

Modified Perineal Urethrostomy for Obstructed Goats

Karen M. Tobias, DVM, MS, DACVS, &
Sarel R. van Amstel, BVSc, Dip MedVet, M MedVet, DACVIM
University of Tennessee



Diet and anatomy predispose male goats and other small ruminants to obstructive urolithiasis. Uroliths, commonly containing phosphate secondary to high-grain or concentrated diets, often become lodged in the distal sigmoid flexure or the urethral process (ie, vermiform appendage) where the urethra narrows.

Clinical signs of obstructive urolithiasis include stranguria, urine dribbling, and evident discomfort (eg, restlessness, tail twitching, vocalization, colicky behavior). If the bladder or urethra ruptures, the animal may become anorectic and lethargic and develop abdominal distention or subcutaneous urine accumulation, respectively. Goats with obstructive urolithiasis can eventually become dehydrated or may develop azotemia and acid-base and/or electrolyte imbalances (eg, hyperkalemia). Death can result from untreated metabolic derangements. Stabilization with IV fluids is critical for correcting metabolic abnormalities, especially before inducing anesthesia.

If obstruction is suspected, the hairs around the prepuce should be examined for blood clots, crystals, and small stones. Abnormalities of the urethra or bladder may be detected by digital rectal examination, and free fluid in the abdomen can be detected on ultrasound imaging. If urine is obtained by abdominocentesis, the creatinine concentration will be 1.5 to 2 times that of peripheral blood.

For full penile examination, the goat should be sedated with acepromazine at 0.05 to 0.1 mg/kg IV or IM or diazepam at 0.1 mg/kg IV. The goat should be placed in a seated position with its perineum on the ground and forelimbs elevated for exteriorization of the penis. If the urethral process

Hairs around the prepuce should be examined for blood clots, crystals, and small stones.

MORE ►

is present, it can be amputated with scissors or scalpel, possibly providing temporary relief of distal obstructions. A urethral diverticulum at the level of the ischial arch can impede retrograde catheterization of the urinary bladder; therefore, urethral flushing is not routine.

Surgical Options

If obstruction cannot be relieved by urethral process amputation or fluid administration, options include tube cystostomy, urethrotomy, urethrostomy, or bladder marsupialization.



Tube cystostomy is often a short-term recommendation to allow urethral healing or resolution of any swelling after a urolith has been passed; complications include ongoing obstruction, peritonitis, urethral rupture, catheter dislodgement, or adhesions. Bladder marsupialization can cause incontinence, potentially resulting in body odor, urine scald, and frustrated owners. Other complications include ascending urinary tract infection and bladder mucosal prolapse. Prepubic urethrostomy reroutes the urethral opening cranial to the brim of the pubis; it is rarely used in goats because of difficulty, anatomic angle limitations, and risk for recurrent cystitis or further stricture. Traditional perineal urethrotomy and urethrostomy are considered salvage techniques, as stricture and recurrence of signs have been reported 8 months after surgery in 45% to 78% of goats.^{1,2}

What You Will Need

- Standard soft tissue surgery pack, including:
 - Debaquey thumb forceps
 - Metzenbaum scissors
- Periosteal elevators or cartilage scissors
- Malleable retractors
- 8 or 10 French red rubber catheter
- 2-0 and 3-0 or 4-0 absorbable monofilament suture
- Tenotomy or iris scissors
- Skin suture

Modified Proximal Perineal Urethrostomy

Stricture occurrence can be reduced by transecting attachments of the penile body (differentiated from the penile tip) to the ischium and pubis and carefully apposing urethral mucosa to the skin. Transecting the ischiourethralis muscles and ventral penile ligament can improve penile mobility, provide more length for urethrostomy, straighten the penile body, and facilitate urethral catheterization by narrowing the opening of the urethral diverticulum. It may also reduce tension on the urethrocutaneous anastomosis. The anastomosis can be performed with absorbable monofilament suture.

