

Interventional Radiology and Interventional Endoscopy in Treatment of Nephroureteral Disease in the Dog and Cat

Alexander Gallagher, DVM, MS

KEYWORDS

- Ureteral obstruction • Ureteral stent • Subcutaneous ureteral bypass
- Ectopic ureter • Idiopathic renal hematuria • Laser ablation

KEY POINTS

- Interventional endoscopy and interventional radiology allow for minimally invasive techniques in the treatment of kidney and ureteral disease in the dog and cat.
- Ureteral obstructions are being diagnosed with increased frequency in veterinary medicine and may lead to the development of obstructive nephropathy, pyonephrosis, and critical illness.
- Prompt recognition and treatment of ureteral obstructions is needed to provide the best return of renal function.
- Renal pelvic dilation greater than 13 mm is consistent with ureteral obstruction, but smaller dilations may also be caused by obstruction and require antegrade pyelography to further access.

INTRODUCTION

Dogs and cats are commonly affected by diseases of the kidneys and ureters. In the past, many of these diseases were only treatable with invasive surgeries or may not have had a treatment option. In recent years, advancements in equipment and techniques has allowed the development of minimally invasive urology procedures, alone or combined with surgery, to treat many conditions of the urinary tract. These techniques rely on imaging including fluoroscopy, ultrasound, and endoscopy, often in combination. This article focuses on the current evidence for application of minimally invasive endourologic procedures for management of diseases of the kidney and ureter.

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Small Animal Medicine, Department of Small Animal Clinical Sciences, College of Veterinary Medicine, University of Florida, 2015 Southwest 16th Avenue, Gainesville, FL 32608, USA

E-mail address: gallaghera@ufl.edu

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KIDNEY

Idiopathic Renal Hematuria

Idiopathic renal hematuria (IRH) is a rare condition in dogs with only 27 cases reported in the literature.^{1–10} It is characterized by chronic, often gross, hematuria that is not associated with hematologic or radiologic abnormalities. Bleeding can lead to the formation of clots in the renal pelvis, ureter, or bladder with possible obstruction of the urinary tract.^{1,3} Most cases occur in young, large breed dogs, but it has also been reported in older dogs and smaller breeds.⁷ Of the 27 reported cases, 19 (70%) were unilateral, seven (26%) were bilateral (three of these dogs were initially unilateral), and one was undetermined if unilateral or bilateral. In addition, IRH has been anecdotally reported in cats.¹¹

Diagnosis of IRH requires visualization of the urine jets at the ureterovesicular junction (UVJ), most commonly by cystoscopy (Fig. 1D). Bright red blood is typically seen from the side that is bleeding. Because of the intermittent bleeding in some cases, cystoscopy may reveal grossly normal urine jets if there is not active bleeding at the time of cystoscopy. In these cases, cystoscopy should be repeated as soon as the owner notes return of gross hematuria. In people, strenuous exercise (eg, climbing stairs) before cystoscopy has been recommended to improve the likelihood of detecting bleeding in patients without gross hematuria.¹² Cystotomy with ureteral catheterization can also be done, but care must be used to prevent iatrogenic trauma and bleeding from the ureters during catheterization.

Previously, IRH has been treated by nephrectomy in cases with unilateral bleeding.^{1–3} In one dog with unilateral IRH, manual compression of the dorsal ramus of the renal artery resulted in cessation of hematuria intraoperatively. Subsequently, the dorsal ramus was ligated with resolution of gross hematuria.⁴ Because greater than 25% of cases are bilateral and lesions are likely not parenchymal, renal-sparing techniques as used in people including sclerotherapy and ureteroscopy with cauterization have been investigated to avoid nephrectomy.

Sclerotherapy

Sclerotherapy involves the instillation of cauterizing agents into the renal pelvis and has recently been reported as a successful renal-sparing technique for treatment of IRH in dogs.^{7–10} Under endoscopic and fluoroscopic guidance, a ureteral catheter, with or without an occlusion balloon, is placed and the sclerosing agents infused into the affected renal pelvis. After the procedure, a ureteral stent is placed to prevent ureteral obstruction caused by ureteritis that may occur secondary to the sclerosing agents (Fig. 1). Commonly used agents in dogs include silver nitrate and/or povidone-iodine.

Berent and colleagues⁷ initially described an endoscopic-guided technique using a combination of both agents in six dogs, five male and one female. Initially, one dog had bilateral hematuria and five had unilateral hematuria. One dog developed hematuria on the contralateral side 4.5 months after sclerotherapy for a total of eight renal pelvises treated. Complete resolution of gross hematuria occurred in five of six dogs (six of eight renal pelvises) within 1 week (median, 6 hours; range, 0–7 days). All dogs had resolution of anemia, pollakiuria, and stranguria. Since this study, Berent¹³ has reported performing sclerotherapy in greater than 25 dogs with a success rate of 80% to 85% including success in one dog treated with povidone-iodine alone.

Di Cicco and colleagues⁸ reported on a dog with IRH treated with silver nitrate alone. At cystotomy, urine from the right ureter was grossly normal but had microscopic hematuria. Urine from the left ureter was grossly hematuric. Silver nitrate was instilled in the left renal pelvis. The urine was grossly normal at discharge from

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