

UROLITHIASIS (urinary calculi, bladder stones)

By Sue Reith. (5/06 update)

Symptoms: Usually the first obvious sign of urolithiasis is that the animal seems to be trying unsuccessfully to have a bowel movement. Some may also repeatedly strike at the abdomen with a rear hoof. This behavior is repeated more and more often because he can't urinate properly and his discomfort is increasing. Unfortunately, most owners aren't concerned when they first see this behavior, so a couple of days may go by before they start to worry. By then the poor animal's bladder has become quite distended and his abdomen starts to look bloated. Observant owners will note that they've seen no urination for quite a while.

Treatment: If started early, before the urethra (the tube inside the penis) is completely blocked, the bladder is distended, and rupture becomes eminent, ammonium chloride can be given to try to dissolve the stones and small crystals in the bladder and urethra, at the rate of ¼ teaspoon per 25lbs of goat, 2X daily for 2 days. That should be followed by 1/8 teaspoon per 25lbs of goat 2X daily for several more days, and then 1/8 teaspoon per 25lbs of goat 1X daily thereafter.

Once the ammonium chloride treatment is started, Banamine should be given by injection ASAP at the regular dose of 1cc per 100lb, to cut inflammation where the stone is lodged in the urethra. Wait at least one hour after giving Banamine to give it time to work. In the meantime, carefully study the attached drawing**** of the structure of the male genito-urinary system so you can see what you're working with. Take particular note of the urethral process (seen at the front end of the penis), and at the Sigmoid flexure (the S-shaped angle in the penis just above the testes).

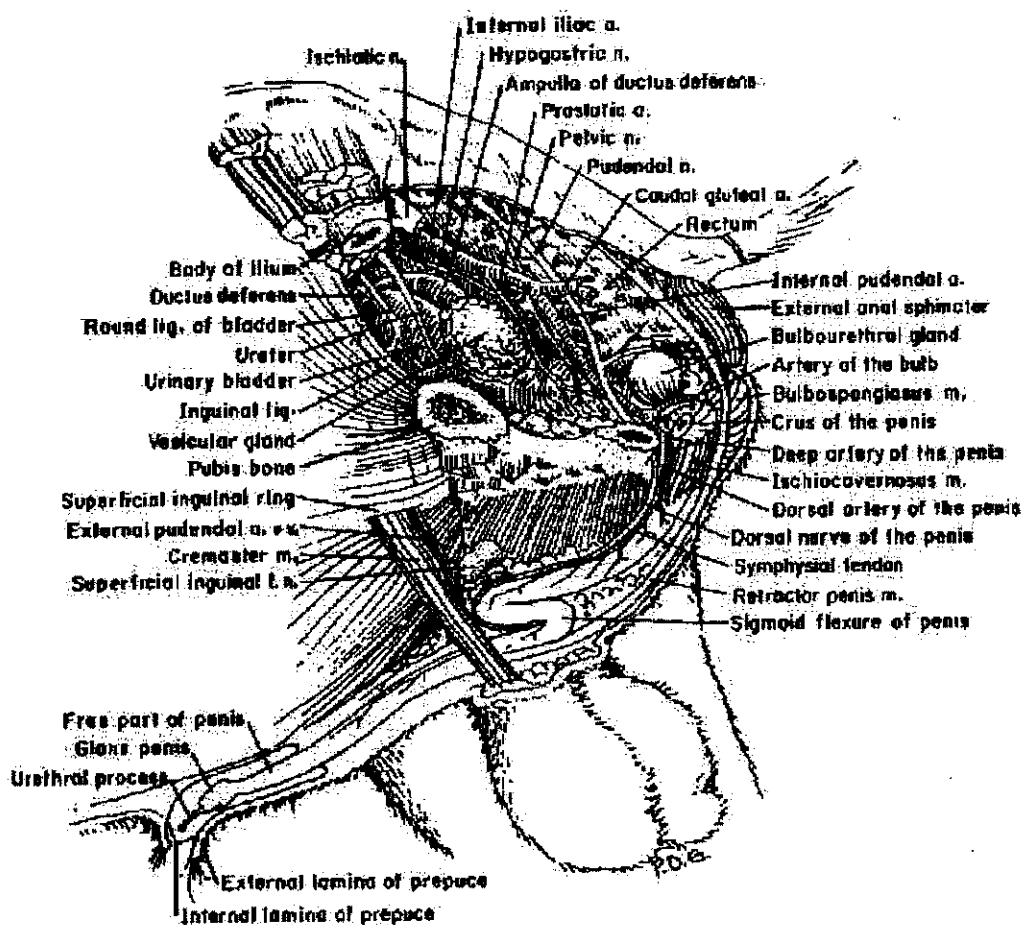


Fig. 5-1. Left lateral view of the male goat. Left leg and left os coxae are removed.

