HOW I TREAT URETHRAL OBSTRUCTION

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Urinary obstruction, specifically urethral obstruction, is a frequent emergency scenario encountered in both dogs and cats. Obstruction most commonly occurs due to lodging of stones, sludge, or plugs within the urethra. Due to significant anatomical differences, obstruction is far more likely to occur in male dogs and cats than in females. The male canine urethra is long, and luminal diameter abruptly changes at the level of the proximal end of the os penis. This is a very common location for stones to become trapped. The male feline urethra also has an abrupt change in diameter as it transitions from the pelvic (membranous) to the penile urethra at the level of the bulbourethral glands.

Signs of urethral obstruction include stranguria and pollakiuria. Obstructed animals may display signs of discomfort, anxiety, and abdominal pain, and may vocalize when trying to urinate. If obstruction is unrecognized for greater than 24 hours, animals may present for lack of appetite, vomiting, collapse, stupor, or coma. Physical examination will reveal a large distended, painful urinary bladder. Animals may be clinically dehydrated and hypothermic. Bradycardia is a notable finding as the animals may have significant electrolyte abnormalities leading to cardiac conduction problems.

On presentation, intravenous access should be obtained as soon as possible. Ideally, blood is collected prior to starting fluids and PCV, total solids, BUN, creatinine, electrolytes, and venous blood gas are measured. Fluid therapy is instituted with 0.9% NaCl. Animals, particularly cats, may be severely azotemic, hyperkalemic, hypocalcemic, and acidotic. Metabolic acidosis occurs because hydrogen ions are unable to be excreted. Hyperkalemia develops because potassium is also unable to be excreted, as well as a shift of potassium from the intracellular space in response to acidosis. S everely elevated potassium levels affect the cell's ability to repolarize once depolarization occurs, which most affects cardiac conduction. Classic EKG findings associated with hyperkalemia include, bradycardia, widened QRS complexes, small to absent P-waves, tall and narrow T-waves, and ST segment depression.

Treatment of metabolic and electrolyte abnormalities is best achieved by relieving the obstruction and providing intravenous fluid therapy. Life-threatening metabolic acidosis (ph < 7.1) may be additionally treated with sodium bicarbonate. The traditional dose for sodium bicarbonate is 0.3 X weight (kg) X base deficit. Typically one-third of this dose is administered slowly over 15 minutes, and then blood gas analysis is rechecked. If cardiac conduction abnormalities are present, hyperkalemia can be additionally treated with calcium gluconate, insulin and dextrose, as well as sodium bicarbonate. Calcium gluconate (50-100 mg/kg IV) immediately antagonizes the effect of hyperkalemia, but the benefits are transient (30-60 minutes). Regular insulin (0.1 U/kg to 0.25 U/kg, IV) causes potassium to move intracellularly, and dextrose (0.5 gm/kg, IV) is administered concurrently to avoid severe hypoglycemia. Very sick animals, usually cats, may not require sedation for urethral catheterization. Although historically controversial, cystocentesis can be performed as a transient means of obstruction relief in very unstable animals or when catheterization is difficult.

More stable animals should be sedated at a minimum, for attempts to relieve urethral obstruction. If initial attempts are unrewarding, general anesthesia may be indicated. The stability of the animal influences choices for sedative and anesthetic protocols.

For urethral obstruction by calculi, the goal of urethral catheterization is to push the stone back into the urinary bladder. The location of the stone and success of retropulsion can be determined by abdominal radiographs, as most often stones are radiodense. In male dogs, radiographs should include a lateral image of the caudal abdomen with the rear limbs pulled forward. This allows visualization of the entire length of the urethra. Contrast radiographs can be performed in obstructed animals if no obvious calculi are visible on plain films.

Attempts for urethral catheterization in cats are usually performed using a stiff 3.5-fr tomcat catheter. If catheterization is successful, this catheter is then replaced with one made of softer material. Saline is used to help flush the stone or plug back in to the urinary bladder. For dogs, the largest urinary catheter that can be placed is inserted until it comes against the urethral stone. Saline flush mixed with sterile lubricant (50 ml saline: 10 ml lube) is then flushed through the catheter with a fair degree of force. If the obstruction is not relieved, the proximal urethra can be occluded by a finger inserted in the rectum of the animal. The catheter is flushed, dilating the urethra. Pressure on the proximal urethra is then released letting the stone be flushed into the urinary bladder. A lateral abdominal radiograph should be performed prior to surgery to confirm that all stones have been dislodged from the urethra. The catheter is left in place until the dog goes to surgery in order to prevent stones from falling back into the urethra.

