Polyendocrine Gland Failure in Dogs

"Poly" is the medical term for many, and "endocrine" is the medical term for gland that makes hormones. So Polyendocrine Gland Failure (PGF) is destruction of more than one endocrine gland by the immune system. Other terms that might be used to describe the same syndrome include polyglandular syndrome, polyendocrine autoimmune disease, and autoimmune polyglandular syndrome.

Endocrine glands most commonly affected in PGF in dogs include:

- Pancreas – failure causes diabetes mellitus, or need for insulin
- Thyroid - failure causes a constellation of clinical signs called "hypothyroidism," or need for thyroid hormone replacement
- Adrenal – failure causes Addison's Disease, or hypoadrenocorticism (sodium/potassium imbalance), or need for adrenal hormone replacement
- Parathyroid –failure causes calcium/phosphorus imbalance
- Reproductive glands (if not spayed or neutered)
- Junction between muscles and nerves – failure causes weakness and regurgitation, called Myasthenia gravis
- Pituitary-Hypothalamus – Diabetes Insipidus prevents one from being able to concentrate urine, so massive water intake is needed to prevent dehydration, and massive urination results.

In people, PGF is divided into Type I and Type II. Type I PGF occurs in children less than 10 years old, and has never been described in animals. There is widespread failure of the parathyroid, adrenal, thyroid and sex glands. Many of these children also have liver disease.

Type II PGF I people is called Schmidt's Syndrome, and occurs when a person has two or more of the following disorders:

- Addison's Disease
- Primary Hypothyroidism
- Diabetes mellitus
- Poorly developed sex organs
- Myasthenia gravis
- Grave's Disease (overactive thyroid)
- Celiac Disease (inflammatory bowel disease)

Many dogs have met the criteria for Schmidt's Syndrome.

What Causes PGF?

In people, type II PGF is a hereditary (passed in the DNA from parents to children) problem, resulting in the destruction of endocrine glands over time. Autoimmune destruction of the glands is a slow process, and signs of disease show only after most of the organs involved have been destroyed. We do not know if there are genetic causes of PGF in dogs, but biopsy reports show that destruction of glands takes place in a similar way when dogs are compared to people. Familial tendencies for developing PGF may be difficult to identify in dogs, because puppies are often separated from parents and sibling early in life. In a recent study of 10 dogs with PGF, two dogs were mother and daughter, and one dog had a sibling with Addison's Disease.

Addison's Disease is the most common hormonal disease observed in people and dogs with type II PGF and is most often diagnosed as the first hormonal disease. In people, hypothyroidism, is the most common second hormonal failure, and often follows the first by 10-20 years. Most dogs with Addison's Disease are diagnosed as young adults. IN dogs, the second hormonal disease most often develops 1-2 years after the first. In dogs, diabetes mellitus and hypothyroidism are also commonly diagnosed in the same dog. Diabetes mellitus is usually diagnosed first, followed by hypothyroidism, which most often is detected when insulin regulation becomes difficult.

PGF should always be considered in any dog with hormonal disease, who is not responding well to therapy. Often all hormonal deficiencies can not be well controlled until all are treated.

What are the Signs of PGF?

Addison's Disease – frequent GI upset or poor appetite, including bloody diarrhea, vomiting and/or regurgitation; episodes of poor energy, weakness or collapse/shock if severe; can resemble kidney failure on blood work, but the kidneys are actually fine – just not getting enough blood due to low blood pressure/shock.

Hypothyroidism – weight gain; frequent skin infection; symmetrical hair loss; darkening of the skin; low heart rate; very low energy; heat seeking behavior; regurgitation.

Diabetes Mellitus – increased water drinking and urination due to high blood sugar; weight loss despite increased appetite; loss of muscle tone; frequent infections; can be very seriously ill if diabetic coma is reached (diabetic ketoacidosis).

If a dog has both Addison's Disease and hypothyroidism, and only the hypothyroidism is treated, the Addison's disease can be made worse, and can result in a shock crisis. Addison's Disease should be considered any time that thyroid hormone supplementation causes an animal to feel poorly.

If a dog has both hypothyroidism and diabetes mellitus (DM), and only the DM is treated, insulin will not work very well until hypothyroidism is diagnosed and thyroid hormones are replaced.

Dogs with type II PGF often exhibit high cholesterol and low sodium. High cholesterol can be associated with diabetes mellitus and/or hypothyroidism. Low sodium can be associated with Addison's Disease and/or hypothyroidism. If sodium remains low after either Addison's Disease or hypothyroidism is corrected, consideration should be given to performing tests for the other hormonal disease.

High potassium can be an indication of Addison's disease. Tests for Addison's should be considered of a dog with hypothyroidism or diabetes mellitus develops high potassium.

Sudden decrease in insulin requirements and low sodium in a dog with diabetes mellitus should prompt us to do tests for Addison's disease.

How is PGF Treated?

PGF is best treated by identifying and correcting all hormonal deficiencies. As mentioned above, when there is more than one hormonal deficiency, all are not usually easily corrected until all are identified and corrected. If a dog with hormonal disease suddenly decompensates (gets worse), consideration should be given to investigate other hormonal disease, in addition to other tests that might be indicated by a patient's individual problems.

If both hypothyroidism and Addison's Disease are discovered at the same time, Addison's Disease should be treated first, then thyroid hormone replacement should be added once the proper dose of medications for Addison's Disease is determined. As mentioned above, treating hypothyroidism first in these dogs can precipitate and Addisonian crisis.

References:
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