

Hypoadrenocorticism (Addison's)

A PowerPage Presented By



Hypoadrenocorticism is a disease that can appear very differently in the clinic compared to how it tends to appear on board exams. In the real world, this disease can be “The Great Imitator” and should be on the differential list for a multitude of common clinical signs. Dogs can present anywhere along the spectrum from vague and mild clinical signs and bloodwork abnormalities to a life-threatening emergency with severe GI signs and cardiac abnormalities. Fortunately, on board exams, you should expect to be asked about cases that display most of the “classic” signs associated with Addison’s disease which are discussed on this PowerPage. In order to avoid misleading you about this disease, there are additional notes in *italics* that pertain more to the real world but are less noteworthy for board exam preparation.

Key Points

- Key tip offs:
 - Bradycardia in the face of cardiovascular collapse
 - Severe dehydration with USG <1.030
 - Na: K ratio < 27
 - Episode brought on by stress (new household member, a move, a medical procedure, etc.)
- Extremely uncommon in species other than dogs
- Diagnostic test of choice - ACTH stimulation test
- Critical therapies: Rapid infusion of fluids (0.9% NaCl is best choice), treatment of severe hyperkalemia (calcium gluconate, regular insulin, dextrose, bicarbonate), corticosteroids

Relevant Pathophysiology

- Inadequate adrenal production of glucocorticoids and mineralocorticoids, most commonly from idiopathic adrenocortical atrophy
 - Glucocorticoids are needed by nearly every organ in the body for homeostatic function and glucose regulation
 - Mineralocorticoid deficiency leads to an inability to retain sodium or to excrete potassium and hydrogen resulting in hypotonic dehydration, hyperkalemia and metabolic acidosis
- *While most animals will have both, atypical patients can have a deficiency in only glucocorticoids or mineralocorticoids*

Clinical Signs

Often middle aged (3-7 years, mean 4 years old), 70% females

Breed predilections: Standard Poodles (black), Portuguese Water Dogs, Great Danes, Rottweilers, West Highland White Terriers, Wheaton Terriers

- **Acute** - Hypovolemic shock with weakness and vomiting (maybe hematemesis)
- **Chronic** - May see worsening of signs at stressful periods. Polyuria, polydypsia.
 - *Nonspecific and often mistaken for renal disease, GI disease or pancreatitis*
- **Hyperkalemia, hyponatremia (Na: K ratio of < 27)**, hypochloremia, hypercalcemia, hypoglycemia
- Pre-renal azotemia secondary to severe dehydration, can be confused with renal failure
- **Low specific gravity (<1.030)**
- Absence of a stress leukogram on CBC (stress leukogram typically characterized by neutrophilia, lymphopenia, monocytosis, eosinopenia)

- GI blood loss (decreased albumin from protein losing enteropathy) and increased BUN (GI bleeding)
- Bradycardia and ECG changes consistent with hyperkalemia (**tall tented T waves, diminished to absent P waves, prolonged P-R interval, wide QRS complexes**)
- May see megaesophagus, microcardia, small adrenal glands on U/S

Diagnostic Confirmation

ACTH Stimulation Test- The Test of Choice

- Measure serum cortisol before and after administration of ACTH gel or synthetic ACTH
 - Normal dogs generally have post-stimulation cortisol levels >10 ug/dl. Post stimulation levels <2 ug/dl is considered diagnostic *and most patients are <1 ug/dl*
- Administration of any steroid other than **dexamethasone** will invalidate this test

Treatment

Treatment of Acute Presentation

- **Restore blood volume:** Rapid administration of fluids. 60-90 ml/kg is commonly cited as a “shock dose” *although many criticalists and endocrinologists prefer incremental boluses of 10-30 ml/kg until resuscitation achieved.* This also helps to avoid overly rapid increases in sodium. This will restore perfusion to organs including the kidneys and reduce hyperkalemia through increased GFR and dilutional effects. Classically, fluid of choice is **0.9% NaCl**.
- **Treat hyperkalemia if necessary:** While fluid therapy is often sufficient to reverse hyperkalemia, if cardiac abnormalities are significant, temporary cardio-protection with calcium gluconate may be necessary in addition to glucose, insulin or bicarbonate to promote intracellular shift of potassium.
- **Intravenous glucocorticoids:** **Dexamethasone SP** is often preferred as it will not interfere with diagnostic tests.
- **Begin maintenance therapy of corticosteroids and mineralocorticoids** (see below).

Treatment of Chronic Presentation

- **Lifetime corticosteroid maintenance:** Prednisone or prednisolone, typically starting at 0.5 mg/kg/day as supraphysiologic dose for one week and taper down to maintenance (0.1-0.2 mg/kg/day). Give 2-4X maintenance dose at times of stress.
- **Lifetime mineralocorticoid supplementation:** Options include oral fludrocortisone (given daily) or injectable DOCP (desoxycorticosterone pivalate) every 3-4 weeks.



References and Links

Ettinger, Feldman- Textbook of Veterinary Internal Medicine, 5th ed.- pp. 1488-1499

Mark Peterson- Hypoadrenocorticism (Addison's Disease) in Dogs:

www.canineaddisonsinfo.com/OSUproceedings093006.doc -

Katy Goover- Hypoadrenocorticism in the Dog and Cat: An Overview:

www.vet.uga.edu/VPP/clerk/groover/index.php - Good disease summary notes

Markus Rick:

[http://www.markusrick.com/download/Canine%20Hypoadrenocorticism%20\(Addison%27s%20Disease\).pdf](http://www.markusrick.com/download/Canine%20Hypoadrenocorticism%20(Addison%27s%20Disease).pdf)

Nice PowerPoint, has more detail than you likely will need for a board exam

VIN Conference Proceedings Notes:

Deborah Greco- Hypoadrenocorticism in Small Animals:

<http://www.vin.com/Members/Proceedings/Proceedings.plx?CID=acvc2002&PID=pr02392&O=VIN>

Edward Feldman- Current Concepts on the Diagnosis and management of Hypoadrenocorticism in Dogs:

<http://www.vin.com/Members/Proceedings/Proceedings.plx?CID=wvc2004&PID=pr05300&O=VIN>

David Church- Management of Acute Hypoadrenocorticism:

<http://www.vin.com/Members/Proceedings/Proceedings.plx?CID=bsava2008&PID=pr20152&O=VIN>

