

The Animal Medical Clinic

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Bladder Stones in Dogs

Bladder stones, or uroliths, are rock-like collections of minerals that form in the urinary bladder. Uroliths may occur as a large, single stone or as dozens of smaller stones. Individual stones can vary in size from tiny stones, which can be voided in the urine stream to larger stones the size of a golf ball.

Kidney stones (nephroliths) do not have to be present for bladder stones to form. In fact, kidney stones are relatively uncommon in the dog. Both stones are unrelated to development of gallstones (stones in the gall bladder).

Bladder stones are classified by their mineral content; this is determined by laboratory analysis of a stone. The types of stones reported to occur in dogs include struvite, calcium oxalate, urate, cystine and silicate stones.

Contributing Factors

Predisposing factors for development of stones are unique for each type of stone but can include the following:

1. Presence of a urinary tract infection
2. Excessive loss of urate or calcium into the urine
3. Inability of the kidney to re-absorb certain amino acids

The factor that can be eliminated with appropriate treatment is a urinary tract infection. For the others, a metabolic disturbance is responsible for stone formation and may not be preventable (see Prevention).

Prevalence

Bladder stones are a relatively common problem in the dog and occur in about 1-2% of all dogs. Bladder stones are more common in middle-aged dogs. Struvite, the most common stone, is seen with higher frequency in female dogs; the other types of stones are more common to male dogs.

Breeds commonly affected with bladder stones include the following: Dalmatian, Pekingese, miniature Schnauzer, Yorkshire Terrier, Scottish Terrier, Dachshund, Bulldog, miniature Poodle, Pug, Basset Hound, Shih Tzu, and Cocker Spaniel. Certain types of stones are more commonly found in certain breeds.

Causes/Transmission

There are several theories of bladder stone formation. Each is feasible in some circumstances, but there is probably an interaction of more than one of them in each dog. The most commonly accepted theory is called the Precipitation-Crystallization Theory. This theory states that one or more stone-forming crystalline compounds are present in elevated levels in the urine. This may be due to abnormalities in *diet* or due to some previous disease in the bladder, especially *infection* with bacteria. When the amount of this compound reaches a threshold level, the urine is said to be supersaturated. This means that the level of the compound is so great that it cannot all be dissolved in the urine, so it precipitates and forms tiny crystals. These crystals stick together, usually due to mucus-like material within the bladder, and stones gradually form. As time passes, the stones enlarge and may increase in number.

Growth will depend on the quantity of crystalline material present and the degree of infection present. Although it may take months for a large stone to grow, some sizable stones have been documented to form in only a few weeks.

Clinical Signs

The two most common signs of bladder stones are blood in the urine (hematuria) and straining to urinate (dysuria). Hematuria occurs because the stones mechanically irritate the bladder lining, causing bleeding from its surface. Dysuria occurs when stones obstruct the passage of urine out of the bladder. Large stones may cause a partial obstruction at the point where the urine leaves the bladder and enters the urethra; small stones may flow with urine into the urethra.

Bladder stones may also pass into the urethra but be too large to get completely out of the body, resulting in complete obstruction of the urethra. When this occurs, urine cannot pass out of the body and the dog becomes very painful in the abdomen. It may cry in pain, especially if pressure is applied to the abdominal wall.

Hematuria, dysuria, and inability to urinate are the most common signs seen, but abdominal pain usually occurs also. We know this because when bladder stones are removed surgically, many owners tell us that the dog feels noticeably better and is more active soon after surgery.

Diagnosis

Most dogs that have bladder infections do not have bladder stones. These dogs will often have blood in the urine and will strain to urinate, the same symptoms as a dog with bladder stones. Therefore, we do not suspect bladder stones just based on these clinical signs.

Some bladder stones can be palpated (felt with the fingers) through the abdominal wall or with a rectal exam. However, failure to palpate them does not rule them out.

Most bladder stones are visible on radiographs (x-rays) or an ultrasound examination. These procedures are performed if stones are suspected. This includes dogs that show unusual pain when the bladder is palpated, dogs that have recurrent hematuria and dysuria, or dogs that have recurrent bacterial infections in the bladder.

Some bladder stones are not visible on radiographs. They are said to be radiolucent. This means that their mineral composition is such that they do not block the x-ray beam. These stones may be found with an ultrasound examination (if available) or with special radiographs that are made after placing a dye (contrast material) into the bladder.

Treatment

There are two options for treatment. Quick results can be achieved with surgical removal of the stones. This requires major surgery in which the abdomen and bladder are opened. Following two to four days of recovery, the dog is relieved of pain and dysuria. The hematuria will often persist for a few more days, and then it stops. Surgery is not the best option for all patients; however, those with urethral obstruction and those with bacterial infections associated with the stones should be operated unless there are other health conditions that prohibit surgery.

The second option is to dissolve the stone with a special diet. This avoids surgery and can be a very good choice for some dogs. However, it has three disadvantages.

1. It is not successful for all types of stones. Unless some sand-sized stones can be collected from the urine and analyzed, it is not possible to know if the stone is of the composition that is likely to be dissolved.
2. It is slow. It may take several weeks or a few months to dissolve a large stone so the dog may continue to have hematuria and dysuria during that time. Continued trauma to the bladder wall may thicken it and leave it scarred.
3. Not all dogs will eat the special diet. The diet is not as tasty as the foods that many dogs are fed. If it is not consumed *exclusively*, it will not work.

Prognosis

Prognosis depends upon whether the underlying cause can be eliminated (urinary tract infection) or it is rooted in a metabolic disturbance. Obviously, metabolic tendencies are cannot be manipulated with great success. Therefore, the prognosis is dependent upon each individual dog's particular situation.

Prevention

In some cases, stones can be prevented from recurring a second time. There are at least four types of bladder stones, based on their chemical composition. If stones are removed surgically or if some small ones pass in the urine, they should be analyzed for their chemical composition. This will permit us to determine if a special diet will be helpful in preventing recurrence. If a bacterial infection causes stone formation, it is recommended that periodic urinalyses and urine cultures be performed to determine when antibiotics should be given.