



## BLADDER STONES (CALCULI)

### What are bladder stones?

Bladder stones, more correctly called uroliths, or cystic calculi are rock-like collections of minerals that form in the urinary bladder. They may occur as a large, single stone or as collections of stones the size of large grains of sand or gravel.

### Are these the same as gall stones or kidney stones?

No. Gall stones are in the gall bladder, and kidney stones are in the kidney. Although the kidneys and urinary bladder are both part of the urinary system, kidney stones are usually unrelated to bladder stones.

### What problems do bladder stones cause?

The two most common signs of bladder stones are hæmaturia (blood in the urine) and dysuria (straining to urinate). Hæmaturia occurs because the stones mechanically irritate the bladder wall, 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 the urine into the urethra and cause an obstruction there.

When an obstruction occurs, the bladder cannot be emptied and this is very painful. Your dog may cry in pain, especially if pressure is applied to the abdominal wall.

Hæmaturia and dysuria are the most common signs seen in dogs with bladder stones but with obstruction there is usually pain as well. We know this because when bladder stones are removed surgically, many owners tell us how much better and more active their dog feels.

### Why do they form?

There are several theories to explain the formation of bladder stones. 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-Crystallisation Theory. This theory states that one or more stone-forming crystalline compounds is 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. Sometimes the condition may be due to a fault in body chemistry. 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 increase in number.

## How fast do they grow?

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 sizeable stones have been documented to form in as little as two weeks.

## How are they diagnosed?

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 diagnose bladder stones just based on these clinical signs.

Some bladder stones can be palpated (felt with the fingers) through the abdominal wall. 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 hæmaturia 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 reflect 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 special dye (contrast material) in the bladder.

## How are bladder stones treated?

There are two options for treatment. The fastest way is to remove them surgically. 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 hæmaturia will often persist for a few more days, 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 upon 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 analysed, 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 hæmaturia and dysuria during that time.
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.

## Can bladder stones be prevented?

The answer is a qualified "yes." 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 analysed 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.

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