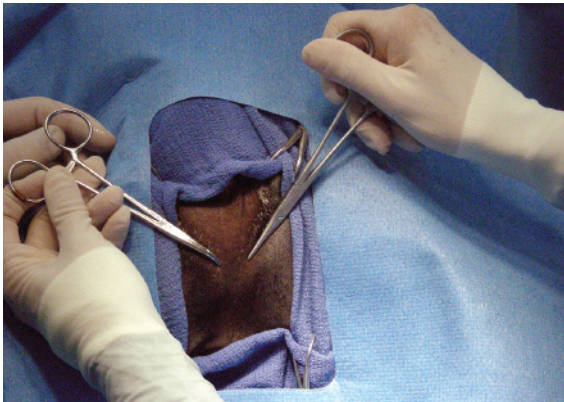
Modified proximal perineal urethrostomy is the authors' routine when goats not intended for breeding have urethral obstruction that cannot be resolved easily. Although the authors have not seen postsurgical strictures, the procedure may present other complications. Modified proximal perineal urethrostomy is more difficult in goats than in cats: penile attachments are thick and firm, and some tissues must be transected blindly, potentially leading to hemorrhage. Veterinarians unaccustomed to performing surgery on goats should practice on a goat cadaver before attempting this procedure.

Modified proximal perineal urethrostomy does not prevent urolithiasis; goats can still be obstructed by large calculi if appropriate dietary and medical management is not instituted. Patients may develop urine scald if the urethrostomy diverts urine toward the hocks.

Traditional perineal urethrotomy and urethrostomy are considered salvage techniques.

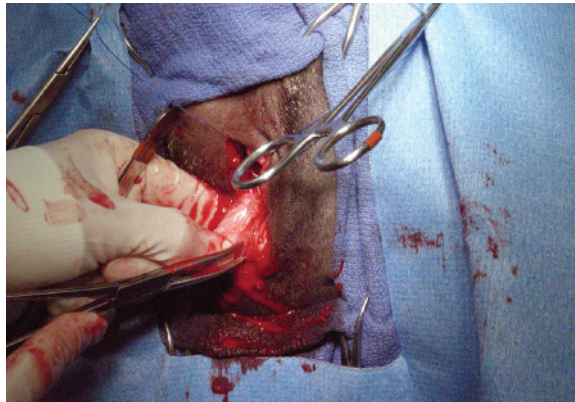
Step-by-Step ■ Modified Perineal Urethrostomy for Goats

Step 1



Position the goat in sternal recumbency in a perineal position with hindlimbs hanging over the end of a padded surgery table. Place additional roll towels under the cranial thorax and neck to keep the patient's head upright. Place a purse-string suture in the anus before proceeding with final preparations. Drape the patient so the ischial tuberosities (indicated by hemo-stats) are in the center of the field and the anus is covered.

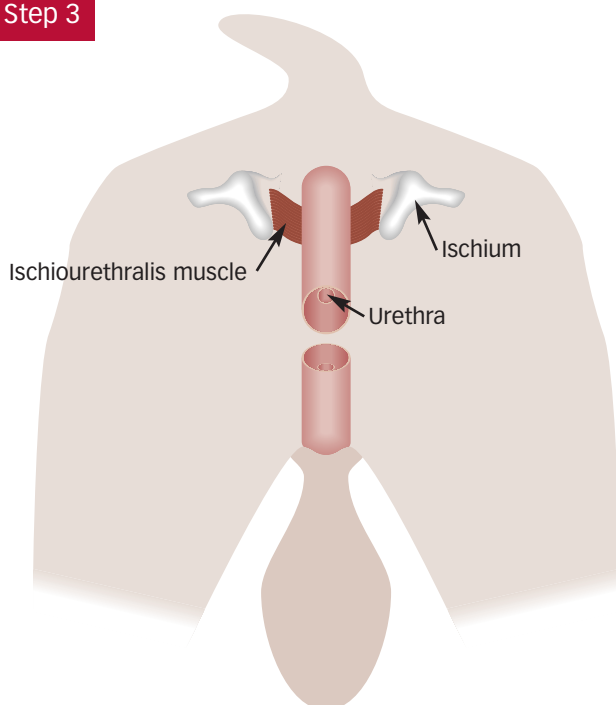
Step 2



Starting at the level of the ischial tuberosities, incise the skin ventrally along the perineal midline for 6–8 cm. Identify the penile body by digital palpation and, with blunt and sharp dissection, free it from surrounding tissues to the level of the ischium. Transect the retractor penis muscles if present. When possible, separate the dorsal artery of the penis from the penile body and retract it cranially.

