



PATIENT

Curt DiFillippo

SPECIES

Canine

BREED

Miniature Dachshund

SEX

Neutered Male

AGE

11 Years 10 Months

WEIGHT

11.83 kg

INTERPRETED BY

Eric Lindquist, DMV,
DABVP(CFM), Cert.
IVUSS

IMAGING PERFORMED BY

Renee Trionfetti VMD

HOSPITAL NAME

Cypress Veterinary
Clinic

REFERRING VET

Dr. Laura Johnson
VMD

INVOICE

14665

DATE

03/26/26

PRESENTING CLINICAL SIGNS

- Ultrasound of the neck to further evaluate hypercalcemia. MSU panel consistent with primary hyperparathyroidism. Blue Pearl requested ultrasound to check thyroid before starting treatment. PMH: Splenectomy due to splenic mass-benign, Grade 2/6 HM- not appreciated on recent PE
- Meds: cyclosporine drop BID, carprofen 25 mg SID, eye lubricant

CBC: Hct 44.7%-n. Neuts 11.692, Mono 1.332, nRBCs 20, plts 539. Slight polychromasia and anisocytosis Chem: Ca unchanged fasted at 12.1, ALP stable at 733 H. Now ALT is normal off NSAID MSU Panel: Although parathyroid hormone is not increased above the upper reference limit, this concentration is viewed as inappropriately high in association with hypercalcemia. The results of this profile are in support of a diagnosis of primary hyperparathyroidism. The low (normal) PTHrP concentration would be expected with this diagnosis. - Parathyroid hormone 10-n, iCa 1.62 H, parathyroid related protein 0.0-n Prev AUS w/ Sonopath (4/3/2025): Splenic mass, geriatric abd

ULTRASONOGRAPHIC EXAMINATION

The salivary glands, esophagus, trachea, and regional tissues all appear normal.

The left thyroid lobe was unremarkable and uniform, measuring 3.0 mm in width. Two separate visible parathyroid glands were noted in the cranial pole with the largest of which measured 0.50 cm x 0.13 cm.

The right thyroid lobe revealed a hypoechoic irregular nodule, consistent with parathyroid adenoma, measuring 0.66 cm x 0.38 cm. Other parathyroids appeared unremarkable. The right thyroid lobe measured 0.46 cm in width.

ULTRASONOGRAPHIC FINDINGS

- Right cranial parathyroid adenomatous nodule.
- Normal parathyroids and thyroid tissue otherwise.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

Even though the left cranial parathyroid gland appears to be upper limits of normal and appears to be uniform, the right parathyroid adenomatous nodule is irregular and more consistent with parathyroid adenoma. Ultrasound guided FNA could be considered of both nodules to further assess. However, I believe the resection of the right cranial parathyroid nodule is likely the best option in this patient.



