

Struvite Stones and Crystals

By Dr. Karen Becker

Hi, this is Dr. Karen Becker, and today we're going to discuss struvite stones and crystals. Struvite stones are a type of bladder stone. They're also called triple phosphate and magnesium ammonium phosphate stones, and occur in both dogs and cats. Magnesium, ammonia, and phosphate are common elements in urine. In high enough concentrations, they bind together to form crystals that can irritate and inflame the bladder. When the crystals combine with mucus, they can form a plug that blocks the urinary tract. The crystals can also fuse together to form struvite stones.

Struvite stones account for over one-third of all urinary tract stones in dogs and about half of all urinary stones in cats. The problem is seen more often in female dogs and cats and pets that are from six to seven years of age.

The causes of struvite stones include extremely alkaline urine (oftentimes from a biologically inappropriate diet), high steroid use, abnormal retention of urine, a urinary tract infection, or another disorder of the urinary tract.

Dog breeds that are prone to struvite stones include the miniature schnauzer, shih tzus, bichons, miniature poodles, cocker spaniels, and the Lhasa Apso.

Some pets with bladder stones show no signs, but common symptoms include frequent urination, straining to urinate, an abnormal urinary stream (for example, the dog lifts his leg and maybe a few drops come out, and then a few drops more), urinating in inappropriate places (especially if it's an indoor kitty), cloudy or bloody urine, and oftentimes, increased thirst.

Diagnosis

If there's a lot of inflammation, the bladder may be enlarged and sometimes the stones can actually be palpated through the abdominal walls. Sometimes veterinarians can pick up that there's a bladder stone just through palpation at a physical exam. Urine samples will be taken to check for abnormalities.

A urinalysis will provide information about the presence of blood, protein, glucose, ketones, and bilirubin. It will also determine the concentration of urine, which is a measure of kidney health and a contributing factor to stone formation. A urinalysis will also pick up the presence of white blood cells indicating inflammation or infection.

A urine culture and sensitivity test can determine if there is, in fact, bacteria present and will also determine what medication will be most effective in clearing the infection. Because certain bacteria can exacerbate struvite formation, this is a very important step that you should not overlook. However, some pets can experience bladder inflammation in crystals or stones without infection. In this case, it's a different management protocol that's needed.

X-rays and ultrasounds are typically used to determine the size, shape, and location of the stones and to assess different treatment options.

Treatment

A urinary blockage is obviously a medical emergency requiring immediate treatment. This particular problem is seen much more often and is actually much more serious in male pets versus female pets. If your male dog or female dog, for that matter, can't urinate, you need to get him/her to the veterinary clinic immediately.

If your pet has crystals or stones that aren't completely blocking or occluding the urethra, making it possible for urine to pass, the situation can often be managed with medication and dietary adjustments.

The first thing to do for a pet with crystals or stones is to create a healthy urine pH that is neither too acidic nor too alkaline. A pH of 7 is neutral. Everything above 7 is alkaline, and everything below 7 is acidic. 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 that's going to predispose animals to 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 that the crystals can form without the presence of infection. These animals are very prone to chronic cystitis, as these sharp crystals cause microtrauma to the lining of the bladder, which can cause discomfort and irritation.

Many holistic veterinarians use traditional Chinese medicinals, homeopathy, and nutraceuticals to help with this condition, including things like glucosamine and cranberry extract, which can help reduce inflammation in the bladder.

If you're a dog owner, I recommend buying pH strips from your vet or at the local drug store to check your pet's urine pH at home to try and help keep it in a normal range.

In the morning, prior to your dog eating, you need to collect the urine sample. You can either just hold the urine pH tape in the stream of urine while your dog is voiding, or you can catch a urine sample and then dip the pH tape in to check your dog's urinary pH. You need to check the urine pH immediately to ensure that it's accurate. We do recommend that you keep a log of your pet's urine pH to be able to show to your veterinarian at your next appointment.

To reduce urinary pH – which is the goal in most struvite situations – you need to feed a low-carb, grain-free, potato-free, and preferably fresh or, at least, can-food diet for the increased moisture content. When dogs and cats who are designed to eat meat are fed a grain-based diet or a starch-rich diet, the starch alkalizes urine pH which can predispose pets to struvites.

Often, a pet's urine pH can be maintained naturally between the 6 and 6.5 healthy range on a species-appropriate diet. Dry foods cause an increase in urine concentration, which can contribute to crystal and stone formation. Creating a more dilute urine by offering a moisture-rich diet is critical for avoiding stone or crystal recurrence. 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.

Stones located in the urethra or the ureters (which are the tubes that connect the kidney to the bladder), typically must be removed surgically along with any stones that don't dissolve despite the fact that you've instituted some dietary changes or medical management.

Surgery to remove a bladder stone is known as cystotomy. Depending on the patient and the location and size of the stone, there are some other less invasive procedures that might be appropriate. These include a technique called laser lithotripsy (which breaks down stones into smaller pieces that can then be voided out) and a technique called voiding urohydropropulsion (which is a technique that involves manually expressing stones out the urethra while the patient is sedated).

Most importantly, if your pet has been diagnosed with struvite crystals or stones, it's imperative that you continue treatment until the condition is resolved, and then incorporate a proactive prevention plan to prevent recurrence.

A urinalysis should be completed monthly until all the crystals are dissolved and then every six months to ensure that your pet isn't brewing additional crystals or stones.

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