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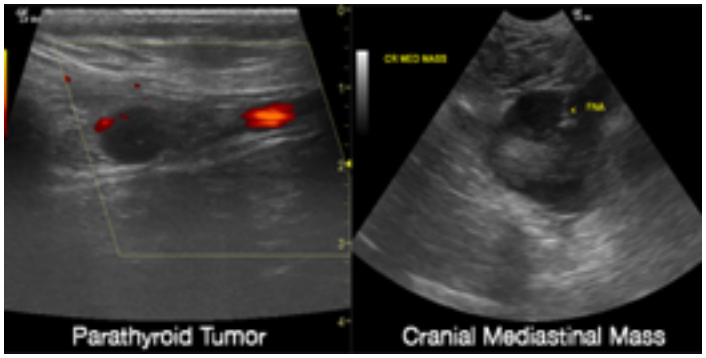
Hypercalcemia



Description: *Hypercalcemia is defined as either a persistently elevated total serum calcium concentration (greater than 12 mg/dl) or a serum ionized calcium (greater than 1.45 mmol/L). Clinical signs are often absent with mild hypercalcemia (< 13 mg/dl) and often the hypercalcemia is only discovered when serum biochemistry is done for unrelated reasons. Clinical signs are usually mild with serum calcium concentrations less than 14 mg/dl but are readily apparent when the serum calcium is greater than 15 mg/dl. Life threatening cardiac arrhythmias can develop when the serum calcium exceeds 18 mg/dl.* In the dog, common etiologies of hypercalcemia include humoral hypercalcemia of malignancy (HHM), hypoadrenocorticism, chronic kidney disease, hypervitaminosis D, and primary hyperparathyroidism; whereas in the cat, HHM, chronic kidney disease, primary hyperparathyroidism, and idiopathic hypercalcemia are the most common etiologies. Less common etiologies include bone neoplasia, osteomyelitis, hypertrophic osteodystrophy, granulomatous disease, calcium supplementation, and oral phosphate binders.

Clinical Signs: Common clinical signs are 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: An important etiology of hypercalcemia is laboratory error, thus hypercalcemia should

always be confirmed before embarking on any further diagnostic evaluation. Results of a CBC, serum biochemistry panel, and urinalysis, in conjunction with the history and physical examination findings, can often provide clues to the diagnosis. The appendicular skeleton, peripheral lymph nodes, abdominal cavity and rectum should be carefully palpated for masses, lymphadenopathy, hepatomegaly, splenomegaly, or pain on digital palpation of the long bones. Diagnostic tests that are helpful in identifying an underlying malignancy include 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. Measurement of serum ionized calcium, PTH and PTHrP aids in differentiating primary hyperparathyroidism from HHM. The finding of one or more enlarged parathyroid glands on ultrasound of the neck supports a diagnosis of primary hyperparathyroidism. Hypoadrenocorticism-induced hypercalcemia usually occurs in conjunction with hyponatremia, hyperkalemia, and pre-renal 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 increased and kidney function is normal, hypervitaminosis D or osteolysis should be suspected. Determining whether kidney failure is primary or secondary to the hypercalcemia, when hyperphosphatemia and hypercalcemia coexist with azotemia, can be difficult. Serum ionized calcium concentrations are typically normal or decreased in renal failure and increased in hypercalcemia caused by other disorders. Sternal and hilar lymphadenopathy is common with lymphoma-induced hypercalcemia and can be readily identified on thoracic radiographs. With 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 peripheral lymph nodes, bone marrow, and spleen can be helpful in identifying lymphoma. Increased serum ionized calcium concentration, detectable serum PTHrP concentration, and non-detectable serum PTH concentration is diagnostic for HHM. Lymphoma is the most common etiology of HHM, but other tumors such as apocrine gland adenocarcinoma and various carcinomas (mammary gland, squamous cell, bronchogenic) can all result in hypercalcemia. Increased serum ionized calcium, normal to increased serum PTH, and non-detectable PTHrP concentrations are diagnostic of primary hyperparathyroidism.

Treatment: Specific therapy of hypercalcemia is aimed at correcting the underlying etiology. However, as prolonged hypercalcemia can result in renal damage, the use of fluid therapy, furosemide, and possibly prednisone is indicated in all cases to reduce serum calcium levels.

References: Feldman EC. Disorders of the parathyroid glands. In: Ettinger S J, Feldman E C Textbook of Veterinary Internal Medicine (7th edn). Saunders Elsevier, St Louis: 2010, pp 1722 -1750

This article is an excerpt form the upcoming pocket guide offered by SonoPath.com: "The Curbside Guide, Diagnosis & Treatment of Common Sonographically Detected Disease." Available Spring 2014.

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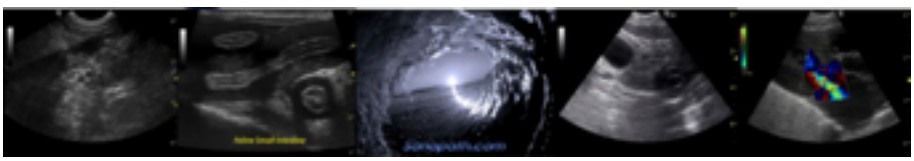

SonoPath LLC. 31 Maple Tree Ln. Sparta, NJ 07871 USA

Via Costagrande 46, MontePorzio Catone (Roma) 00040 Italy ***Tel: 800 838-4268***