Then, if the affected wether is either a kid or one of the smaller varieties of goat (thus light enough to deal with) sit him on your lap as though you're watching TV with him, and have someone (hopefully, if available) snip off the urethra process with a pair of scissors. Next, starting at the Sigmoid flexure and traveling forward towards the head of the

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penis, begin to palpate the urethra gently but thoroughly. If you're lucky, the stone will be located trapped in that portion of the penile tissue. In that case, very carefully manipulate it forward until it can be removed from the opening at the head of the penis.

If the stone is instead lodged back up BEHIND the Sigmoid flexure, I'm very sorry to say that it's most likely the end of the game for the poor fellow... This is a tragic outcome, but sadly there is little recourse. As an example of how frustrating attempts to save a Urolithiasis victim can be when palpation doesn't work, I recently had to make a Urolithiasis diagnosis in an ailing 4-year-old wether for an owner who, unwilling to accept the little guy's fate, but equally unwilling to follow the directions I had provided to attempt removal of the stone, called the vet out to help. The vet, who apparently didn't know about a male goats' unusual penile structure, actually shoved a catheter up into the urethra and was amazed when it stopped suddenly at the Sigmoid flexure! This was a particularly bad decision on her part, because in the event that the blockage had been in the front portion of the urethra between the Sigmoid flexure and the urethral process, thus possibly removable via manual palpation, shoving a catheter up in there like that could only jam the stone farther back into the Sigmoid flexure area, causing additional pain, inflaming the tissue around it even further, and ending any chance for survival. The veterinarian then promptly euthanized the poor wether.

Because treatment is generally so unrewarding, locally practicing veterinarians for the most part are unwilling to deal with this problem at all. Those that do agree to help will sometimes try to undo the damage by performing a surgical procedure wherein they straighten out the penis by redirecting it backwards toward the goat's rear and out the anus. But even if cost is not a factor for the owner, the surgery itself is painful and traumatic, and invariably results in the death of the patient within just a few days anyway. In my experience the only successful surgeries to correct Urolithiasis have been performed in veterinary teaching hospitals. If the owner's budget can handle it this might be an option, if there's one close enough to do the work before the bladder ruptures, and if that facility has veterinarians available that are experienced in doing the procedure. In those victims that survive this surgery, more often than not it will have to be repeated at least once more during their lives.

(5/06 Addendum to the above:) A goat owner in Texas, Chris Clark, recently added this great contribution to my article! She wrote, "We went thru this with our wether and were fortunate to have our vet, Dr. Henry Beam in Van Alstyne, Texas, help us out. He gave the goat a mild dose of anesthesia to make him very drowsy, and in a couple of minutes we lifted him up onto a metal table and laid him on his side. With his bare hands Dr Beam began pushing / milking the prepuce (shaft covering the penis), sometimes with just one hand, and sometimes with both, forcing the penis forward and out through the prepuce opening so he could work with it. When it was extended about an inch beyond the opening he grabbed the urethral process (the small, black, worm-like appendage that grows out of the tip of the penis) with his fingers and, holding a paper towel to get a better grip, he pulled it off with his other hand. This part of the procedure took a lot of patience, because each time he got the penis extended far enough to work with it, it would slip right out of his fingers and slide back in! It took about 10 minutes for him to finally get a firm grip, but once the urethral process was removed he was able to extract the stone lodged there at the opening and hand it to me. After we got the goat on his feet again the vet pushed on both sides of the bladder area, squeezing some urine out to make sure the urethra was no longer blocked.

Additional input from an owner that used this added info (above): Working with her vet, they saved her mature buck by using the same procedure, but with one slight variation... Between the two of them, they sat the drowsy buck up on his haunches (which helps force the penile tissue upward and out), and propping him in that position with their knees they were able to remove the urethral process and force the stone out successfully as well!!

