If Your Pet Can't Do This, It's an Emergency

Some pets with this condition give no advanced warning. If they show any of these six symptoms, it has the potential to develop into a true medical emergency. If he can't pass this at-home test, get him medical help ASAP.

Reviewed by Dr. Becker

STORY AT-A-GLANCE

- Struvite stones are a type of bladder stone or crystal that occurs in both dogs and cats; in severe cases, they can completely block the urinary tract
- Symptoms of struvite stones include frequent urination, straining to urinate and blood-tinged or cloudy urine
- Diagnosis will include a urinalysis, a culture and sensitivity test for bacterial infections, and abdominal X-rays or ultrasound
- Treatment of mild to moderate cases involves resolving any existing infection, creating and maintaining a healthy urine pH, and providing a species-appropriate, moisture-rich diet
- Struvite stones located in the urethra or the ureters, and stones that don’t dissolve despite dietary changes and medical management, typically require surgery

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Struvite stones, also called triple phosphate stones and magnesium ammonium phosphate stones, are a type of bladder stone or bladder crystal that occurs in both dogs and cats. Magnesium, ammonia, and phosphate are common substances found in urine. In high concentrations, they can bind together to form crystals that irritate your pet's bladder and cause inflammation. If the crystals combine with mucus, they can form plugs that partially or completely block the urinary tract.

In worst-case scenarios, these crystals fuse together to form uroliths, which is the medical term for bladder stones. Struvite stones account for about one-third of all urinary tract stones in dogs, and about half of all urinary stones in cats. Female pets around 6 to 7 years of age are the highest risk group for struvite stones. Dog breeds prone to struvite stones include the miniature Schnauzer, Shih Tzu, Bichon Frise, miniature Poodle, Cocker Spaniel and the Lhasa Apso.

Causes and Symptoms of Struvite Stones

Struvite stones can have a number of different causes, including extremely alkaline urine, which is often a result of a biologically inappropriate diet; a urinary tract infection (UTI) or another disorder of the urinary tract; abnormal urine retention, where urine is stored in the bladder for unnaturally long periods of time; and prolonged use or high doses of steroids. Some pets with bladder stones show no obvious signs, but common symptoms can include:

- Frequent urination
- Straining to urinate
- Abnormal urination (for example, your dog lifts his leg and only a few drops come out, and then a few drops more)
- Urinating or dribbling urine in inappropriate places (such as a cat **peeing outside the litterbox**)
- Cloudy or blood-tinged urine
- Increased thirst

It's very important to know that a urinary blockage is possible with this type of stone and is a life-threatening medical emergency. If your pet isn't able to pass urine, you need to get him to a veterinarian or an emergency animal hospital immediately. Complete blockages are seen much more often and are typically much more serious in male pets than females.

Diagnosis of Struvite Stones

If your pet's bladder is extremely inflamed, it may also be enlarged. Sometimes with nonobese pets, a veterinarian may be able to feel the stones through the abdominal walls when he or she palpates the abdomen.

A urinalysis will check for the presence of blood, protein, glucose, ketones, and bilirubin. It will also determine the concentration of the urine, which is a measure of kidney health and function and can be a contributing factor to stone formation. A urinalysis will also detect the presence of white blood cells, which are an indication of inflammation or infection.

A urine culture and sensitivity test will reveal if there is bacteria present and can also determine what medication will be most effective in clearing the infection. Because certain bacteria can contribute to struvite stone formation, this is a very important step that should not be skipped.

It's possible for your pet to have bladder inflammation along with crystals or stones, but no infection. This condition is called cystitis. If this is the case, the treatment protocol will obviously differ from the treatment for a urinary tract infection.

This is why it's so important that your veterinarian immediately establishes whether or not there's a bacterial infection, and if so, the type of bacteria present. It's bad medicine to simply guess at the type of bacteria your pet is dealing with, as well as the best antibiotic to treat it. This approach can foster antimicrobial resistance.

X-rays and ultrasounds are also quite important, especially if your pet has a recurrent issue. Imaging scans help your vet evaluate the size, shape, and location of the stone(s), and can also help determine treatment options.

Treatment Recommendation — Create a Healthy Urine pH

If your pet has crystals or stones but is still able to urinate, the situation can often be managed with medication and dietary adjustments. The first thing we want to do for pets with crystals or stones is create a healthy urine pH that is neither too acidic nor too alkaline. A urinary pH of 7 is neutral. Everything above 7 is alkaline, and everything below 7 is

acidic. Most pets with struvite crystals or stones will have a urine pH well above 7, which creates a perfect environment for bacterial proliferation.

Some pets start out with just some struvite crystals, but their alkaline urine eventually causes a urinary tract infection. Naturally acidic urine helps prevent urinary tract infections. Alkaline urine also creates a perfect environment for sediment to form in the bladder (often called "bladder sludge").

Bladder sludge is a blend of crystals, mucus and inflammatory debris that can be picked up on an ultrasound image. Dogs and cats, as carnivores, should have a slightly acidic urine pH, optimally between 6 and 6.5. We want to maintain the urine pH at no more than 7, because above 7, your pet is at risk for developing struvite crystals.

