

## **BLADDER STONES - WHERE DO THEY COME FROM? WHAT CAN YOU DO?**

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Bladder stones (uroliths) occur in dogs when crystals form in the urine and these crystals "grow" within the bladder to a size where they irritate the bladder lining or, even worse, cause partial or complete obstruction of the urethra, the channel that leads from the bladder to the outside world. While no dog owner would consider by-passing the vet in dealing with a problem like bladder stones, it can be important for the owner to have a general understanding of the dog's condition since this can directly affect the success of the treatment. In this article, I'll describe what types of symptoms can occur when bladder stones are present, I'll provide some background on what can cause stones to form, and, in general terms, what treatments are available.

The symptoms of bladder stones are really not different from those associated with a bladder infection, or cystitis, and this condition can in fact be a cause of stones, as described below. Your dog may begin to urinate frequently, or have accidents in the house, and you may see some evidence of straining during urination and possibly see blood in the urine. In an extreme case, where some obstruction has taken place, you will see the dog strain for some time and only a little urine will appear. In all of these cases, a trip to the vet is warranted; if you can obtain a urine specimen to take along, all the better. With females, this can be done pretty easily by slipping something flat like a clean saucer under the bitch while she is urinating. With males, it is easier to let the vet obtain the sample by slipping a canula directly into the bladder, which can also be done with females; any skilled vet should be able to do this with either sex. A bonus of this approach is that the sample will be "sterile", that is, taken directly from the bladder without contamination by the outside environment. This sample is the first step in diagnosis, because urinalysis can provide information about any bacteria that are present, whether blood or crystals are being excreted, the pH of the urine, etc. The ultimate diagnosis of stones can be made with an X-ray, since stones are radio-opaque and will therefore be visible on the film. The vet can also get information from the level of bacteria and the amount of blood in the urine because stones can be a constant source of irritation to the bladder lining and result in significant bleeding within the bladder. However, a bladder infection can be the cause of stones or can result from the presence of stones that formed for another reason and caused chronic bladder irritation. As a result, identifying the presence and cause of bladder stones can be tricky and it can help if one has some understanding of what factors lead to their formation.

First, it's important to realize that the pH of urine is generally low, somewhere around 5-6; this means that the urine is normally quite acid. The most common problem that leads to bladder stones is any condition that results in a rise in urinary pH, that is, makes urine more alkaline than normal. A bladder infection, or cystitis, is a common cause of alkaline urine, because enzymes released by the bacteria cause the urinary pH to go up. Moreover, since our pets can't tell us about the early symptoms, we usually don't know that such a condition exists until it's been there for awhile. In normally acidic urine, salts that are being excreted by the kidney like phosphates and urates are soluble and pass harmlessly out; however, in alkaline urine these become insoluble and crystallize out. When concentrations of these salts are high enough in the urine, stones will begin to form. The most common type of stone is called a "struvite" stone; these stones are made up of a complex form of magnesium, ammonium and phosphate, and possibly calcium, and are sometimes called "super phosphate" or "triple phosphate" crystals. Other types that form in alkaline urine are either urate-based or composed of the amino acid

cystine. These types of stones can be dissolved, over time, if the underlying cause of the alkaline urine is treated and the urine becomes acid again. For these stones, the problem can be a urinary tract infection, as already described, or something more unusual and harder to diagnose, like a genetic defect in kidney function (cystine stones) or liver function (urate stones) or a dietary problem where the intake of calcium is too high (lots of milk products, or eating lots of bones, or feeding "puppy" chow in an adult). However, there are also rarer types of stones which can occur even in urine that is acid. An example of these is oxalate stones, consisting of calcium, magnesium, or ammonium oxalate. The cause of this type of stone is less well understood but many green vegetables, like spinach or broccoli, are very high in oxalates, and ingestion of lots of veggies, or maybe grass, could be a cause of oxalate stones. Also, certain molds that exist in water excrete high levels of oxalate, so a water bowl that isn't cleaned frequently enough to discourage molds from growing might contribute to this problem. As you can see from this very general description, there can be many underlying problems that cause bladder stones, so it's important to know, whenever possible, the makeup of the stone. Sometimes, the owner can actually retrieve a stone when it is passed in urine, if it's big enough and the timing is "just right". Or, if surgery is necessary (see below) the vet will save a stone for analysis. Finally, even if stones are removed or dissolved, it's important to follow-up by checking the dog sometime later for normal urine, to be sure that the underlying cause has been identified and dealt with in treatment.

The quickest and most direct method of treating bladder stones is surgical removal. However, this involves general anesthesia and abdominal surgery so, although this surgery is not an uncommon procedure and well within the skills of a good vet, it is a major trauma to the dog. For this reason, if the symptoms are not too severe and if the urine is alkaline, many vets will recommend "medical" treatment, that is, taking steps to acidify the urine and attempting in this way to dissolve the stones. If an infection is present, one would obviously begin antibiotic therapy, with a broad spectrum antibiotic if a culture has not been performed to identify the bacteria. If there isn't a quick response (3-5 days), a culture might be advisable so a more appropriate antibiotic can be started. Drinking lots of water can also help since this will increase urinary volume and help to "flush" out the stones. Adding just a little salt to a dog's diet can increase the intake of water and accomplish this. The dog will usually be placed on a special calculolytic diet like Hill's S/D which, if effective, usually takes about 2 months to dissolve the stones. Once these are no longer present, it is important to insure that the urine has also returned to normal, that is, that it is acidic. Again, whether this will occur depends largely on what caused the stones in the first place. In some cases, a "metabolic" problem may exist and the vet may recommend a special diet like Hill's C/D, which has a mineral composition that helps keep the urine acidic. However, even on this diet it is important to check the urine to be sure the pH is acid since, from my own personal experience, this is not effective for all dogs. In such a case, a direct additive to food such as "Uroeze" or "Methigel" twice a day may solve the problem. In the rare case where stones formed in acid urine or were of a type indicating another organ is involved, the vet will recommend another treatment to deal with the cause, like a diet change, etc. With the right treatment and some owner-delivered tender loving care, there's every reason to expect a life of normal health and length for a dog afflicted with bladder stones.

*Submitted by Joanne Orth, 12-6-96.*