

# Urolithiasis

## ABOUT THE DIAGNOSIS

Urolithiasis refers to the formation of stones in the urinary tract (either bladder stones or kidney stones). In dogs and cats, as in humans, the kidneys are organs that consist of a dense meshwork of tissue that filters the blood; waste substances are filtered out by the kidneys and passed down thin slender tubes in the abdomen called ureters. The ureters pass these urinary waste products into the bladder, which acts as a reservoir for collecting this waste as urine. The urine is then voided out of a larger tube called the urethra.

Urinary stones, also called urinary calculi or uroliths, may form in the kidneys or the bladder. They may pass into and cause obstruction of the ureters (the paired tubes connecting kidneys to bladder) or urethra (the larger tube from the bladder to the exterior of the body). Uroliths may be formed from several substances. The most common types of uroliths in dogs and cats are struvite (or "triple phosphate") uroliths and calcium oxalate uroliths. Uroliths may also be composed of calcium phosphate, cystine, urate, or xanthine. Struvite uroliths are often linked to urinary tract infections in dogs and to nutritional factors (high-ash, low-acid diet) in cats. Cats can develop blockage of the urethra due to "plugs" made up of a combination of tiny uroliths and other material. Some breeds of dogs are more likely to develop certain types of uroliths. Some diseases and inborn defects in metabolism increase the likelihood of formation of uroliths because the diseases cause an unnaturally high level of a substance to be present in the urine, allowing it to precipitate into the form of a urolith. For example, urate uroliths often occur in pets born with a defect called portosystemic shunt.

Straining to urinate (stranguria), frequent urination of small amounts (pollakiuria), and blood in the urine (hematuria) are symptoms that can arise as a result of uroliths located in the bladder or urethra. However, not all dogs and cats with these symptoms have uroliths; therefore, since other disorders can produce these kinds of symptoms, it is important to have your dog or cat checked by a veterinarian if any of these symptoms is present. Occasionally, in some pets with uroliths, no symptoms may be present, and the uroliths are only detected as a coincidence (incidental finding) during tests being performed for other problems (e.g., x-rays).

Total blockage of the outflow of the bladder by a urolith (urethral obstruction) can occur, and this is an emergency. If urine cannot be evacuated from the body for 24 hours or more, the pet could die from uremia, a buildup of waste products in the body that would normally be evacuated in the urine. Uroliths in the bladder and kidney are less urgent if they are not blocking the outflow of urine. It is important to note that the main symptom that helps differentiate urolithiasis causing urethral obstruction from urolithiasis that does not block the outflow of urine is straining to urinate: pets with blockage of the urethra usually will strain to urinate with no urine flowing out as result, since the path of urine flow is blocked. If not noticed, this situation then leads to lethargy, weakness, and eventually (over a period of 24 to 48 hours) coma and death.

**DIAGNOSIS:** Tests are always performed in patients suspected of having uroliths because no single symptom is 100% specific to urolithiasis. The tests most commonly used are analysis of a urine sample (urinalysis), routine blood work (complete blood count and serum biochemistry panel), and diagnostic imaging (x-rays and/or ultrasound).

Analysis of urine samples may show the presence of blood, crystals (although the presence of crystals is not necessarily connected to the existence of uroliths), or infection. Radiographs (x-rays) and ultrasound examinations are the most useful for detecting uroliths. Blood tests can be important because in some cases they will show abnormalities related to the formation of uroliths. For example, high blood calcium levels may be related to the formation of calcium oxalate uroliths. When a urolith is passed or surgically removed, it should be analyzed to determine its composition. The composition of the urolith determines the measures needed to prevent reoccurrence and, in some cases, influences treatment options. If infection is present, a bacterial culture is needed to determine which antibiotic will be best for treatment.

## LIVING WITH THE DIAGNOSIS

Dogs or cats that have been treated for uroliths are at increased risk of developing more uroliths in the future. Therefore, some degree of preventive management is often necessary. Measures to minimize the reoccurrence of uroliths depend upon the type of urolith. For example, for some types of uroliths, special diets or medications can reduce the risk of reoccurrence, whereas for other types of uroliths an underlying condition (such as portosystemic shunt) needs to be corrected.

## TREATMENT

Treatment depends on the location and type of the urolith. The results of tests as described above are necessary to provide the information for optimal treatment. Importantly, some treatments for certain types of uroliths would make other uroliths worse and vice versa. Therefore, determining the urolith type through laboratory analysis of the stone itself allows for a focused treatment plan.

General principles include removing the uroliths that are present, reducing the risk of recurrence, and controlling secondary problems (e.g., preventing infection). Uroliths blocking the urethra can usually be flushed back into the bladder under general anesthesia to relieve the obstruction. Small uroliths in the bladder can sometimes be removed using a catheter or flushed out through the urethra. Some types of uroliths can be slowly dissolved by feeding special diets formulated for that purpose. Many times, bladder uroliths must be removed with surgery. Uroliths within the kidneys are difficult to reach even with surgery and are not always removed, except if they are of a type that can be dissolved with a special diet. Uroliths lodged in a ureter need surgical removal.

If infection is present, antibiotics must be given to eliminate it. Antibiotic treatment generally is needed for several weeks to completely eliminate all traces of infection.

### DOs

- Give medications exactly as directed.
- Restrict your pet's exercise after surgery; have skin sutures removed in 10 to 14 days.

### DON'Ts

- If feeding a special diet to dissolve uroliths or prevent their reformation, do not feed other foods or treats.
- After surgery, do not let your pet lick or chew the incision or get it wet.

## WHEN TO CALL YOUR VETERINARIAN

- If your pet cannot pass urine (i.e., strains to urinate without a normal stream of urine coming out), seems uncomfortable, or becomes lethargic. Complete urethral blockage is an emergency, even if the pet seems alert and normal.
- After surgery, if there is swelling at or drainage from the surgical incision or if your pet is licking the incision.

## SIGNS TO WATCH FOR

As initial symptoms of urolithiasis, or signs that urolithiasis potentially has returned:

- Straining to urinate, with dribbling or no urine passed.
- Frequent urination of small amounts.
- Bloody urine.

## ROUTINE FOLLOW-UP

- Pets that have previously had urolithiasis should be checked periodically for reoccurrence using x-rays or ultrasound. Urine samples should also be analyzed for the presence of infection. When treating uroliths by dissolving them with feeding of special

diets, the progress of treatment must be monitored every few weeks.

*Other information that may be useful: "How-To" Client Education Sheet:*

- How to Collect a Urine Sample



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