Some pets are genetically predisposed to producing a protein called cauxin, which is excreted into the urine, causing sterile crystals or sterile struvite crystalluria. This means the crystals can form without the presence of infection. These animals are prone to chronic cystitis (chronic bladder inflammation), as these sharp crystals cause microtrauma to the lining of the bladder that results in discomfort and irritation.

Supplements to Promote Healthy Urine pH

Many holistic veterinarians use Chinese herbal medicines, homeopathy, and nutraceuticals to manage this condition, including glucosamine to help maintain the mucous membranes in the lining of the bladder, and **cranberry extract**, which helps fight urinary tract infections and promotes a healthy urine pH. We also use D-mannose to help prevent future infections once any current infection has been correctly identified and treated.

Herbs that may be beneficial include chanca piedra, dandelion, goldenseal, horsetail, marshmallow, plantain, Oregon grape root, uva ursi, yarrow, maitake mushrooms, corn silk and olive leaf. If you're a dog parent, buy pH test strips from your veterinarian or at the local drug store so you can check your pet's urine pH at home so you know when it's in or outside the desired range.

In the morning prior to feeding your dog is when you should collect the urine sample. You can either hold the pH tape in the stream while your dog is urinating, or you can catch a urine sample in a container and immediately dip the tape into the sample to check the pH. Keep a log of your pet's urine pH to show to your vet at your appointments.

Cats tend not to appreciate an audience when they're using the litterbox, but if you can manage to slide a test strip through kitty's urine stream, do it, because it can provide valuable information.

Treatment Recommendation: Diet

In some cases your pet may need medical assistance getting his pH down into a healthy range. This can be accomplished by adding the amino acid DL-methionine, in tablet or powder form. This all-natural ingredient is what is added to veterinary diets to make them "prescription" for pets who are stone-prone.

Feeding highly processed diets is not recommended for many reasons. They are made with feed-grade (not food-grade or human-grade) rendered meat sources. They also contain unnaturally high amounts of synthetic nutrients and grains. Those starchy carbohydrates are one of the reasons pets develop crystals in the first place.

A much better approach is to add DL-methionine to a high-quality, species-appropriate, home-prepared, starch-free diet, if the meat-based, fresh food diet alone doesn't fix the pH problem. Ask your **holistic or integrative veterinarian** for dosing instructions.

Occasionally, there's also success modulating urine pH using ascorbic acid, which is vitamin C. Use true ascorbic acid, which helps pets drop urine pH down into a normal range, not buffered vitamin C. However, be aware that too much vitamin C can create loose bowels. If you find you can't control your pet's urine pH with ascorbic acid, you'll need to switch to DL-methionine.

Carnivores have naturally acidic urine. Herbivores, or vegetarian animals, have naturally alkaline urine. When dogs and cats — who are designed to eat animal meat — are fed a grain-based or high-starch diet, the starch alkalizes the urine, which can lead to the development of struvite crystals and stones.

When you look at the ingredient list on your pet's processed food, you'll see things like corn, wheat, rice, and soy, as well as perhaps oatmeal, chickpea, sweet potato, potato, and tapioca. All of those carbohydrates alkalize your pet's urine.

One of the best things you can do for a pet struggling to maintain a healthy urine pH is reduce the amount of carbohydrates or starches in her diet. To reduce urine pH, which is the goal for most pets with struvite crystals, feed a low-carb, grain-free, starch-free, potato-free, preferably fresh food diet. The second choice is canned food or a dehydrated or freeze-dried diet that has been reconstituted with lots of water.

The Importance of Moisture in the Diets of Stone-Prone Pets

Often, a pet's urine pH can be maintained naturally between 6 and 6.5 on a nutritionally balanced, species-appropriate diet, which does not include kibble. Dry food can cause a tremendous increase in the concentration of your pet's urine, which can contribute to crystal and stone formation.

Feeding a high-moisture diet is one of the cornerstones in preventing struvite crystals. Insuring your pet is drinking plenty of clean, fresh water is also a primary prevention strategy.

You might want to consider providing a water fountain with continuously filtered, fresh, running water to encourage your pet to drink, along with placing bowls of fresh water in multiple locations around the house. You can also add bone broth or low-sodium bouillon or stock to the water or food to entice your pet to consume more water.

Creating more dilute urine by offering a moisture-rich diet is critical to avoiding a recurrence of stones or crystals. A species-appropriate diet in combination with infection management is often effective at dissolving struvite stones, but it can take a few weeks to several months for the stones to completely disappear.

When Surgery Is Required

Stones located in the urethra or the ureters, which are the tubes that connect the kidneys to the bladder, often need to be surgically removed along with stones that don't dissolve despite dietary changes and medical management.

Sometimes, depending on the location and size of the stone, a technique called laser lithotripsy can be used to break down the stone into smaller pieces that can be passed out of the body in urine. There's also a procedure called voiding urohydropropulsion, which is a technique that involves manually expressing the stones out through the urethra while the patient is sedated.

If your pet has been diagnosed with struvite crystals or stones, it's imperative that you continue treatment until the condition is totally resolved, and then incorporate a proactive prevention plan to avoid recurrence. A urinalysis should be performed monthly until all the crystals are dissolved, and then every six months to ensure no new crystals or stones are forming.