

PARATHYROID TUMORS (PTH)

Associated Terms:

Hyperparathyroidism, Hypercalcemia, Primary Hyperparathyroidism

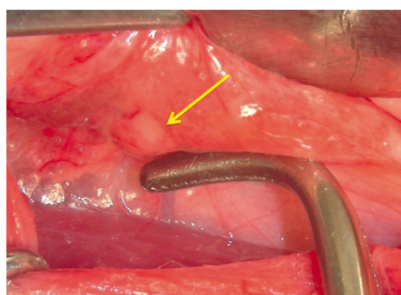
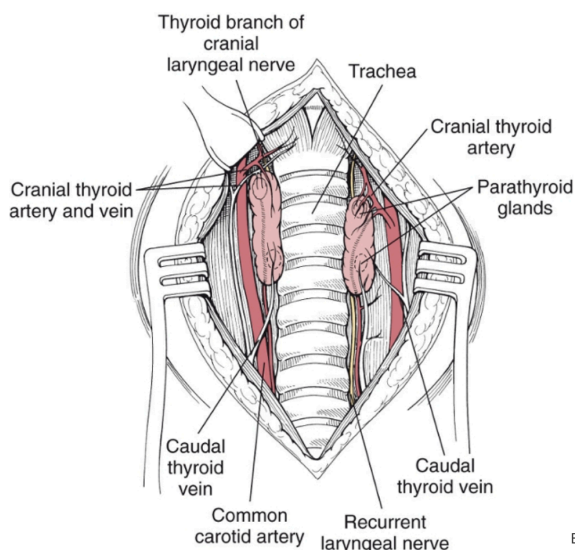
[Parathyroid Tumors in Dogs & Cats Video Link Information: <https://youtu.be/4R7wpdozzy>]

OVERVIEW

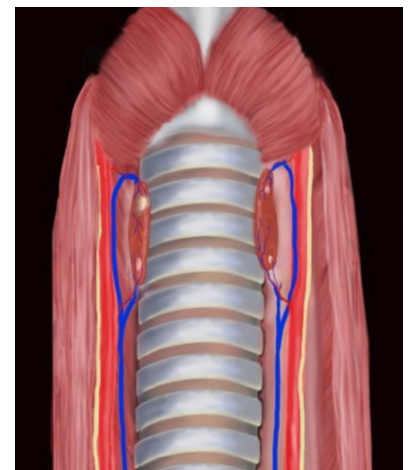
Parathyroid tumors are uncommon in dogs & much less common in cats. These tumors usually are benign, meaning that they usually do not metastasize or invade into nearby tissues. They usually are very small tumors that raise a lot of havoc in the affected patient's body, because they produce excessive amount of parathyroid hormone. Multiple parathyroid tumors are found in about 10% of affected patients. Most parathyroid tumor are closely associated with the thyroid glands in the neck; however, ectopic parathyroid tumors can be embedded in the base of the tongue, anywhere along the length of the neck or within the chest cavity. Breeds that most commonly develop this parathyroid tumors include Keeshonds, Labradors retrievers & German shepherds.

The parathyroid glands are small (1/4 inch diameter), flat glands that play a very important role in maintaining the blood calcium concentration in dogs & cats. Chemical sensors within the parathyroid glands monitor blood cholesterol levels & if the calcium levels decrease, the glands secrete parathyroid hormone (PTH). PTH acts on the kidneys, intestines & bones to increase the amount of calcium in the bloodstream. There are usually four parathyroid glands in most mammals, 2 on either side of the throat, closely associated with the thyroid glands (hence the name, parathyroid). Tumors of the parathyroid glands are uncommon; however they can produce serious problems in dogs & cats if the tumors secrete excessive, unregulated amounts of PTH. Excessive PTH causes elevated levels of blood calcium which can have toxic effects on the kidneys, the intestines, & the brain.

Parathyroid tumors have been reported in many different breeds of dogs & cats. There is no known dietary or environmental cause; in most cases the occurrence seems to be random circumstance. However, certain breeds of dogs appear to be more at risk. A genetic predisposition for parathyroid tumors has been found in Keeshonds. Keeshonds with parathyroid tumors should not be bred.



Enlarged and nodular external parathyroid gland (arrow) in a dog with hypercalcemia.



