BRAIN TUMORS

BASICS

OVERVIEW

- Brain tumors may be classified as "primary" or "secondary"
- "Primary brain tumors" originate from cells normally found within the brain and meninges (membranes covering the brain)
- "Secondary tumors" are either cancer that has spread to the brain (known as "metastasis") from a primary tumor outside the nervous system, or tumors that affect the brain by invading or extending into brain tissue from adjacent non-nervous system tissues, such as bone
- Pituitary gland tumors (adenomas or carcinomas) and tumors arising from cranial nerves are considered secondary brain tumors; the "cranial nerves" are nerves that originate in the brain and go to various structures of the head (such as the eye, face, and tongue)
- Brain tumors appear to be more common in dogs than in other domestic species

GENETICS

- An unusually high incidence of benign tumors originating from the membranes covering the brain (membranes are the meninges; tumors are "meningiomas") has been reported in cats with mucopolysaccharidosis type I; "mucopolysaccharidosis" is the term for a group of inherited disorders in which particular enzymes necessary for normal cell function (that is, metabolism) are deficient

SIGNALMENT/DESCRIPTION of ANIMAL

Species

- Dogs and cats

Breed Predilections

- Meningiomas (benign tumors originating from the membranes covering the brain) occur most frequently in dolichocephalic breeds of dog; "dolichocephalic breeds" are dogs that have long heads and noses, such as the collie and Afghan hound
- Glial cell tumors and pituitary tumors occur commonly in short-nosed, flat-faced (known as "brachycephalic") breeds of dog; "glial cell tumors" originate from cells that surround and support nerve cells and act as insulation between these cells
- Canine breeds that appear to be more likely to develop brain tumors than other breeds include the boxer, golden retriever, Doberman pinscher, Scottish terrier, and Old English sheepdog
- No increased likelihood of developing brain tumors has been identified in any breed of cat

Mean Age and Range

- Brain tumors occur in dogs and cats of any age
- Most frequent in older dogs, with the greatest incidence in dogs greater than 5 years of age

Predominant Sex

- Older male cats appear to be most likely to develop meningiomas (benign tumors originating from the membranes covering the brain)

SIGNS/OBSERVED CHANGES in the ANIMAL

- Vary with tumor location
- Most frequently recognized clinical sign associated with a brain tumor of a dog or cat is seizures, particularly if the first seizure occurs after the animal has reached 5 years of age
- Other clinical signs frequently associated with a brain tumor are abnormal behavior and mental status; vision abnormalities (such as blindness); circling; wobbly, incoordinated or "drunken" appearing gait or movement (known as "ataxia"); head tilt; being overly sensitive to pain or touch (known as "hyperesthesia") in the area of the neck

CAUSES

- Uncertain
- Dietary, environmental, genetic, chemical, viral, traumatic, and immune system factors may be considered

RISK FACTORS

- Uncertain

TREATMENT

HEALTH CARE

- The major goals of therapy for a brain tumor are to control secondary effects, such as increased pressure of the cerebrospinal fluid within the skull cavity (known as "increased intracranial pressure") or fluid build-up in the brain (known as "cerebral edema"), and to eradicate the tumor or reduce its size

• Three methods of therapy for a brain tumor are available at this time for use in dogs and cats including surgery, radiation therapy, and chemotherapy

Surgery

• Neurosurgery for complete surgical removal, partial removal, or biopsy of the brain tumor
• Meningiomas (benign tumors originating from the membranes covering the brain) may be able to be removed completely (or almost completely) by means of surgery, especially in cats

Radiation Therapy

• Radiation therapy may be used either alone or in combination with other treatments for either primary or secondary brain tumors
• Careful treatment planning by an experienced radiation therapist is essential to the success of radiation therapy

Chemotherapy

• Chemotherapy drugs (such as carmustine [BCNU] or lomustine [CCNU]) may result in reduction of tumor size, and in improvement of clinical signs in dogs with glial cell tumors; "glial cell tumors" originate from cells that surround and support nerve cells and act as insulation between these cells
• Cytosine arabinoside (ARA-C) has been used in dogs to treat lymphoma of the central nervous system; "lymphoma" is a type of cancer that develops from lymphoid tissue, including lymphocytes, a type of white-blood cell formed in lymphatic tissues throughout the body

MEDICATIONS

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

• Steroids may be utilized to decrease fluid build-up (edema) and, in some cases (such as for treatment of lymphoma), to slow tumor growth; "lymphoma" is a type of cancer that develops from lymphoid tissue, including lymphocytes, a type of white-blood cell formed in lymphatic tissues throughout the body
• Some animals with brain tumors will have dramatic improvement in clinical signs for weeks or months with sustained steroid treatment
• Medications to control seizures (known as "anticonvulsants"), such as phenobarbital or bromide
• Mannitol to reduce increased intracranial pressure (increased pressure of the cerebrospinal fluid within the skull cavity)

FOLLOW-UP CARE

PATIENT MONITORING

• Serial nervous system examinations
• Serial diagnostic imaging (computed tomography [CT or CAT scan], magnetic resonance imaging [MRI])

POSSIBLE COMPLICATIONS

• Aspiration pneumonia due to depressed swallowing reflexes associated with increased intracranial pressure (increased pressure of the cerebrospinal fluid within the skull cavity)
• Seizures

EXPECTED COURSE AND PROGNOSIS

• Information is limited; however, prognosis generally is guarded to poor for animals treated to control the secondary effects of a brain tumor only, without an attempt to eradicate the tumor; the results of one study indicate a mean and median survival of 81 days and 56 days, respectively, following CAT scan diagnosis of a primary brain tumor in 8 dogs
• Several studies confirm that the prognosis for a dog or cat with a primary brain tumor may be improved significantly by surgical removal of the tumor, radiation therapy, and chemotherapy (used either alone or in combination)

KEY POINTS

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