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Hypertension

High blood pressure

Affected Animals:

Cats of all ages can develop hypertension, although middle-aged and older cats are affected most frequently. As a rule, the most common diseases associated with hypertension in cats are kidney failure and hyperthyroidism, which also tend to occur more often in middle-aged and older cats.

Overview:

Most cats with hypertension have an underlying illness responsible for its development; kidney disease and hyperthyroidism are the two most common diseases associated with high blood pressure in cats. In rare circumstances, primary hypertension -- high blood pressure without an associated or underlying cause -- can occur. The diagnosis is made by measuring the blood pressure, and treatment is usually initiated if the elevation is severe or if symptoms due to the high blood pressure are present. The long-term outlook with treatment for high blood pressure has not yet been determined. However, with increased awareness of the condition and early identification of elevated blood pressure readings, serious consequences of hypertension may be prevented from developing.

Clinical Signs:

Because hypertension is commonly associated with an underlying cause, the clinical signs seen in an individual cat are often due to the disease that causes the elevated blood pressure. Examples of possible symptoms associated with the underlying disease of renal failure include lethargy, anorexia, weight loss, polydipsia, polyuria, and vomiting. Clinical signs of hyperthyroidism, another disease associated with high blood pressure, include weight loss, vomiting, polydipsia, polyuria, and polyphagia. Signs due to hypertension itself vary, and may range from no clinical signs to ocular abnormalities such as hyphema, retinal detachment, and increased tortuosity of retinal vessels. Neurological abnormalities such as seizures, collapse, and abnormal behavior secondary to complications from hemorrhage or arterial spasm may also occur.

Symptoms:

Many cats with high blood pressure have no signs at all, although some cats develop signs secondary to the disease that has caused the elevation in blood pressure. For example, cats experiencing hypertension due to kidney failure may have a poor appetite, and experience weight loss, increased thirst or urination, and vomiting. With hyperthyroidism, another disease causing high blood pressure, symptoms include weight loss, vomiting, increased thirst, increased activity, and increased appetite. Cats with primary hypertension usually will have symptoms that result from damage to the eyes, kidneys, heart or blood vessels, or central nervous systems, since these are the systems primarily affected by hypertension. Signs may include blindness due to bleeding or retinal

detachment. Neurological signs such as seizures, fainting, weakness, or collapse can occur when hypertension leads to blood vessel injury in the central nervous system.

Description:

Blood pressure is determined by cardiac output and the total resistance to blood flow in blood vessels throughout the body. Cardiac output itself is related to the heart rate and to the amount of blood pumped by the heart with each beat. Regulation of blood pressure encompasses a very complex interplay between receptors in the brain, the peripheral blood vessels, and the kidneys, endocrine, and cardiovascular systems. When blood pressure is high, complications can occur due to release of fluid, plasma, or bleeding into the tissues. Spasm of blood vessels may result in lack of oxygen in cells in target organs such as the eyes, kidneys, heart, and brain. Changes, including heart muscle thickening, may occur secondary to hypertension.

Hypertensive cats usually are taken to the veterinarian because of signs secondary to the underlying cause of their high blood pressure, or because of damage to the eyes, kidneys, cardiovascular system, or central nervous system. On physical examination, findings such as retinal hemorrhage or detachment may be seen. Other changes like blood in the eye or blood vessel abnormalities in the retina may be detected. Reduced kidney size may occur in cats with long-standing kidney disease. Heart murmurs are often heard, but lung changes secondary to heart disease are not usually due to hypertension alone. Additional heart changes, such as an abnormally rapid heart rate or the presence of an extra heart sound called a gallop rhythm, are also common. Cats with hyperthyroidism may be agitated or pant during their exams, and usually have an enlarged thyroid gland that can be palpated in the neck.

Hypertension is diagnosed most commonly through indirect blood pressure measurement. Bloodwork, x-rays, and ultrasound examination are performed to look for underlying causes of hypertension as well as changes secondary to it. Treatment focuses on the use of oral medications to control blood pressure, although in crisis situations there are drugs that can be used intravenously if deemed appropriate. There are many different classes of anti-hypertensive drugs. The calcium channel blocker amlodipine, marketed as Norvasc, is one of the most commonly prescribed anti-hypertensive drugs for cats.

