



## Parathyroid Tumors

Associated Terms:

Hyperparathyroidism, Hypercalcemia, Primary Hyperparathyroidism



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### Overview:

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 and cats. Chemical sensors within the parathyroid glands monitor blood calcium levels and if the calcium levels decrease, the glands secrete parathyroid hormone (PTH). PTH acts on the kidneys, intestines, and bones to increase the amount of calcium in the bloodstream. There are usually four parathyroid glands in most mammals, two 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 and 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, and the brain.

Parathyroid tumors have been reported in many different breeds of dogs and 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.

### Signs and Symptoms:

Since parathyroid tumors are small and 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 and 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 and other organs, causing permanent damage.

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 and 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.

### Diagnosics:

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 and PTHrP (PTH related-peptide). Both PTH and 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, and [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 and 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" and 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 and an experienced ultrasonographer can easily detect normal parathyroid glands associated with thyroid glands in the neck of a dog. Parathyroid tumors are **usually single and appear as a spherical enlargement of the parathyroid gland**. Typical tumors are 2-4 times the size of normal parathyroid glands.

### Treatment:

There are **two treatment options for parathyroid tumors**, surgical excision and ultrasound-guided ethanol ablation. The ACVS board certified veterinary surgeon handling the care of your pet will make a decision regarding treatment based on the age and health of your pet, the size and number of parathyroid tumors, and the efficacy of the procedure in his or her hands. 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 and 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 and leaving the remaining parathyroid glands in place.

**Ultrasound-guided ethanol ablation** is a minimally invasive alternative to surgical incision. The procedure requires general anesthesia to ensure that there is no movement during the ablation. The hair on the neck is clipped and the skin is scrubbed similar to surgical preparation. Ultrasound is used to identify the parathyroid tumor and a long needle attached to a syringe containing 1-2 mL of ethanol is introduced into the skin of the neck. Using ultrasound imaging, the needle is guided into the parathyroid tumor and ethanol is injected into the parathyroid tumor. The ethanol is toxic to the parathyroid tumor and causes rapid necrosis, destroying the tumor. Care must be taken that the ethanol does not leak out of the parathyroid capsule and damage the fine nerves in the area. There is a possibility that the ethanol will not destroy the entire tumor and repeat administration would be needed.

### Aftercare and Outcome:

In order to minimize the possibility of postoperative hypocalcemia, your veterinarian will carefully monitor the blood calcium level after parathyroidectomy and supplement with calcium or vitamin D if needed. Supplementation is gradually weaned as the remaining parathyroid glands begin to function normally and 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 and 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. Immediate post-parathyroidectomy hypocalcemia can cause serious, even fatal, complications so careful monitoring during the first few days after parathyroidectomy is warranted.

This Animal Health Topic was written by and reviewed by Diplomates of the American College of Veterinary Surgeons. Any opinions stated in this article are not necessarily the official position of the American College of Veterinary Surgeons.

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