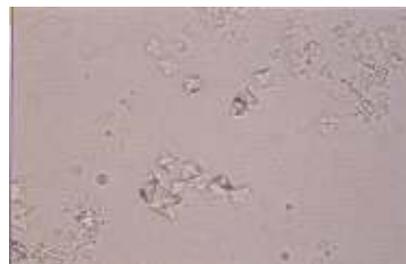
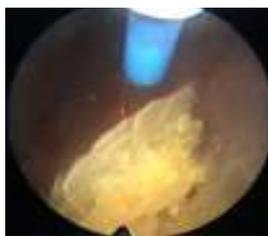


Protocol for Calcium Oxalate Urolithiasis Management in Dogs and Cats

Jodi L Westropp DVM, PhD, DACVIM

This protocol is intended only as a guideline. For specific questions, please do not hesitate to contact the laboratory.



Because the management for CaOx urolithiasis in dogs and cats is similar, these guidelines are applicable for both species.

After the stone(s) is (are) removed, perform two view abdominal radiographs to ensure no small cystic or urethral calculi remain.

1. Submit the stones to the UC Davis Urinary Stone Analysis Laboratory for quantitative crystallographic analysis.
2. Submit a urine culture and sensitivity, and initiate appropriate antibiotic therapy if indicated.
 - a. If an infection is documented, it is usually secondary to the presence of the stone. Unlike struvite urolithiasis, infections do not induce CaOx stone formation.
3. Evaluate serum total calcium concentration. If elevated, evaluate serum ionized calcium concentration and pursue appropriate diagnostics for hypercalcemia.
4. Consider evaluating a fasted serum sample for triglyceride concentration. This is of particular concern in miniature schnauzers and other breeds at increased risk for hyperlipidemia.
 - a. If elevated, institute a low fat diet.
5. Begin an appropriate diet that is **high in moisture***.
 - a. Canned diets are usually easiest; however, the patient can also be fed a dry diet mixed with water on a 1 to 5 volume basis. The water should be added gradually over 3 to 4 weeks so diarrhea does not develop.
 - b. Low fat diets are often necessary for dogs with concurrent hypertriglyceridemia.
 - c. Diets must be complete and balanced with proper concentrations and ratios of essential nutrients, as suboptimal intake of several nutrients is associated with increased risk of CaOx urolithiasis.
 - d. Diets should be limited in ingredients high in oxalate content to reduce oxaluria.
6. Reevaluate the animal in four to six weeks (or after the owner feels they have increased the moisture content appropriately) followed by regular monitoring.
 - a. Have the owner bring a urine sample obtained from the pet while in their own environment and assess the urine specific gravity.
 - b. If specific gravity is not ideal (<1.020 for dogs, <1.025 for cats), add more water to the diet. If necessary, consider adding salt to the food (or tuna/clam juice or low sodium broth to the water source) to encourage voluntary water intake.

- i. Additional salt should not be used when contraindicated (e.g. renal disease, heart disease, and hypertension).
 - c. Obtain a fresh urine sample and evaluate urine sediment. The urine should be free of crystals on microscopic examination.
 - d. Radiograph the patient to assess for new urolith formation. If no stones are present, radiographs should be repeated periodically (every 2-3 months initially, then less often as the disease is managed). If small stones recur, voiding urohydropropulsion can be performed to remove them.
7. Monitor body weight, especially if a diet change was instituted. Make appropriate adjustments to the amount of the diet being fed to achieve and then maintain an ideal weight and body condition score. Institute a weight loss plan (using an appropriate canned therapeutic diet formulated for active weight loss*) if obese.
 8. For recurrent calcium oxalate urolithiasis, consider further increasing moisture intake, the addition of hydrochlorothiazide to decrease urinary calcium excretion and/or potassium citrate to chelate urinary calcium.

Client information sheets regarding urolithiasis are available here:

http://www.vetmed.ucdavis.edu/vmth/small_animal/nutrition/client_info_sheets/uroliths.cfm

If you are a veterinarian and wish to discuss specific dietary recommendations for your case, please contact the G. V. Ling Urinary Stone Analysis Laboratory at: 530-752-3228 or ucdstonelab@ucdavis.edu.

OR the UC Davis Nutrition Support Service:

http://www.vetmed.ucdavis.edu/vmth/small_animal/nutrition/index.cfm.

** As a public institution, UC Davis does not endorse any particular brand or type of pet food. The higher moisture content of canned formulations is helpful in stone prevention. Any dietary management plan should take into consideration concurrent diseases and other individual client and patient factors. **Dietary management plans for any patient that is overweight, or that has a low energy requirement, or that has any other concurrent disease should be individualized to optimize efficacy and avoid problems.***

*The reader is encouraged to discuss dietary strategy with a veterinary nutritionist; **a customized approach is often indicated.** There are large variations in the nutritional profiles of various diets marketed for urolithiasis management (see list below), while many other diets can be effectively used 'off-label' for this purpose.*

Commercially Available Diets Marketed for Management of Canine Calcium Oxalate Urolithiasis:

1. Hill's Prescription Diet Canine u/d canned and dry
2. Royal Canin Veterinary Diet Canine Urinary SO canned and dry
3. Purina Veterinary Diet NF Kidney Function Canine Formula canned and dry
4. Natura Innova Large Breed Puppy Stew, Flex Adult Dog Beef and Barley canned, Flex Large Breed Beef and Barley canned, and Flex Large Breed Senior canned

Commercially Available Diets Marketed for Management of Feline Calcium Oxalate Urolithiasis:

1. Iams Veterinary Formula Urinary O-Moderate pH/O Feline canned and dry
2. Purina Veterinary Diet UR Urinary St/Ox Feline Formula canned and dry

3. Hill's Prescription Diet c/d Multicare Feline canned and dry
4. Royal Canin Veterinary Diet Feline Urinary SO canned and dry
5. Natura Innova Flex Adult Cat Beef and Barley canned