Author Insight Raising the table to level the surgeon's line of vision with the perineal region can prevent inadvertent transection of the penile body too far proximally.

Step 3

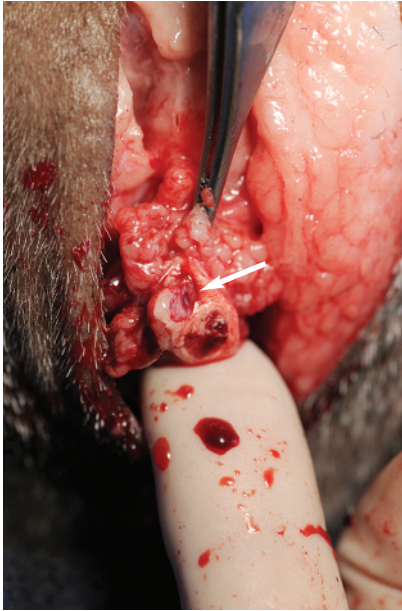


Transect the penile body at the caudal aspect of the proximal end of the sigmoid flexure, about 4–8 cm distal to the caudal edge of the pubis.

Author Insight Although it is known as the *dorsal artery of the penis*, at this level the artery is actually cranial or ventral to the penile body.

MORE ►

Step 4

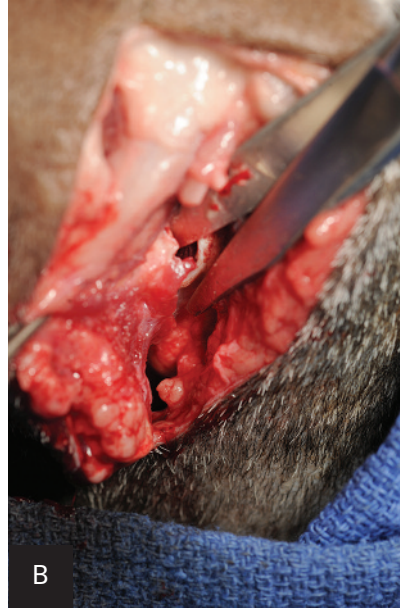
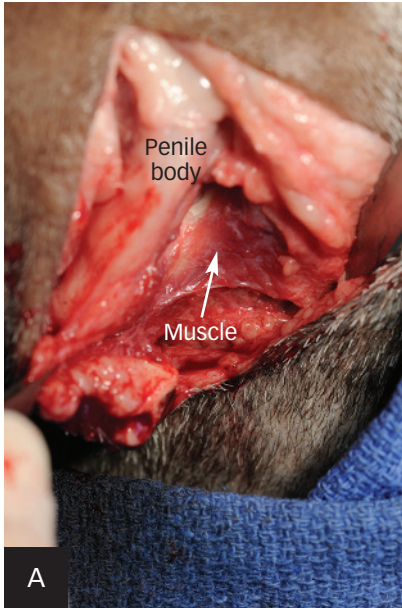


Identify the urethra (**arrow**) on the dorsal surface of the transected penile body. If the proximal or distal segment of the penile body is bleeding, oversew the segment end with absorbable monofilament or directly ligate any vessels.

Author Insight

If oversewing the proximal segment, pass a urethral catheter to avoid including the urethra in any sutures.

Step 5

**Author Insight**

To facilitate manipulation of the proximal penile segment, the tunica albuginea can be grasped with tissue forceps.

Retract the penile body to one side while an assistant uses a malleable retractor to retract the skin to the opposite side. Identify the ischiocavernosus muscle (**A**, **arrow**) and transect with scissors (**B**). Repeat the process on the opposite side.

Step 6



Retract the penile body dorsally and use a periosteal elevator, cartilage scissors, or blade to carefully separate any remaining attachments between the penile body and pelvis. Use intermittent digital palpation to identify remaining tissues and verify that the ventral 180° section of the penile body has been freed.

