

## Bladder Stones in Cats

### What are bladder stones?

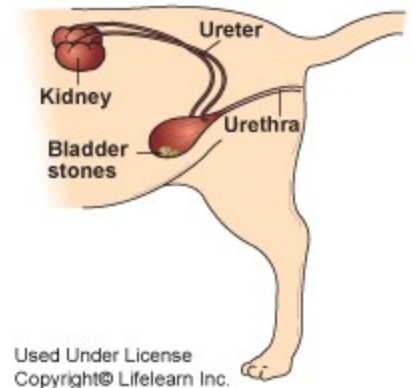
Bladder stones (*uroliths or cystic calculi*) are rock-like formations of minerals that develop in the urinary bladder. There may be a large, single stone or a collection of stones that range in size from sand-like grains to gravel. Many times, there is a mixture of both large and small stones present.

### What other kinds of stones are there?

Gallstones form in the gall bladder and contain bile salts. Kidney stones are mineralized formations that develop in the kidney. Neither of these is directly related to bladder stones. Even though the kidneys and urinary bladder are both part of the urinary system, the development of kidney stones is not usually linked to the development of bladder stones. All stones form because of disease or inflammation in the affected structure.

### What are the clinical signs of bladder stones?

**The most common symptoms of bladder stones in the cat are hematuria (blood in the urine) and dysuria** (straining to urinate). Hematuria occurs because the stones rub against the bladder wall, irritating and damaging the tissues and causing bleeding. Dysuria may occur from inflammation and swelling of the bladder walls or the urethra, from muscle spasms or due to a physical obstruction to urine flow caused by the presence of the stones. Veterinarians assume that the condition is painful, because people with bladder stones experience pain, and because many clients remark about how much more active their cat becomes following surgical removal of bladder stones.



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Large stones may act almost like a valve or stopcock, causing an intermittent or partial obstruction at the neck of the bladder, the point where the bladder attaches to the urethra. Small stones may flow with the urine into the urethra, where they become lodged and cause an obstruction. This problem occurs more frequently in male cats, because of their anatomy.

If an obstruction occurs, the bladder cannot be emptied fully. This is very painful, especially when pressure is applied to the abdomen. If the obstruction is not relieved, the bladder may rupture. A complete obstruction is potentially life threatening and requires immediate emergency treatment.

### How did my cat get bladder stones?

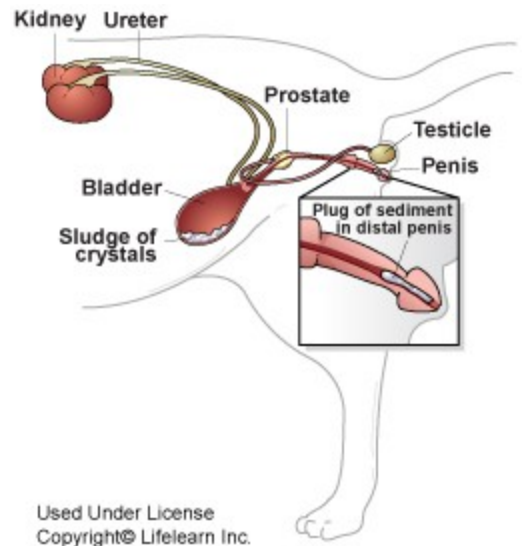
"The most commonly accepted theory for stone formation is called the **Precipitation-Crystallization Theory**."

There are several theories of how bladder stones form. The most commonly accepted theory for stone formation 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. When the amount of this compound exceeds a threshold level, the urine becomes *saturated* and cannot hold any more of the compound. The saturation level depends on the specific minerals that are present and the pH of the urine. The excess precipitates out of solution and forms tiny crystals. The sharp crystals irritate the bladder lining, causing a production of mucus. The crystals and mucus stick together, forming clusters that gradually enlarge and harden into stones. This is similar to the way "rock candy" is formed.

### How quickly can bladder stones form?

Bladder stones can develop within a few weeks or may take months to form. The rate of urolith formation and growth is variable, depending on factors such as on how much crystalline material is present in the urine, the pH of the urine, etc.

### How are bladder stones diagnosed?



Inflammatory diseases of the bladder are common in cats, and produce the same symptoms as bladder stones. Therefore, we do not assume that a cat has bladder stones based only on these clinical signs.

Some bladder stones can be palpated or felt with the fingers through the abdominal wall. However, failure to palpate bladder stones on examination does not rule them out because many are too small to be detected in this manner.

Most bladder stones are visible on radiographs (x-rays) or an ultrasonic bladder examination. These diagnostic imaging techniques should be performed on cats that show signs of abdominal pain or have recurrent episodes of hematuria or straining.

Some bladder stones are *radiolucent*, or are not visible on radiographs, because their mineral composition does not reflect x-ray beams. They can be detected by an ultrasound examination or with 'contrast radiographs' a specialized technique that uses dye or contrast material to outline the stones within the bladder.

## How are bladder stones treated?

There are two options for treatment. The fastest solution is to perform a *cystotomy*, or surgically open the bladder and remove the stones. This routine surgery is the most common choice for most clients, and cats usually make a speedy post-operative recovery. Cats with a complete urethral obstruction caused by large stones require immediate surgical intervention. In some cases, a cystotomy may not be necessary if the obstruction can be relieved by passing a catheter, especially if it is caused by soft plugs of crystals and mucus or urethral spasms. Surgery is not the best option for patients that have other health concerns.

*"The fastest solution is to perform a cystotomy..."*

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

- 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.
- It is slow. It may take several weeks or a few months to dissolve a large stone so the cat may continue to have hematuria, dysuria, and recurrent infections during that time. The risk of life-threatening urethral obstruction is present during the dissolution process.
- Not all cats will eat the special diet. The diet is not as tasty as the foods that many cats are fed. If it is not consumed *exclusively*, it will not work.

## Can bladder stones be prevented?

Prevention is possible in many cases. There are at least four types of bladder stones in cats, each based on their chemical composition. If bladder stones are removed surgically or if small ones pass in the urine, they should be analyzed for their chemical composition. This will permit us to determine if a special diet or medication is appropriate. Periodic urinalysis or ultrasound examination may be helpful in some cases to detect early recurrence of the problem and allow adjustments in diet or treatment.