

Peer Reviewed

ENDOCRINE & ANESTHESIA PROTOCOLS: AN EXCLUSIVE SERIES

This series focuses on anesthesia considerations for dogs and cats with conditions of the pancreas, thyroid, parathyroid, and adrenal glands.

Anesthesia for Parathyroid Disease



You have asked...

What is the best approach for anesthetizing patients with parathyroid diseases?

The expert says...

The chief cells of the parathyroid gland secrete parathyroid hormone (PTH), which regulates the concentration of ionized calcium. When ionized calcium is low, PTH is released, resulting in the mobilization of calcium from bone and both reabsorption of calcium and inhibition of phosphate reabsorption by the kidney. Vitamin D synthesis by the kidney is also stimulated and enhances calcium reabsorption from both the GI tract and kidney. Calcitonin (secreted by C cells of the thyroid in response to hypercalcemia) antagonizes PTH effects.

tend to be more invasive. Secondary hyperparathyroidism is also commonly observed in patients with renal failure and those with both primary and metastatic cancers. Additional information about differentiating primary from secondary hyperparathyroidism is available.¹⁻³

Clinical signs are generally related to hypercalcemia (and hypophosphatemia) and include anorexia, weakness, listlessness, vomiting, mentation changes, urolithiasis, straining to urinate or incontinence, bone weakness (stress fracture), and pain.

Additional concerns for anesthetic management include effects of hypercalcemia on renal, neurologic, and cardiovascular function. Following is a suggested anesthetic plan for hypercalcemia secondary to primary hyperparathyroidism presented for unilateral removal of the parathyroid gland.

WHAT IS THE SUGGESTED PROTOCOL FOR PATIENTS WITH HYPERPARATHYROIDISM?

Hyperparathyroidism primarily affects middle-aged and older dogs and has no documented sex predilection. Adenomas are more common and are typically well differentiated, while carcinomas

Hyperparathyroidism is primarily a disorder of middle-aged and older dogs.

CONTINUES

PTH = parathyroid hormone

Fast Facts

- In the noncompromised patient with mild hypercalcemia, propofol may be safely used for induction.
- Potential complications of parathyroidectomy include hemorrhage, damage to recurrent laryngeal nerve, and Horner syndrome.

Premedication

An opioid (eg, hydromorphone 0.1 mg/kg SC or 0.01–0.02 mg/kg IV), which is cardiovascularly safe, may be used for preoperative sedation and perioperative analgesia. Use of an anticholinergic (eg, atropine 0.02–0.04 mg/kg SC or 0.01–0.02 mg/kg IV) is dependent on the clinical picture: administration may be warranted in patients with low heart rates but avoided in patients with tachycardia or tachyarrhythmias.

Anesthesia Induction

Induction is dictated by the clinical picture. In a canine patient's case wherein it is crucial to avoid hypotension (eg, renal disease) and minimize arrhythmias, a combination of an opioid (fentanyl 10 µg/kg IV) and benzodiazepine (midazolam or diazepam 0.25 mg/kg IV) is safe as long as any ensuing bradycardia and hypoventilation are managed. In the noncompromised patient with mild hypercalcemia and no secondary disease, induction may be accomplished safely with other drugs (eg, propofol 4–6 mg/kg IV).

Anesthesia Maintenance

Inhaled agent dosed to effect.

Periprocedural Analgesics

Mu-opioid agonists are commonly used to provide periprocedural analgesia. A single dose used for premedication should suffice for a short procedure. Repeat dosing or administration by infusion may be warranted for a longer procedure or in a compromised patient.

Support & Monitoring

Heart rate (ideally with ECG to evaluate potential rhythm changes from hypercalcemia) and blood pressure (hypertension may result from hypercalcemia and subsequent vasoconstriction) should be monitored. If hypercalcemia is severe, diuresis using a non-calcium-containing electrolyte solution is suggested; diuretics (eg, furosemide) may also be administered.

Ionized calcium levels should be monitored periodically. Acidemia increases the fraction of ionized calcium (relative to the total) while alkalemia decreases it, so careful attention to blood pH is recommended in patients manifesting clinical signs of hypercalcemia. Respiratory acidosis is treated by improving ventilation, whereas metabolic acidosis is treated with IV fluids, cardiovascular support, and in some cases sodium bicarbonate. Occasionally, glucocorticoids are administered for symptomatic management of hypercalcemia.

Body temperature, oxygen saturation, and end-tidal carbon dioxide monitoring is also recommended. For patients with cardiovascular or renal compromise, additional support and monitoring techniques may be useful and will vary by case (eg, lidocaine for ventricular arrhythmias).

Recovery

Periodic postoperative monitoring of ionized calcium is recommended, in addition to standard postoperative care after parathyroidectomy.

The decline in PTH and ionized calcium occurs over 1 to 7 days and may require treatment. This may include vitamin D therapy and, in extreme circumstances, calcium supplementation until the function of the remaining parathyroid gland returns to normal. For patients with renal compromise, fluid administration should be continued and urine output monitored. For patients with cardiovascular compromise, monitoring and support should be continued into recovery.

Additional Considerations

Similar to the considerations listed for thyroidectomy, the endotracheal tube (with a Murphy eye) should be placed with the tip distal to the surgical site to minimize the risk for occlusion. Clinical signs of anesthesia depth are difficult to monitor after draping a patient for surgery. Other less common but potential complications include hemorrhage, damage to the recurrent laryngeal nerve, and Horner syndrome.

FIND MORE...

Look for **Anesthesia for Pancreatic Disease** in a future issue!

PTH = parathyroid hormone

Take-Home Points

- Clinical signs for hyperparathyroidism include anorexia, weakness, listlessness, vomiting, mentation changes, urolithiasis, straining to urinate, bone weakness, and pain.
- Anesthesia induction is dictated by clinical picture.
- Hypoparathyroidism is commonly an iatrogenic disease seen after thyroid or parathyroid removal.
- Emergency treatment of hypoparathyroidism includes administration of calcium gluconate with subsequent oral calcium supplementation.



WHAT IS THE SUGGESTED PROTOCOL FOR PATIENTS WITH HYPOPARATHYROIDISM?

Hypoparathyroidism is commonly an iatrogenic disease seen after thyroidectomy or parathyroidectomy. Occasional primary disease is reported in both dogs and cats. There appears to be no age predilection, and female dogs are more commonly diagnosed.

Clinical signs are often episodic and attributed to effects of hypocalcemia on neurologic and musculoskeletal systems (generalized seizures, stiff gait, muscle rigidity, tetany, cramping). Cataracts are also frequently diagnosed. Broad-ranging cardiovascular side effects (eg, brady- or tachyarrhythmias) may also be observed.

In a patient with these signs, hypocalcemia and hyperphosphatemia in the face of normal renal function may be used to support the diagnosis. It is uncommon for a patient to present for anesthesia with this clinical picture; however, this may present following surgery of either the thyroid or parathyroid gland.

In a crisis, treatment includes administration of calcium gluconate with subsequent oral calcium supplementation as necessary to help regulate the patient. These patients are supplemented with vitamin D₃ for long-term management.

See Aids & Resources, back page, for references & suggested reading.

Fast Fact

Hypoparathyroidism appears to have no age predilection.

COMING SOON

to *Clinician's Brief*...

Special Endocrine Focus

- Diagnosing Hypothyroidism
- Managing Hyperthyroidism
- Understanding Canine & Feline Diabetes