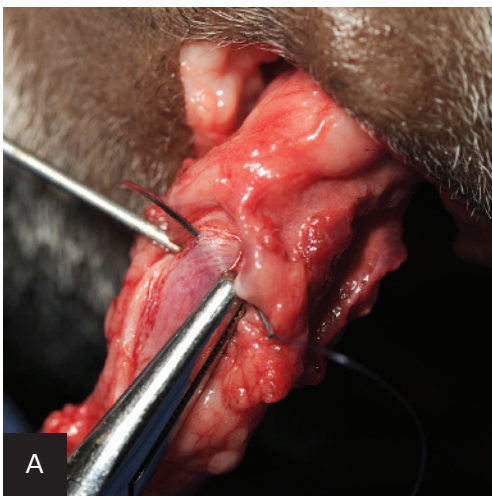
Step 7



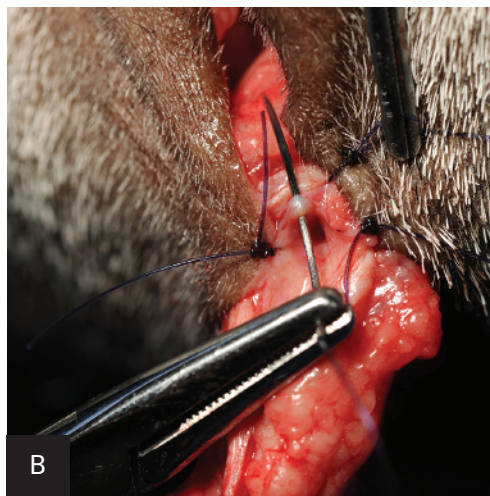
Retract the penile body ventrally and use Metzenbaum scissors to incise 2 cm on the dorsal midline of the urethra.

Author Insight The ischia of the male goat are angled acutely. The surgeon should frequently palpate the area for orientation. At this stage, it can be easy to slip below the ischium and pubis; dissection ventral to the pelvis can dramatically increase hemorrhage.

Step 8



Suture the spatulated end of the urethra to the perineal skin with absorbable monofilament suture, starting dorsally. First, place a simple interrupted suture from the dorsolateral mucosa to the dorsolateral skin (A). Place a second suture similarly on the contralateral side. Place 1 or 2 interrupted sutures from the most dorsal extent of the urethral mucosa to the skin dorsolaterally (B).



Author Insight The dorsal interrupted sutures can be preplaced and secured with hemostats to evaluate the position of the urethrostomy before sutures are tied.

MORE ►

CAUTION: Federal (US) law restricts this drug to use by or on the order of a licensed veterinarian.

BRIEF SUMMARY: Please consult package insert for complete product information.

Indications: For use in dogs to prevent canine heartworm disease by eliminating the tissue stage of heartworm larvae (*Dirofilaria immitis*) for a month (30 days) after infection and for the treatment and control of roundworms (*Toxocara canis*, *Toxascaris leonina*), hookworms (*Ancylostoma caninum*, *Uncinaria stenocephala*, *Ancylostoma braziliense*), and tapeworms (*Dipylidium caninum*, *Taenia pisiformis*).

WARNINGS: For use in dogs only. Keep this and all drugs out of reach of children. In safety studies, testicular hypoplasia was observed in some dogs receiving 3 and 5 times the maximum recommended dose monthly for 6 months (see Animal Safety). In case of ingestion by humans, clients should be advised to contact a physician immediately. Physicians may contact a Poison Control Center for advice concerning cases of ingestion by humans.

PRECAUTIONS: Use with caution in sick, debilitated, or underweight animals and dogs weighing less than 10 lbs. The safe use of this drug has not been evaluated in pregnant or lactating bitches.

All dogs should be tested for existing heartworm infection before starting treatment with IVERHART MAX Chewable Tablets, which are not effective against adult *D. immitis*. Infected dogs should be treated to remove adult heartworms and microfilariae before initiating a heartworm prevention program.

While some microfilariae may be killed by the ivermectin in IVERHART MAX Chewable Tablets at the recommended dose level, IVERHART MAX Chewable Tablets are not effective for microfilariae clearance. A mild hypersensitivity-type reaction, presumably due to dead or dying microfilariae and particularly involving transient diarrhea, has been observed in clinical trials with ivermectin alone after treatment of some dogs that have circulating microfilariae.