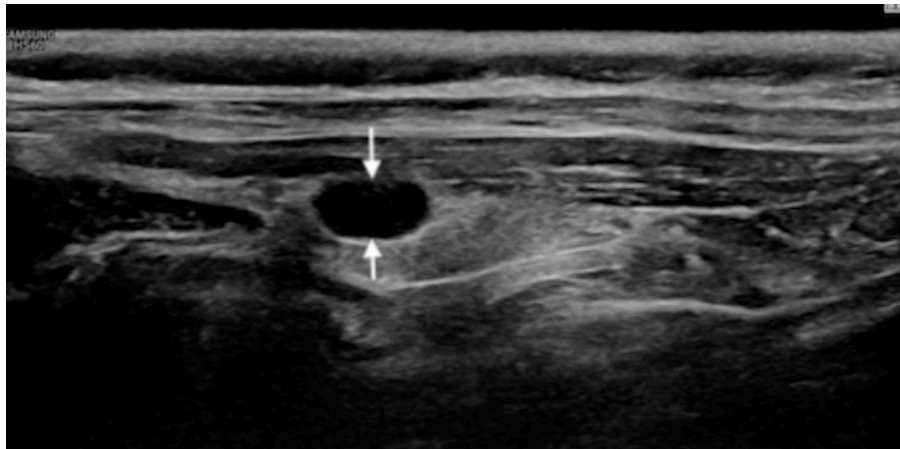
ANATOMY & PHYSIOLOGY

Dogs & cats have 4 parathyroid glands; 2 glands are located on each side of the neck. The parathyroid glands are attached to the surface or imbedded within the thyroid glands. One parathyroid gland is commonly located on the top pole (end) of the thyroid & the other is located on the bottom pole. Normally these glands are about 2 to 3 mm in diameter & are tan colored. The glands produce parathyroid hormone which causes the calcium level in the blood to increase. Because the function of organs such as the kidneys, gastrointestinal tract, muscles & brain are totally dependent on calcium, a change in the normal level of this important element in the blood can be very harmful to the pet. In addition, high calcium levels can cause kidney failure & calcium stones to form in the urine.

CLINICAL SIGNS & SYMPTOMS

Signs of hyperparathyroidism develop as a result of abnormally high calcium levels in the blood. Most common signs of this condition include increased thirst & urination. Subsequently, lethargy, weakness & poor appetite may be noted. Signs such as straining to urinate, passage of blood-tinged urine or the inability to pass urine may be caused by calcium-based stones. Cats can have diarrhea & vomiting as additional signs. Because the relatively small parathyroid tumors are located deeply within the neck in dogs, they usually cannot be palpated. In cats, however, these same tumors can be palpated along the side of the neck. A complete blood count, chemistry profile & urine testing are completed in the initial stages of the evaluation. Blood test results will be evaluated to check for damage to internal organs that may have occurred from the high blood calcium levels. Blood tests showing an elevation of the calcium level may be due to a parathyroid tumor, however, there are many other diseases that may elevate the calcium in the blood. To confirm a diagnosis of a functional parathyroid tumor, parathyroid hormone level is measured from a blood sample collected from the pet. Ultrasound of the neck can identify these small tumors within the neck. In addition, ultrasound is used to check the bladder & kidneys for stones.

Since parathyroid tumors are small & are located deep in the neck, there are usually no external signs to prompt an owner that a dog might have a parathyroid tumor. Instead, it is the clinical signs caused by excessive calcium levels in the bloodstream (hypercalcemia) that prompts an owner to seek veterinary attention. Hypercalcemia can cause dysfunction in many organs, especially the kidneys. Elevated calcium levels in the blood interfere with the ability of the kidneys to concentrate urine so affected pets urinate frequently & drink more water to compensate for the fluid loss from frequent urination. As more calcium passes out through the kidneys into the urine, calcium-based urinary stones (urolithiasis) can appear in the urinary bladder, ureters or kidneys. Hypercalcemia also affects intestinal function; some pets may vomit, become constipated, or lose their appetite. Affected pets show signs of weakness as hypercalcemia interferes with normal muscle function. If hypercalcemia persists long enough, calcium-phosphate complexes will develop in the tissues of the kidney & other organs, causing permanent damage.



DIAGNOSTICS

The most common way in which parathyroid tumors are diagnosed is through routine blood testing done as part of the yearly health evaluation of an older dog or cat. The early signs of hyperparathyroidism are very subtle & may be attributed to old age by a pet owner. However, if hypercalcemia is detected in a blood evaluation, then further testing is warranted to determine the cause.

If a parathyroid tumor is suspected in your pet, whether because of hypercalcemia detected in a blood screen or because of clinical signs related to hypercalcemia, the definitive test done by your primary care veterinarian is the measure of PTH in the bloodstream. This is a very specific test that measures two types of parathyroid hormone, PTH & PTHrP (PTH related-peptide). Both PTH & PTHrP cause elevation of calcium in the bloodstream. However, PTH is uniquely produced by the parathyroid glands while PTHrP is released from certain cancers such as lymphoma, multiple myeloma & anal sac adenocarcinoma. If PTHrP is elevated in the presence of hypercalcemia, then a diagnosis of a non-parathyroid tumor is supported. However, if PTHrP is non-detectable & PTH is in the normal or elevated range, then a parathyroid tumor is strongly suspected. It is important to note that a normal blood concentration of PTH in the presence of hypercalcemia is still “abnormal” & suggests poorly regulated hormone secretion by a parathyroid tumor. PTH secretion by healthy parathyroid glands is suppressed by hypercalcemia.

