Technician Assessment & Management of Endocrine Diseases

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Introduction

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Introduction

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Introduction

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A Technician’s Role

- Back To Basics!
- Triage - Primary Assessment
  - Chief complaint and brief client interview
  - Perfusion parameters (Mentation, HR, RR, pulses, temperature, MM/CRT)
  - Know normal parameters and what may cause them to be altered.
  - Performing diagnostics based on clinician’s secondary assessment.
  - Monitoring trends to assess responsiveness to treatment (fluids, drugs, etc).

A Technician’s Role

Understanding pathophysiology of disease
Better understanding of patient needs
Foresee any additional orders the doctor will want/need
Client education
Pharmacology
Medical math
Technical skills
Acid Base, electrolyte and chemistry analysis
Most Importantly - patient care and compassion

Common diseases of the Endocrine System

- Diabetes Mellitus
  - Diabetic Ketoacidosis
  - Insulin overdose
- Hypoadrenocorticism (Addison’s Disease)
- Hyperadrenocorticism (Cushing’s Disease)
- Hyper/Hypothyroidism
- Diabetes Insipidus
- Hyper/hypoparathyroidism
- Pheochromocytoma

Endocrine Emergencies

- failure of hormone production
- disruption in hormones reaching their intended destination
- when targeted tissue fails to recognize and accept the hormone

Diabetic Ketoacidosis

Pancreas: Multifunctioning Organ
- Composed of cells called Islet of Langerhans
- Surrounded by secreting acinar cells
1. Alpha: Secrete Glucagon
2. Beta: Secrete Insulin
3. Delta: Secrete Somatostatin
4. F Cells: Secrete pancreatic polypeptide
- Insulin is needed to transport glucose into the cells - essentially “feeding” the cells
- Without insulin, cells start to starve
- The body needs a way to feed the cells!

Diabetic Ketoacidosis

- Ketones are normally found in the blood stream in small amounts
- Overproduction occurs due to insulin deficiency - PROTECTIVE MECHANISM
- Three Ketone Bodies:
  1. Acetone
  2. Acetoacidic Acid
  3. Betahydroxybutyric Acid
  - Read Ketones via ketometer, urine dip stick, or serum
  - Ketosis can’t occur without this ketone body
  - If patient highly suspicious but Ketometer not reading ketones, add a drop or two of hydrogen peroxide

Diabetic Ketoacidosis

How will these patients present to the hospital?
- Dependent upon comorbidites and how long the patient has been sick.
- Assess perfusion parameters!

Clinical Signs:
- Altered mentation: Flat, obtunded, weak
- Pulses weak or poor
- Tachycardia
- Tachypnic
- Hypothermic

Diabetic Ketoacidosis

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Assess perfusion parameters!

Diabetic Ketoacidosis

What to also be on the look out for:
- Kussmaul respirations: deep, labored breathing associated with severe metabolic acidosis (pH < 7.35, BE < -4, HCO₃ < 18)
- Acetone smell on breath
- Plantigrade stance associated with diabetic peripheral neuropathy (A.K.A “Hock Drop”)

http://www.peteducation.com/article.cfm?c=1+2118&aid=1129

Diabetic Ketoacidosis

Diagnosis:
- Hyperglycemia with Ketonemia and a Metabolic Acidosis
- Glucosuria
- Ketonuria
- Electrolyte abnormalities
- Polycythemia (hemococoncentration due to dehydration)
- Leukocytosis (concurrent infection?)
- Increased liver enzymes
- Azotemia (rule out pre renal or renal)
- USG via refractometer

Diabetic Ketoacidosis

Initial Workup: Rule out concurrent systemic disease processes
- Chest rads:
  - CHF, pneumonia
- Abdominal Ultrasound:
  - Pancreatitis, hepatic lipidosis, kidney changes
- Urinalysis, Urine Culture and Sensitivity:
  - Cystocentesis / Urinary Catheter for sterile sample
  - Obtain USG
  - Test for urinary tract infection
  - T4 levels in cats

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Diabetic Ketoacidosis

Nursing Considerations:
- WEAR GLOVES! Immunocompromised, increased risk of infection
- Place largest bore peripheral catheter
- Catheter Maintenance
- Intracatheter placement (frequent BGs, blood gas, PCV/TS and electrolyte checks)
- Catheter maintenance
- Triple Lumen Catheter - Seldinger Technique
- Catheter maintenance
- Blood Pressure (Doppler vs Oscilometric vs Direct)
  Don’t rely solely on this number - assess patient’s perfusion parameters as a whole
- Urinary Catheter placement
  Pre-renal vs renal
  Catheter maintenance

Diabetic Ketoacidosis

Pharmacology
- Insulin - watch potassium, treats Ketonemia
- Humulin R vs Long Acting
- Dextrose and insulin in the line

Medical Math
- Constant Rate Infusions
- Bolus doses and calculations
- Dosages for medications
- Monitoring and reassessing patient
- Fluid overload
- Perfusion parameters
- Assess pain
- Nutrition
- TLC!