Diagnosis:

The diagnosis is made by documenting elevated readings during blood pressure measurement. The normal range for blood pressure in cats is up to 180 to 200 mm Hg for systolic readings; systolic refers to the phase of the heart's cycle characterized by contraction of the ventricles. For diastolic readings, which measure ventricular filling, the normal range is 100 to 110 mm Hg. Since stress associated with blood pressure measurement can elevate readings above this range even in normal cats, the results must be interpreted in light of the individual cat's situation. Measuring blood pressure in a quiet, calm environment is important, because allowing cats to become acclimated to their surroundings will help eliminate some of the "white coat syndrome." A diagnosis of hypertension is more plausible if the cat has symptoms that are common with disorders known to be associated with hypertension, if such disorders have already been diagnosed, or if signs such as bleeding in the eyes, retinal detachment, blindness, or severe neurological abnormalities are present.

Once the diagnosis is established, other pieces of information are important in assessing feline hypertension. A complete blood count, chemistry profile, urinalysis, and thyroid

hormone level will detect evidence of kidney failure, hyperthyroidism, and other complicating disorders. X-rays of the chest and abdomen should be obtained to screen for obvious structural disorders such as tumors, abnormalities of kidney shape or size, and heart enlargement. Ultrasound examination of the abdomen may be used if abnormalities are suspected, and an ultrasound of the heart, or echocardiogram, may be necessary if the cat has a heart murmur or if changes appear in the chest x-rays. Since many cats with hypertension have heart murmurs, echocardiography is used frequently to assess for changes in the heart secondary to hypertension and for other structural heart muscle or valve disorders that are common in older cats.

Prognosis:

The long-term prognosis for most cats with hypertension is unknown, and depends to some degree on the underlying cause. Blindness of short duration due to retinal detachment or hemorrhage may resolve, but most cats that have been blind for longer than one or two days will remain blind, even after their blood pressure has been controlled and the hemorrhage or detachment resolves. Very old cats with severe central nervous system abnormalities or severe heart disease do not have a good prognosis. If hypertension is diagnosed and treated before signs occur, serious complications may be prevented, but the effects of such treatment over many years have not yet been investigated.

Transmission or Cause:

Although primary hypertension can occur, its cause is unknown. High blood pressure in cats is usually associated with underlying kidney or thyroid disease.

Treatment:

Mild hypertension may not need to be treated. However, treatment may be indicated for cats with moderate to severe blood pressure elevations, and for cats that already have signs due to high blood pressure. In addition, any concurrent disorder

Many different types of drugs can be used to treat hypertension. Diuretics decrease blood volume, which in turn can decrease cardiac output. Diuretics may also decrease blood vessel resistance by decreasing total body salts and water. Examples of diuretics that can be used include furosemide, marketed as Lasix; spironolactone, marketed as Aldactone; and hydrochlorothiazide, marketed as HydroDIURIL.

A class of drugs called beta-blockers can be used to decrease blood pressure. These drugs help lower heart rate, and in turn lower cardiac output. Members of this group include propranolol, marketed as Inderal, and atenolol, marketed as Tenormin. Alpha-blocker drugs, such as prazosin, marketed as Minipress, can be used to decrease blood vessel resistance. Angiotensin converting enzyme, or ACE, inhibitors are another class of drugs used to manage hypertension. These medications have multiple effects that might help to lower blood pressure. Enalapril and lisinopril are the most common ACE-inhibitors used today. Finally, calcium channel blocking drugs may be used to decrease cardiac output and blood vessel resistance, thereby lowering blood pressure. Diltiazem, marketed as Cardizem, and amlodipine, marketed as Norvasc, are the calcium channel blockers used most commonly in cats. Amlodipine is probably the most frequently prescribed drug used in the treatment of hypertension in cats.

Once treatment is started, blood pressure should be reevaluated to see if it is improving. In addition, it is important to ensure that the blood pressure has not dropped too low. Other follow-up procedures depend on the presence of additional diseases.

Prevention:

Since there is no known way to prevent hyperthyroidism or kidney disease, there is no way to prevent high blood pressure secondary to these disorders. As awareness of hypertension increases, and more veterinarians learn to assess it, hopefully more cats will be diagnosed before complications arise. This should enable earlier treatment and lessen the incidence of complications due to high blood pressure.