

Advances in Urinary Tract Endoscopy

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KEYWORDS

- Endourology • Endoscopy • Ureteral stenting • Endoscopic nephrolithotomy
- Sclerotherapy for idiopathic renal hematuria • Ureteroscopy
- Percutaneous cystolithotomy (PCCL) • Lithotripsy

KEY POINTS

- Endoscopic-assisted diagnostic and treatment options for urologic disease are becoming the standard of care in veterinary medicine.
- Ureteral obstructions should be considered an emergency and decompression can be performed endoscopically in dogs using ureteral stents, a procedure that holds the lowest morbidity and mortality.
- The combination of endoscopy and fluoroscopy allows for the diagnosis and treatment of various upper urinary tract diseases like ureteral stenting, endoscopic nephrolithotomy, laser ablation of ectopic ureters, sclerotherapy, or ureteroscopy/electrocautery for renal hematuria.
- Proper training and expertise in these endourologic techniques should be acquired before performing them on clinical patients for the best possible outcomes.

Interventional endoscopy uses endoscopy with or without fluoroscopy or ultrasonography to gain access to various parts of the body for various diagnostic and therapeutic endeavors. The most common organ system in veterinary medicine that uses this technology for visualization is the urinary tract. Over the past decade, these therapeutic and diagnostic modalities have become increasingly more accessible to veterinary patients,¹⁻¹⁷ similar to the experience in human medicine.

There are many advantages to using urinary tract endoscopic techniques, particularly compared with traditional surgical alternatives. Aside from reduced morbidity and mortality, image-guided therapies allow new treatment options for many conditions for which traditional surgery was either not possible, contraindicated, or met with severe complications.

With the high incidence of upper and lower urinary tract disease and the invasiveness and morbidity associated with traditional techniques, endourology has become

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appealing in the practice of veterinary medicine. In this article, some of the most common urologic endoscopy procedures being performed in small animal veterinary patients are reviewed.

KIDNEY

Endoscopic Approach to Nephrolithiasis

Nephrolith removal is rarely necessary in veterinary medicine and should be considered only when the stones are problematic: causing intractable pyelonephritis despite appropriate medical management/dissolution when indicated; causing a ureteral outflow tract obstruction associated with hydronephrosis; or enlarging and overtaking the renal parenchyma, resulting in progressive renal damage. Most nephroliths do not seem to cause pain or discomfort unless they are associated with pyelonephritis, pyonephrosis, or a ureteral outflow obstruction, so the need for removal is rarely necessary. There is some concern that dogs with progressive renal insufficiency may benefit from stone removal, but this is not clinically proved.

Surgical options to treat nephroliths include nephrotomy, pyelotomy, and ureteronephrectomy and are reported to be associated with frequent complications and high long-term morbidity. In 1 study,¹⁸ 43% of dogs had stone fragments remaining after surgery, a 23% complication rate was associated with the procedure, and 67% of dogs developed renal azotemia postoperatively. In a study of normal cats in which a nephrotomy was performed,¹⁹ there was a 10% to 20% decrease in the glomerular filtration rate (GFR) after the surgery. In clinical patients, with previous renal injury associated with the uroliths, compensatory mechanisms are often exhausted before the diagnosis, implying that similar surgical interventions would have a more detrimental effect on renal function. In addition, knowing that more than 30% of adult cats develop renal azotemia, losing 10% to 20% of function from a nephrotomy can be a life-threatening procedure. In the author's opinion, open surgical nephrotomy should always be avoided whenever possible, and other options such as extracorporeal shock-wave lithotripsy (ESWL) or endoscopic nephrolithotomy (ENL) should be considered.

Extracorporeal shock-wave lithotripsy

ESWL refers to the fragmentation of stones using external shock waves that pass through a water bag, through the soft tissues of the patient, and are directed onto the stone using fluoroscopic guidance. The stone(s) is shocked at different energy levels based on location and stone composition, to facilitate it breaking up into small fragments that are able to pass down the ureter and into the urinary bladder over a 2-week to 12-week period.

ESWL is typically reserved for nephroliths and ureteroliths in dogs and is not recommended in cats^{3-5,20} because of their type of stone (calcium oxalate monohydrate), which is resistant to fragmentation,²¹ and the small size of their ureteral lumen (0.3 mm), making stone fragments unlikely to pass successfully. ESWL is believed to be safe for the canine kidney, although subclinical intrarenal hemorrhage does occur.³⁻⁵ Studies have shown minimal effect of ESWL on GFR in both the short-term and long-term.^{22,23} The availability of ESWL for veterinary patients is limited and is routinely available only at Purdue University (Dr Larry Adams) and the Animal Medical Center, New York (Dr Allyson Berent).

In dogs, ESWL fragmentation is successful, but up to 30% of dogs require more than 1 treatment to achieve adequate fragmentation of nephroliths.³⁻⁵ Mortality with ESWL is less than 1%, with the most common complication being the development of a transient ureteral obstruction in approximately 10% of cases.³⁻⁵ The risk of

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