Hyperadrenocorticism (Cushing's Disease) in Dogs

Rhea V. Morgan, DVM, DACVIM (Small Animal), DACVO

BASIC INFORMATION

Description

Hyperadrenocorticism arises from overproduction of glucocorticoid hormones by one or both adrenal glands (Cushing's disease) or from chronic or excessive administration of steroid medications (Cushing's syndrome). In atypical cases, other adrenal hormones, such as sex hormones, may also be elevated.

Causes

Pituitary-dependent hyperadrenocorticism (PDH) develops when a tumor of the pituitary gland produces high levels of adrenocorticotropic hormone (ACTH), which subsequently causes the adrenal glands to become overactive. PDH is the most common cause (85%) of Cushing's disease in the dog. Most pituitary tumors are small (microadenoma) and do not cause neurologic signs, but large tumors (macroadenoma) occur in about 30% of affected dogs. Since ACTH influences both adrenal glands, both glands are usually enlarged with this form of the disease.

Adrenal tumors occur in 15% of affected dogs, and about half of these tumors are malignant. Often, only one adrenal gland is affected and enlarged.

Iatrogenic hyperadrenocorticism arises from prolonged or excessive administration of glucocorticoid medications (such as prednisone, dexamethasone, hydrocortisone, triamcinolone, or methylprednisone). Since the pituitary gland constantly detects high levels of steroids in the blood, it decreases the production of ACTH, which causes both adrenal glands to shrink.

Clinical Signs

Most affected dogs are middle-aged or older. The miniature poodle, dachshund, boxer, Boston terrier, and beagle are predisposed to the disease. Adrenal tumors occur more often in female, large-breed dogs.

Common clinical signs include the following:

- Increased thirst, urination, appetite
- Obesity ("pot belly" appearance), lethargy, muscle weakness
- Symmetrical thinning or loss of hair coat, especially on the trunk
- Thinning or darkening of the skin, skin that bruises easily
- Panting, heat intolerance
- Urinary tract and skin infections

Less common clinical signs include hypertension and hemorrhages within the eyes, infertility, congestive heart failure, acute breathing problems from blood clots in the lungs, and ruptured ligaments in the knees.

Diagnostic Tests

Cushing's syndrome is usually suspected based on a history of prolonged exposure to steroid medications and can be confirmed through laboratory evidence of low adrenal gland function (low cortisol levels and poor response to an ACTH stimulation test).

The diagnosis of Cushing's disease requires laboratory and other testing, because no clinical sign is specific for the disease. Routine tests may show elevations in liver enzymes, cholesterol, blood sugar, and white blood cells. Urinalysis and urine culture may indicate infection.

Several *screening tests* are available that involve measurement of cortisol hormone levels in the blood. They include the low-dose dexamethasone test, ACTH response test, urine cortisol/creatinine ratio, and the modified high-dose dexamethasone test. Most of these tests require blood samples to be taken at timed intervals.

Once the diagnosis of Cushing's disease is tentatively made, it is necessary to determine what type (PDH or adrenal tumor) is present. Tests that help differentiate these two conditions are the high-dose dexamethasone test, measurement of blood ACTH, abdominal x-rays, ultrasound of the adrenal glands, and advanced imaging of the pituitary gland.

Cushing's disease can be difficult to diagnose, because test results may not be clear-cut. Multiple tests or repeated testing may be needed to achieve a diagnosis.

TREATMENT AND FOLLOW-UP

Treatment Options

Cushing's syndrome is treated by slow, tapered withdrawal of steroid medications. Rapid withdrawal of drugs should not be done, because it takes some time for the adrenal glands to start producing hormones again. Acute hypoadrenocorticism can occur if steroids are withdrawn suddenly.

PDH is most often treated with medications, namely mitotane (*Lysodren*) or trilostane. Ketoconazole and L-deprenyl may be used in certain circumstances but are often less effective. Radiation therapy of some pituitary tumors may also be considered.

Adrenal tumors may be treated by surgical removal, or medical therapy with mitotane or trilostane may be tried. Surgery is most successful when only one adrenal gland is involved and the tumor has not invaded the surrounding aorta or renal blood vessels. Postoperative care is challenging because the other adrenal gland is often not capable of secreting normal levels of hormone for some time. Malignant tumors may also metastasize to other locations in the body.

Follow-up Care

Treatment of this disorder is complicated and requires frequent adjustment of drug dosages and repeated laboratory testing, which can be expensive. In addition, the drugs are potentially toxic, and the effects of mitotane persist for several days even after it is terminated. A thorough understanding of the effects and side effects of these drugs is crucial.

Prognosis

Although most animals with PDH improve with therapy, not all clinical abnormalities are reversible, and the disease may shorten the dog's overall life span.

IF SPECIAL INSTRUCTIONS HAVE BEEN ADDED, THEY WILL APPEAR ON THE LAST PAGE OF THE PRINTOUT.