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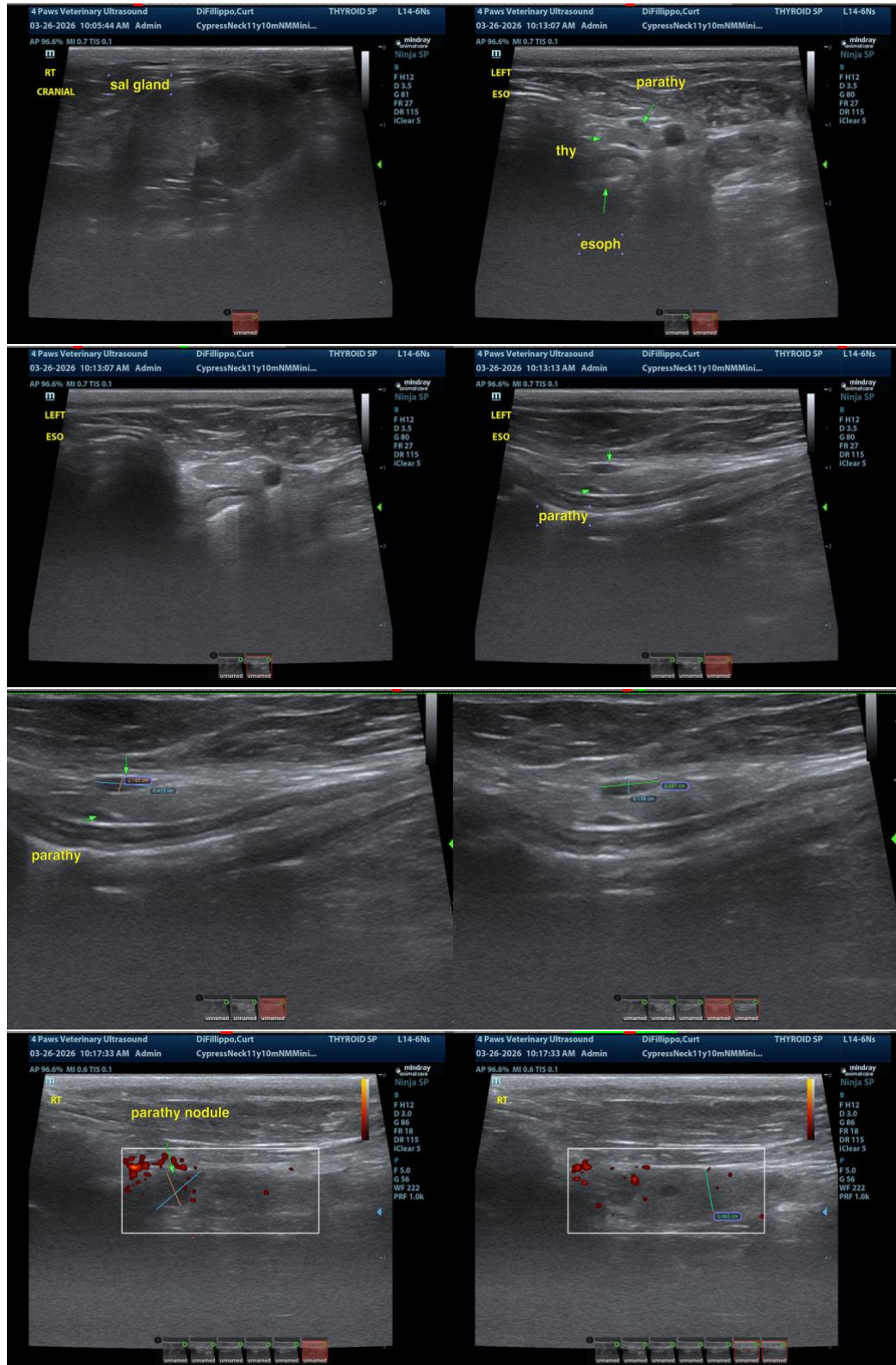
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The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

Thank you for this referral. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance, please contact me.

Eric Lindquist, DMV, DABVP(CFM), Cert. IVUSS,

CEO, Owner, Founder -- SonoPath.com

info@SonoPath.com

CANINE HYPERCALCEMIA

<http://www.sonopath.com/CanineHypercalcemia>

Description: Hypercalcemia is defined as either a persistently elevated total calcium serum (> 12 mg/dl) or ionized calcium (> 1.45 mmol/l) concentration. Clinical signs are often absent with mild hypercalcemia (< 13 mg/dl). In fact, hypercalcemia is often only discovered when serum biochemistry is done for unrelated reasons. Clinical signs are usually mild when the serum calcium concentration is less than 14 mg/dl; however, signs become more readily apparent when the concentration exceeds 15 mg/dl. Life-threatening cardiac arrhythmias can develop when the serum calcium exceeds 18 mg/dl.

Common etiologies of hypercalcemia include humoral hypercalcemia of malignancy (HHM), hypoadrenocorticism, chronic kidney disease (CKD), hypervitaminosis D, and primary hyperparathyroidism. Less common etiologies include bone neoplasia, osteomyelitis, hypertrophic osteodystrophy, granulomatous disease, calcium supplementation, and oral phosphate binders.

Clinical Signs: Common clinical signs include polyuria, polydipsia, lethargy, inappetence, and weakness. With chronic hypercalcemia, calcium oxalate and calcium phosphate uroliths can form, resulting in clinical signs suggestive of lower urinary tract disease. Systemic signs of illness are suggestive of HHM.

Diagnostics: One important etiology of hypercalcemia is laboratory error; therefore, hypercalcemia should always be confirmed before embarking on any further diagnostic evaluation. Results of a CBC, serum biochemistry panel, and urinalysis, in conjunction with a patient history and findings from a physical examination, can often provide enough information to arrive at a diagnosis. The appendicular skeleton, peripheral lymph nodes, abdominal cavity, and rectum should all be carefully palpated for masses, lymphadenopathy, hepatomegaly, splenomegaly, and/or pain in the long bones. The following diagnostic tests are helpful for identifying an underlying malignancy: thoracic and abdominal radiographs; abdominal ultrasound; cytological evaluation of aspirates of the liver, spleen, lymph nodes, and bone marrow; determination of serum ionized calcium, parathyroid hormone (PTH), and parathyroid hormone-related protein concentration (PTHrP); and ultrasound of the neck. Ascertaining the concentrations of serum ionized calcium, PTH, and PTHrP helps differentiate primary hyperparathyroidism from HHM. The finding of one or more enlarged parathyroid glands upon conducting an ultrasound of the neck supports a diagnosis of primary hyperparathyroidism.