ADVERSE REACTIONS: In clinical field trials with ivermectin/pyrantel pamoate, vomiting or diarrhea within 24 hours of dosing was rarely observed (1.1% of administered doses). The following adverse reactions have been reported following the use of ivermectin: depression/lethargy, vomiting, anorexia, diarrhea, mydriasis, ataxia, staggering, convulsions and hypersalivation.

ANIMAL SAFETY: Studies with ivermectin indicate that certain dogs of the Collie breed are more sensitive to the effects of ivermectin administered at elevated dose levels (more than 16 times the target use level of 6 mcg/kg) than dogs of other breeds. At elevated doses, sensitive dogs showed adverse reactions which included mydriasis, depression, ataxia, tremors, drooling, paresis, recumbency, excitability, stupor, coma and death. No signs of toxicity were seen at 10 times the recommended dose (27.2 mcg/lb) in sensitive Collies. Results of these studies and bioequivalence studies support the safety of ivermectin products in dogs, including Collies, when used as recommended by the label.

In a laboratory safety study, 12-week-old Beagle puppies receiving 3 and 5 times the recommended dose once weekly for 13 weeks demonstrated a dose-related decrease in testicular maturation compared to controls.

HOW SUPPLIED: IVERHART MAX Chewable Tablets are available in four dosage strengths (see **Dosage** section) for dogs of different weights. Each strength comes in a box of 6 chewable tablets and in a box of 12 chewable tablets, packed 10 boxes per display box.

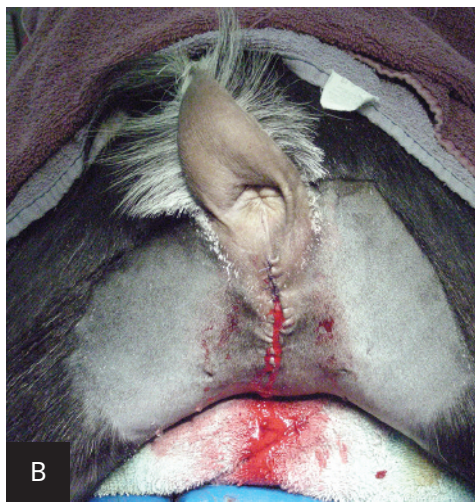
STORAGE CONDITIONS: Store at controlled room temperature of 59°-86° F (15°-30° C). Protect product from light.

For technical assistance or to report adverse drug reactions, please call 1-800-338-3659.

Manufactured by: Virbac AH, Inc. Fort Worth, TX 76137

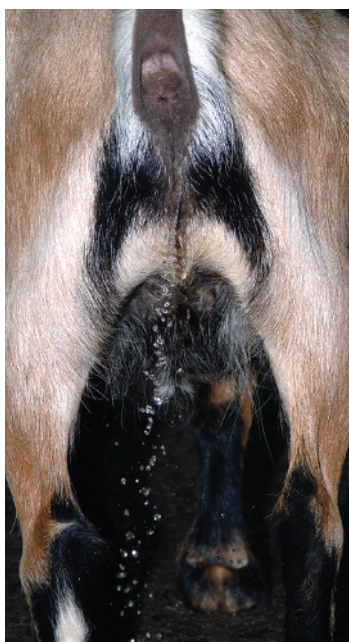
NADA 141-257, Approved by FDA
 IVERHART MAX is a registered trademark of Virbac Corporation in the US and a trademark of Virbac Corporation in Canada.

Step 9



Once the dorsal sutures are placed and tied, suture the urethral mucosa to the skin on each side in a continuous pattern. Close any remaining skin incision routinely. If significant postoperative hemorrhage occurs, place a Foley catheter through the urethrostomy and into the bladder before applying a pressure bandage to the perineal area.

Step 10



Author Insight Once the dorsal sutures are in place, the bladder should be easily catheterized through the urethrostomy site. If it is not, pelvic attachments may remain, curving the penile body downward and allowing the catheter to divert dorsally into the urethral diverticulum.

Ensure healthy urination through a healed urethrostomy site. ■ **cb**

See **Aids & Resources**, back page, for references & suggested reading.