Goals of treatment:
- Restore effective circulating volume
- Treat hyperglycemia/ketonemia with insulin
- May take up to 3 days to resolve ketonemia even after normoglycemia
- Correct electrolyte abnormalities
- Patients will be hospitalized for 3-5 days
  The slower DKA is corrected, the better probability of successful long term treatment.

Diabetic Ketoacidosis

Long term management:
- CLIENT EDUCATION AND DEDICATION (another importance of understanding pathophysiology and pharmacology)
- Long acting insulin (Humulin N, Glargine, PZI)
- BG curves until BG stabilized between 100-300 throughout the day
- Diabetic Diets (Hills MD/WD, Royal Canin Glycobalance, Purina DM)
- Treatment of underlying disease process (if any)
Addison’s = Hypoadrenocorticism  
Adrenal Glands  
Cortex must be atrophied 85-90% before clinical signs occur in non stressful situations

Addisonian Crisis  
Zona Glomerulosa : Secretes mineralcorticoids (aldosterone)  
Zona Fasiculata : Secretes Glucocorticoids (Cortisol)  
Zona Reticularis : Secretes Sex Hormones  
Pheochromocytoma : mass in Adrenal Medulla

Aldosterone is needed to respond to hypovolemia (Renin Angiotensin Aldosterone System: RAAS)  
Reabsorbs sodium to increase intravascular volume (where Na goes, water follows)  
Effective Osmole  
Potassium excretion  
No Aldosterone = Na and H2O lost excessively in states of hypovolemia, hyperkalemia  
Cortisol is needed to respond to stress, GI health, stimulating an appetite, and much more!

How will these patients present to the hospital?  
Not always straight forward, hence “The Great Pretender”  
History of waxing and waning GI signs  
Usually young female canines  
Clinical Signs:  
Altered mentation: Flat, obtunded, weak  
Pulses weak, poor, or absent  
BRADYCARDIA in face of signs of shock  
Hypothermic  
GI signs (sometimes even severe)

Addisonian Crisis  
Atrial Standstill  
Hyperkalemia - resting membrane potential increased  
Needs to be treated immediately!  
Calcium Gluconate  
Dextrose supplementation  
Insulin (Humulin R)

Addisonian Crisis  
Diagnosis:  
Na:K ratio of <27:1 - typical  
Lack of stress leukogram  
Hypoglycemia (30% of cases)  
Polycythemia - hemoconcentration due to dehydration/hypovolemia  
Azotemia - rule out pre renal vs renal  
Atrial Standstill  
HYPOVOLEMIC!  
ACTH stim test gold standard  
SNAP Cortisol
Addisonian Crisis

**Initial Workup:** Diagnosis of Exclusion
- Full blood panel (PCV/TS/BG/blood gas/chemistry/CBC)
- USG, urinalysis/Urine Culture and Sensitivity
- If young, Parvo SNAP (severe GI signs)
- Abdominal ultrasound (pancreatitis, kidney changes, hepatic lipidosis)
- Radiographs
- SNAP Cortisol

**Addisonian Crisis**

**Treatment:** FLUIDS FLUIDS FLUIDS, F-L-U-I-D-S
- Severe hypovolemic
  - Shock dose of fluids: 45ml/kg in felines, 60-90ml/kg in canines.
  - 1/4-1/3 then reassess
  - May need full blood volume - or even more!
  - Synthetic Colloidal support - controversial
  - 5-10ml/kg boluses, not to exceed 24ml/kg/day
  - Fresh Frozen Plasma

**Addisonian Crisis**

**Treatment:** Replace hormones!
- Steroids: Dexamethasone SP and hydrocortisone (do not interfere with ACTH stim test)
- Mineralcorticoids: Percorten (DOCP)
- Manage hyperkalemia
- Manage GI signs
  - pantoprazole, cerenia, ondansetron, famotidine

**Addisonian Crisis**

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**Addisonian Crisis**

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- Monitoring and reassessing patient
- Fluid overload
- Perfusion parameters
- Assess pain

**Addisonian Crisis**

**Medical Math**
- Long term management:
  - Client dedication and education
  - Preparing owners for a crisis or how to respond before/during/after stressful event
  - Life-long steroid and mineralocorticoid therapy
    - DOCP injections every 28 days, or dependent on electrolytes
    - At least biannual exams
    - Prednisone