon the site of the tumor, the relation to the cranial nerves, the presence of hydrocephalus (12), the increased intracranial pressure due to tumor growth (9), and any hemorrhage or tissue reaction in the area of the tumor.

Examination of cerebrospinal fluid (CSF) can be a useful tool in the neurological exam. CSF pressure, as Rubin points out, reflects the dynamics of the brain mass, intracranial vasculature and the CSF itself (16). He also states that optic papilledema is not constant with increased CSF pressure in the dog.

Increased CSF protein may occur in any condition of increased capillary or cell permeability of the CNS (16).

Examination of reflexes is an invaluable aid in the neurological examination. Certain brain neoplasms are amenable to diagnosis by radiograph when used in conjunction with findings elucidated by the neurological exam. Plainol reports the use of IV injections of radioactive serum albumin to confirm the existence and to localize brain tumors and also to identify their histological type (15).

THE ASTROCYTOMA
CASE No. 64-C-1749

The patient was a seven year old female Boston terrier. Ten days previous to presentation the dog had been falling over after which it refused to rise for varying periods of time. The last such attack lasted 15 minutes. Since the most recent attack the dog had become lethargic, had trouble
breathing and had an accelerated respiratory rate. The attacks of falling and prolonged recumbency were preceded by head shaking and circling—usually to the right.

Previous to this time the patient was apparently normal. Hemogram and urinalysis failed to elicit abnormalities.

The patient died shortly after admission to the clinic. Necropsy revealed a very diffuse astrocytoma of the cerebellum and medulla which was confirmed by histopathological exam.

It certainly is desirable to have a more complete description of the attacks, the presence of abnormalities of the reflexes and other neurological signs. The clinician may wish to stimulate an attack that possibly has been poorly described by the client. He may find the use of pentylentetrazol (Metrazole—Knoll) injections useful for this purpose. The signs presented by this patient are suggestive of either cerebral or cerebellar-vestibular lesions. (See McGrath’s text pp. 112, 119).

The astrocytoma is usually a solitary tumor of the cerebellum or cerebrum (4, 12). Metastasis via blood vessels is improbable (12). It can occur as a well circumscribed mass or it may be poorly defined and infiltrative. In this particular patient the tumor was diffuse and infiltrative and its invasion of the white tracts of the cerebellum accounts for the incoordination exhibited by the patient. An astrocytoma may resemble brain tissue or it may be soft and cystic in consistency (12).

Histologically, the astrocytoma varies considerably in appearance (12, 17). Special stains aid diagnosis. The tumor cells of the patient in question were generally slightly oval and a few mitotic figures were present. The cytoplasm was poorly outlined. Although the astrocytes may be radially dispersed around blood vessels (12) this was not demonstrable. One worker suggests that such radial arrangement of cells around blood vessels and the relationship of the glial processes near these vessels may be responsible for the alteration of the blood-brain barrier seen in cases of astrocytoma (4).
THE MENINGIOMA

CASE No. 61-C-0194

The patient, a nine-year old male labrador, was an obese animal which entered the clinic with a history of convulsions. No convulsions were noted during the first two days of hospitalization but the animal exhibited some loss of function in the rear legs. The third day the dog had a convulsion during which time it urinated, salivated excessively and defecated. The animal later appeared ataxic. Di-phenylhydantoin therapy was initiated to control the convulsions. No further convulsions were reported but the dog remained listless and depressed and exhibited rapid breathing, extensive salivation, and responded poorly to the stimulus of normal activity about his kennel. If his name was called he would phlegmatically raise his head. A hemogram revealed a slight hemoconcentration as the only salient finding. The patient was euthanitized. Necropsy revealed adult D. immitis in the right heart, a retained left testicle which was neoplastic, chronic prostatitis and a neoplasm in the left olfactory bulb area.

Histopathology revealed this tumor to be a meningioma.

Meningiomas usually arise from the dura (3, 6, 12). Its origin is from a primitive cell type which persists into adulthood (6). At least one malignant form has been described to arise from the leptomeninges (3). It is usual that this tumor is solitary, well circumscribed, and encapsulated (12) and of variable size (6). The neoplasm generally involves the cerebrum or cerebellum but may occur in any place along the central nervous system (6, 12). One worker describes a brown discoloration around a meningioma mass which he found (3). Generally the clinical signs caused by this tumor are due to expansion and pressure but infiltration into the brain mass has been reported (2, 3, 6, 12). One author states that the tumor may recur but does not metastasize (6) while another reports a case of lung metastasis in the feline (12). The tumor may penetrate overlying bone or the bone may undergo atrophy and erosion or it may stimulate the bone into extracranial hyperostosis (6). This effect may be radiologically detectable. A human study disclosed the meningioma to represent 18 per cent of all primary tumors of the CNS (18).

The clinical signs in this animal of convulsions, excessive salivation, involuntary evacuation of the bowel and bladder, weakness and depression were not unlike those described by McGrath's cerebral syndrome (9). Although the lesion was in the olfactory bulb area, we did not test the functional capacity of the first cranial nerve. This nerve may be tested using a noxious substance such as ammonia to detect the animal's response. Compression of the cerebral hemisphere can account for the symptoms seen in this patient.

Histologically this was typical of the meningiomas described in the literature in that there were countless areas of neoplastic whorls or sharply curving masses of cellular cords. Some foci of mineralization were present with the cellular whorls arranged concentrically about them. Hyaline, fatty, necrotic, and colliquative foci within these whorls have also been described (4, 6, 11). This tumor exhibited polymorph infiltration but lymphocytic infiltration has been described as well (4). In one portion of the tumor the dura appeared to be greatly enlarged. Some workers have described the meningioma as being highly vascular with blood vessels at the centers of the whorls (3, 6, 12).

The cell nuclei were round to oval or polygonal in shape and even a few fusiform shapes were evident. There was a prominent nuclear membrane and the nuclei took a pale basophilic hue. The cytoplasm and cell membranes stained poorly; this may give rise to a syncytial appearance (12). Mitosis has been described as sparse, moderate, and numerous by different workers (2, 3, 4). Davis describes one meningioma that invaded the pons area and formed a cystic space which was lined with neoplastic tissue (4).

Certain of Harvey's observations are of interest. He reports the similarity of the cell growth of the meningioma with the

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architecture seen on the "cellular" cap of the Pacchionian body. He also observed proliferative groups of cells over the arachnoid ("granulations" or "villi") bearing a similar structure. He suggests that the meningioma may be, therefore, a malarchitecture similar to angiomatosis of the skin (6).

To be sure, the clinical signs in cases of brain neoplasms are often obscure and confusing. The accurate diagnosis of such a condition is always interesting and challenging and other disease states may mimic the cranial neoplasm. The diagnosis rests in the skill of the clinician and his ability to evaluate history, clinical examination, and the wide range of diagnostic aids which are at his disposal.

**BIBLIOGRAPHY**

2. Cotchin and Hall, Malignant meningioma invading the cerebellum of the dog, Brit. V. J., 139:116-118, 1953.