Cause: Due to the long, narrow design of the male's urethra, formed bits of calculi can easily get trapped at any of three places; two in that Sigmoid flexure, and one at the urethral process. (See Urinary Tract diagram attached.) Initially just a tiny piece of crystal may get caught in the urethra, but as the urine continues to flow past that minute fragment more and more of the crystalline particles will adhere to it, increasing its size until eventually it becomes large enough to slow down the urine flow, and soon after to block it altogether. If the animal's increasing difficulty in urinating is not noticed and dealt with quickly, before the urethra is completely blocked, the bladder can rupture, resulting in death.

Interestingly, not long ago AASRP (American Ass'n of Small Ruminant Practitioners) research revealed that some bucks are born with a narrower-than-normal urethra and, of course, pass on genetically to their male offspring. As breeding bucks those sires are not often affected, since as a part of the breeding process any stones that may begin to form in the urethra are quickly flushed out. But, given certain circumstances, their wethered sons may not be so fortunate... So those wethers that experience Urolithiasis (the formation of stones or crystals in the bladder, aka urinary calculi, bladder stones) generally have 2 factors working against them to cause it:

- (1) a genetically-inherited narrower-than-usual urethra that makes it easier to trap stones, and,

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- (2) incorrect (imbalanced) diet, leading to excess mineral deposits (calculi) in the urine.*

Prevention:

An imbalanced diet in this situation is most commonly one that contains either *too much grain*, or *no grain at all*. Both approaches are equally harmful if you feed alfalfa for forage (roughage). In that case, to prevent urolithiasis it's important to correct this imbalance by feeding *some, but only a very small amount*, of grain.* OTOH, if you feed only grass hay, to avoid urolithiasis NO grain can be fed at all.

If feeding alfalfa, the correct balance of *at least 2 parts calcium* (in alfalfa) to every 1 part phosphorus (in grain)* is reached by providing a daily ration of free-choice alfalfa or an alfalfa/grass combo, along with a *maximum* of 2 cups of grain per day. If feeding straight grass, it's essential to feed *NO grain* at all! Timothy**, if available, is an ideally balanced feed for goats all by itself.*** Routinely provide all goats, at all times, with fresh water, and make supplemental free-choice loose trace-mineral salt available as well.

Actually, out-of-season breeding bucks do very well when fed a just a good quality grass hay, as do all mature wethers. But IN SEASON, breeding bucks are most assuredly considered 'working' animals, as are pregnant and lactating does and growing kids, including growing wethers... And they should all get a modest grain ration daily, AND alfalfa of course, to sustain them with those additional nutrients. Observe the word 'modest', however! It's essential to keep that essential minimum of 2 parts calcium to every 1 part phosphorus* ratio in mind!

As a rule-of-thumb, if you experience one case of urolithiasis on your farm, that's a 'heads up', and you might want to consider putting ammonium chloride in water routinely, at the rate of ~ 1/8 teaspoon per 25lbs of male goat daily. But that's a judgment call, and it may well be that a correction of diet would solve the problem quickly.

Testimonial from one family that luckily saved their beloved pet wether in the nick of time through quick administration of ammonium chloride, combined with injected Banamine and manual penile palpation to successfully extract the offending stone, reads: "We had thought we were doing the right thing by giving him just alfalfa with no grain, and realize our mistake. We will be feeding him just grass hay from now on, and we have ordered an ongoing supply of the ammonium chloride for him."

* "In males an imbalance of calcium to phosphorus often leads to the development of urinary calculi." (Dr M. E. Ensminger, in the well-respected 'bible' of livestock nutrition, in discussing the importance of maintaining a 2:1 ratio of calcium to phosphorus in order to free up the calcium in the feed for use by the body, Feeds & Nutrition Complete, P.102.)

**Timothy hay is a particular tall-growth grass, commonly seeded in mixtures with medium red or alsike clover. (Dr M. E. Ensminger, Feeds & Nutrition Complete, P.252.)

***Dr George Heinlein, another well-respected livestock nutritionist, in discussing the values of various livestock feeds states that Timothy hay is the most perfectly balanced forage of all for small ruminants.

****(Phillip D Garrett, BS, DVM, MS, Guide to Ruminant Anatomy Based on the Dissection of the goat, P.39.)

(While I urge you to share this information with other individual goat owners, please do not reproduce the article for publication without my specific permission. Thank you. Sue Reith.)

Addendum by Kay Orlando, Health, Education and Research Chair : Not all urinary stones have the same mineral composition. Mineral content of water and foodstuffs vary countrywide as well as from farm to farm. Owners experiencing difficulty with urolithiasis in their goats should consider having the stones analyzed for mineral content. This may help the owner correct any mineral imbalance and prevent future stone problems.