The final step in the diagnosis of a parathyroid tumor is ultrasound imaging of the parathyroid glands. This is a very sensitive test & an experienced ultrasonographer can easily detect normal parathyroid glands associated with thyroid glands in the neck of a dog. Parathyroid tumors are usually single & appear as a spherical enlargement of the parathyroid gland. Typical tumors are 2–4 times the size of normal parathyroid glands.

THE DAY OF THE SURGERY

In preparation for surgery, your pet should be fasted starting at 10 PM the night before surgery, however water does not need to be withheld. To help prevent heartburn after surgery, a single dose of Pepcid AC (10 mg tablet per 20 pounds of body weight) should be administered at 6 AM at home on the day of surgery. Our anesthesia & surgical team will prescribe a pain management program, both during & after surgery, that will keep your companion comfortable. This will include a combination of general anesthesia, injectable analgesics & oral analgesics.

TREATMENT

Initial evaluation of the patient will determine if the kidneys, heart or nervous system are affected by the high calcium levels. If this is the case, treatment with medication & IV fluids may be needed prior to removal of the parathyroid tumor.

A Minimally Invasive technique for Parathyroidectomy (MIP) will be performed. Traditional surgery involves a 4 inch incision on the ventral (front) of the neck. MIP involves mapping the exact location of the parathyroid tumor with ultrasound imaging while the patient is positioned.

There are 2 treatment options for parathyroid tumors, surgical excision & ultrasound-guided ethanol ablation. Both procedures require general anesthesia so a thorough pre-anesthetic evaluation must be done to ensure proper support during the procedure. In some cases, if blood calcium levels are extremely elevated, the risk of cardiac arrhythmias & blood pressure issues during anesthesia is raised.

Surgical excision is done through a midline incision in the neck, just behind the throat. Veterinary surgeons explore both sides of the neck, checking all parathyroid glands. Usually a parathyroid tumor can be excised directly from the thyroid gland, sparing the thyroid gland & leaving the remaining parathyroid glands in place.

AFTERCARE & OUTCOME

After surgery, you can continue to give your pet a prescribed pain reliever to minimize discomfort (most dogs do not need any pain medication with the MIP technique & Nocita). It's also extremely important to limit your dog's activity for 2 weeks after surgery.

~1/3 third of dogs that have a parathyroid tumor removed will develop a low calcium level in the blood. Dogs that have a high calcium level (>14 mg/dl) prior to surgery are much more prone to developing this problem. Left untreated, a low calcium level could be fatal in some patients. Warning signs of this problem may include rubbing the face, dilation of the pupils, twitching muscles, loss of appetite, weakness & seizures. If any of these signs are seen at home, please call us as soon as possible & bring your companion in for an evaluation. Calcitriol will be prescribed for a few weeks until the remaining parathyroid glands start functioning again.

If your companion is recovering well following surgery & no complications develop, the healing process will be monitored by the surgeon with one follow-up exam scheduled 2 weeks after the surgery.

The overall prognosis for your pet should be favorable following treatment of a parathyroid tumor, as this disease can be cured, yet left untreated it can cause irreversible damage to internal organs.

In order to minimize the possibility of post-operative hypocalcemia, your veterinarian will carefully monitor the blood calcium level after parathyroidectomy & supplement with calcium or vitamin D if needed. Supplementation is gradually weaned as the remaining parathyroid glands begin to function normally & regain control of blood calcium levels.

Regardless of the technique used, animals must be watched carefully for the next few days after the procedure. After removal of a functional parathyroid tumor, the hypercalcemia will resolve rapidly. Since the remaining parathyroid glands are normal, they will have been suppressed by hypercalcemia. It usually requires a few days (or longer) for the remaining parathyroid glands to regain function. It is possible that calcium levels will become lower than normal during this period. Low blood calcium (hypocalcemia) can cause serious side effects including seizures & death.

The prognosis for long-term survival after parathyroidectomy is good. Parathyroid tumors are benign so excision is usually curative. Multiple parathyroid tumors are rare, but have been reported. If your dog or cat has multiple parathyroid tumors, they are typically present concurrently, so they are often removed at the same surgery.

If you have any questions, please feel free to ask your primary veterinarian &/or veterinary surgeon.

TREAT Veterinary Surgery Service
Dr. Le-Nguyen, DVM, GPCert Canine/Feline Surgery *2024
(Practice Limited to Surgery)
(916) 230-8103
TREATVeterinarySurgeryService@gmail.com
TREATVeterinarySurgeryService.com