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Hypoadrenocorticism-induced hypercalcemia usually occurs in conjunction with hyponatremia, hyperkalemia, and prerenal azotemia. With HHM and primary hyperparathyroidism, serum phosphorus concentration is often in the low to low-normal reference range. If the serum phosphorus concentration is high but kidney function is normal, hypervitaminosis D or osteolysis should be suspected.

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It can be difficult to determine whether kidney failure is primary or secondary to hypercalcemia when hyperphosphatemia and hypercalcemia coexist with azotemia. Serum ionized calcium concentrations are typically normal or decreased in cases of renal failure and increased in cases of hypercalcemia caused by other disorders.

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Sternal and hilar lymphadenopathy is common with lymphoma-induced hypercalcemia and can be readily identified on thoracic radiographs. In cases of multiple myeloma, discrete lytic lesions in the vertebrae or long bones, hyperproteinemia, proteinuria, and plasma cell infiltration in the bone marrow may be present. Cytological evaluation of the peripheral lymph nodes, bone marrow, and spleen can be helpful in identifying lymphoma.

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Increased serum ionized calcium concentrations, detectable serum PTHrP concentrations, and non-detectable serum PTH concentrations are all diagnostic for HHM. Lymphoma is the most common etiology of HHM, but other tumors, such as apocrine gland adenocarcinoma and various carcinomas (e.g. mammary gland, squamous cell, bronchogenic), can all give rise to hypercalcemia. Increased serum ionized calcium, normal to increased serum PTH, and non-detectable PTHrP concentrations are diagnostic of primary hyperparathyroidism.

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Differentials for Hypercalcemia: "HARD IONS"

Hyperparathyroid

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Addison's

Renee Trionfetti VMD

Renal

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Cypress Veterinary
Clinic

D-toxicity

Idiopathic

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Dr. Laura Johnson
VMD

Osteolytic

Neoplastic

Spurious

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PTH tumor: Elevated total and ionized Ca, low PTHrP, and normal/high PTH. Keeshonds, German Shepherds, and Golden Retrievers are all predisposed.

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Addison's disease: Elevated total and normal ionized Ca, elevated BUN, hypoalbuminemia and hyperkalemia.

Renal failure: Elevated to normal total Ca, low ionized Ca, low PTHrP, elevated PTH, azotemia, and low urine specific gravity.



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Vitamin D toxicity: Elevated total and ionized Ca, low PTHrP, and normal/low PTH.

Hypercalcemia of malignancy (HHM): Elevated total and ionized Ca, high PTHrP, and low PTH.

Granulomatous disease: Elevated total and ionized Ca, low PTHrP, and low PTH.

Renal failure: Elevated to normal total Ca, low ionized Ca, low PTHrP, elevated PTH, azotemia, and low urine specific gravity.

Treatment: Therapies for hypercalcemia are aimed at correcting the underlying etiology; however, because prolonged hypercalcemia can result in kidney damage, the use of fluid therapy, furosemide, and possibly prednisone is indicated in all cases to reduce serum calcium levels. Suggested dosages include saline (0.9% 120-180 ml/kg day IV), furosemide (1-4 mg/kg PO TID), and prednisone (0.25 mg/kg PO Q24hr).

References:

Chew DJ, Schenck PA, Jaege JQ. Clinical disorders of hypercalcemia and hypocalcemia in dogs and cats. Proceedings from the American College of Veterinary Internal Medicine, Charlotte, NC, June 4-7, 2003.

Feldman EC. Disorders of the parathyroid glands. In: Ettinger SJ, Feldman EC, ed. *Textbook of Veterinary Internal Medicine, 7th ed.* St. Louis, MO: Saunders Elsevier; 2010:1722-50.

Peterson ME. Hypercalcemia in dogs & cats: differential diagnosis & treatment. Proceedings from the Western Veterinary Conference, Las Vegas, NV, February 19-23, 2012.