

## Cystotomy/Cystectomy

A cystotomy is a surgery where an incision is made into the bladder. This surgery is most often done when bladder calculi (stones) require removal, or if a mass needs to be removed from the bladder.

The most common types of cystic calculi are struvite and calcium oxalate. Other less common types of calculi include urate, silica, xanthine, cystine and calcium phosphate. Calculi that remain in the bladder can cause bladder irritation, which cause signs like blood in the urine, inconsistent urine stream, urinating small amounts frequently, or pain or difficulty urinating. If calculi are in the bladder and no significant clinical signs are noted, dissolution can be attempted. Dissolution of small calculi can sometimes be successful if the type is known to be struvite, urate or cystine by feeding a food that would change the urine pH. Other types of stones are unable to be dissolved and require surgical removal.

If the calculi move from the bladder into the urethra (the tube that takes urine from the bladder to exit the body through the vaginal vault in females or the penis in males), the pet may become acutely unable to urinate. This would be noted by the pet attempting to urinate multiple times but producing no urine at all, abdominal pain, vomiting, lethargy and depression. If the urinary tract is blocked, and your pet is unable to produce urine, this is an EMERGENCY and should be treated immediately.

Prior to surgery, blood work will be performed. Radiographs are taken to visualize calculi. The majority of calculi are visible on a radiograph. If none are seen, ultrasound may be able to detect radiolucent stones.

If the pet has a urinary obstruction, then the obstruction is relieved by anesthetizing the patient and passing a urinary catheter to dislodge the stones from urethra and moving the stones back into the bladder. A cystotomy is then performed by making an incision into the abdomen, exteriorizing the bladder, and then making an incision into the bladder to scoop out the calculi. After the bladder and body wall are sutured closed, another radiograph is taken to ensure removal of all calculi (if the calculi are radio-opaque).

Calculi are sent for analysis to determine what they are composed of. A stone and a small bladder wall biopsy are submitted for culture to make sure there is not a concurrent infection. We do these tests so we can hopefully treat the pet to decrease the chance that the calculi might recur.

In dogs, at least 20% of struvite calculi and 50% of calcium oxalate calculi will recur. We try to prevent this by feeding a high moisture diet that will produce a neutral urine pH, like Royal Canin SO.

Urate calculi recur about 30% of the time, and can be related to liver conditions that, if present, should be treated to prevent calculi recurrence. If no liver problems are noted, then a high moisture protein restricted diet is used.

Cystine calculi recur 40-50% of the time and can be prevented by adding a medication called 2-MPG (N-(2 mercaptopropionyl)-glycine)). Serial urinalyses to determine pH and presence of debris are necessary to monitor how well the diet is working to create conditions that are

inhospitable for calculi formation. If needed, medications can be added to change the pH if the diet is not making enough of a difference. Radiographs or ultrasounds of the bladder every 3-6 months help detect recurrent calculi early so that they may be removed by voiding hydropropulsion in females, or catheter assisted retrieval in males.

Bladder stones can be frustrating to treat in our pets because, despite our attempts to prevent recurrence, they still may re-form. Some dogs may have multiple surgeries to remove stones. In these instances, a scrotal urethrostomy may be considered in male dogs that repeatedly block. This involves making a new, larger opening for urine to pass from the body in the area of the scrotum. Because the urethra is much wider at that level, and because there is not a need for the urethra to run through the portion adjacent to the os penis (bone inside the penis) where the urethra significantly decreases in size, small stones are more easily passed by the patient, preventing obstruction.

We work in tandem with your regular veterinary provider on a prevention protocol. We try as hard as possible to prevent future stone formation, even though sometimes, no matter what we do to prevent them, they recur.

Occasionally, bladder masses may occur. They may be secondary to inflammation associated with calculi, or they may be cancerous. If bladder masses are located in an area amenable to removal (away from the ureters and the urethra) a cystectomy (removal of a portion of the bladder) may be recommended.

The affected area will be surgically removed, and the bladder will be sutured back together, resulting in a smaller bladder. Thankfully, the bladder is a very stretchy organ, and the cells will accommodate stretching back to a relatively normal size over time. Initially, your pet may need to urinate more often until the bladder is able to stretch, so be prepared to make a few extra visits outside for a few weeks. The mass will be sent for analysis to determine if further treatment is recommended.

The main minor complications after a bladder surgery are: more frequent urination, blood in the urine, and discomfort during urination. These usually clear up relatively quickly, although with a cystectomy, frequent urination may occur for several weeks to a month.

Major complications are rare but may include infection or leakage of urine from the bladder, both of which may require a second surgical procedure.

Information adapted from Veterinary Surgery: Small Animal, Second Edition, Elsevier Inc, 2018.