When urethral catheterization in unsuccessful, an alternative to cystocentesis for urinary drainage, is placement of a cystostomy tube. This short surgical procedure provides a route for urine diversion, allows stabilization of the animal, and provides access for contrast imaging studies of the urinary tract. A minimal caudal abdominal midline approach is made over the distended urinary bladder. A small purse-string suture is placed in a relatively avascular area of the ventral bladder. A balloon-tipped catheter (5 to 8 fr) is passed through a stab incision in the body wall just off to the side of the main incision. The catheter is then placed into the urinary bladder through a small stab incision in the middle of the preplaced purse-string suture, and the balloon is inflated. The purse-string suture is tied and the bladder is pexied to the body wall using several tacking sutures. The catheter is secured on the outside of the abdomen using a finger-trap suture.

Once the obstruction is relieved, postobstructive diuresis is to be expected and in some cases may be profound. Urine output and IV fluid rates should be monitored closely and adjusted often to maintain adequate hydration. Azotemia and other metabolic abnormalities will normalize in short period of time once the obstruction has been relieved. For cats that are obstructed from grit, sludge, or urethral spasm due to feline urologic syndrome (FUS; feline lower urinary tract disease, FLUTD; sterile cystitis) can be managed conservatively by leaving a urethral catheter in for 24 to 72 hours and instituting appropriate medical therapy.

For dogs and cats obstructed due to urethral calculi, cystotomy is indicated to remove the stones. In dogs where the stone could not be retropulsed, urethrotomy is indicated. This most often happens in cases of long-standing partial obstruction where the stone has embedded into the wall of the urethra. Cystotomy is performed from a routine caudal abdominal approach. A ventral incision is made into the bladder in a relatively avascular area. Calculi are removed from the bladder using forceps, spoon, or other smooth and blunt instrument. A urethral catheter is passed several times both normograde and retrograde to make sure that no stones remain in the bladder neck or urethra.

The urinary bladder is unique in that it regains nearly 100% of its original tensile strength by 14

days. Therefore, synthetic rapidly absorbable suture material is most suitable for cystotomy closure. Monofilament suture is preferred as there is some concern that contact between urine and multifilament suture may lead to an increased rate of absorption or may promote urolith formation. Nonabsorbable suture and staples are contraindicated in urinary bladder closure, as they are associated with the formation of urinary calculi.

There are a number of suture patterns that can be used to close the urinary bladder. The surgical goals are to minimize tissue trauma, create a watertight seal, and avoid promotion of calculi formation. Options for cystotomy closure include two-layer appositional continuous pattern, two-layer inverting continuous pattern, single-layer simple interrupted pattern, and a single-layer simple continuous pattern. There is no difference in clinical outcome or circular bursting wall tension of urinary bladders closed with single-layer simple interrupted appositional pattern versus a two-layer continuous inverting closure, and clinical outcomes are similar. Luminal compromise may occur if two-layer inverting patterns are used in urinary bladders with severely thickened walls. Most surgical texts state that the lumen of the bladder should not be entered with suture material. Urinary calculi formation has been associated with multifilament absorbable suture, nonabsorbable suture, and metal staples, however there have been no studies assessing the lithogenic potential of the newer monofilament absorbable sutures. Full-thickness purchase of the bladder wall guarantees incorporation of the submucosal holding layer. Single layer partial-thickness closures of the urinary bladder that miss the submucosa may be inadequate for preventing urine leakage.

Alternatives to cystotomy include voiding hydropulsion, cystoscopic retrieval, lithotripsy, percutaneous cystolithotomy, and laparoscpic-assisted cystotomy. When animals cannot be unobstructed or if a cat suffers from recurrent obstruction, urethrostomy is indicated. Urethrostomy is also considered in dogs and cats that present for repeated obstruction, usually after the third event. Perineal urethrostomy (PU) is performed in cats. This procedure opens up the distal urethra to the level of the bulbourethral glands, exposing the wider pelvic or membranous part of the urethra. If there is damage to the pelvic urethra, antepubic or subpubic urethrostomy is indicated, however this procedure is associated with more complications. In dogs, prescrotal or scrotal urethrostomy is the most common type of permanent urinary diversion. At this location, the urethra is wide, superficial, and in its most gravity dependent location. Complications associated with urethrostomy include hemorrhage, stricture, urine scald, urine extravasation into the subcutaneous tissues, incontinence, and chronic infection.

There is no special postoperative care required following cystotomy. Routine postoperative abdominal radiographs should be taken to confirm that all urethral and bladder stones have been removed. Owners should be warned to expect mild hematuria for 3 to 5 days postoperatively. Follow-up medical management should be based on results of stone analysis. Elizabethan collars should be used in animals postoperatively following urethrostomy to avoid self-trauma. Urethral catheterization is not indicated and is damaging to the freshly created stoma. Some mild hemorrhage or hematuria is to be expected for several days and any clots at the stoma site should be left undisturbed. If azotemia has resolved and there are no other contraindications, nonsteroidal anti-inflammatory drugs are very beneficial for management of postoperative pain and discomfort.

SUGGESTED READING:

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