

Interventional Management of Urethral Obstructions

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KEYWORDS

- Urethral stent • Urethral obstruction • Transitional cell carcinoma • Urethral stricture
- Incontinence • Malignant urethral obstruction • Benign urethral obstruction
- Interventional radiology

KEY POINTS

- Lower urinary tract obstruction can represent a life-threatening emergency. Patient stabilization through appropriate medical therapies for the management of hyperkalemia, metabolic acidosis, and uremia are critical before definitive intervention.
- Malignant urethral obstruction is the most common indication for urethral stent placement in dogs and cats.
- Urethral stent placement offers a minimally invasive, image-guided alternative to prolonged urinary diversion via a cystostomy tube in select patients.
- The most common complication of urethral stent placement is urinary incontinence.
- Percutaneous antegrade urethral access can help facilitate urethral access for catheterization or stent placement when retrograde access to the urethra and bladder is not possible.

INTRODUCTION

Lower urinary tract obstruction is a common cause of morbidity and mortality in small animal patients. Urolithiasis in dogs and obstructive feline lower urinary tract disease in cats are the most common causes of lower urinary tract obstruction, and these conditions can be managed through a combination of medical, dietary, and surgical intervention. Other conditions, including neoplasia and benign urethral strictures, may also cause urinary obstruction. These conditions create therapeutic challenges that, in the past, have necessitated long-term urinary diversion via a cystostomy tube or complex surgical interventions. Urethral stent placement offers therapeutic alternative to these traditional treatment methods.^{1–8} Patient selection and screening is critical to optimizing outcomes. Stent placement is performed using image guidance, with fluoroscopy being preferred, although digital radiography is a described alternative.⁸ Urethral stents are placed almost exclusively via a retrograde approach using the urethral orifice, but an antegrade access approach is also possible. The following paragraphs detail

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stabilization, patient selection, diagnostic workup, placement technique, expected outcomes, and complications for patients undergoing urethral stent placement.

STABILIZATION OF THE PATIENT WITH LOWER URINARY TRACT OBSTRUCTION

Lower urinary tract obstruction can be life-threatening due to hyperkalemia, metabolic acidosis, and uremia. Medical management of these conditions and stabilization of the patient is critical before definitive intervention. Irrespective of the cause of lower urinary tract obstruction, initial stabilization may include the following:

- Volume expansion with balanced isotonic crystalloid solutions or 0.9% saline to restore intravascular volume, treat dehydration, and rapidly dilute the elevated concentration of potassium in the blood.
- Calcium gluconate (20–60 mg/kg intravenously [IV] over 1–3 minutes) works very rapidly to protect the heart from the effects of hyperkalemia.
- Regular insulin (0.25 u/kg IV) and dextrose (0.25–0.5 g/kg IV) will help to redistribute potassium intracellularly and has a more delayed effect than volume expansion and calcium gluconate administration (onset time approximately 20 minutes).
- Sodium bicarbonate ($0.1 \times \text{Body Weight (kg)} \times \text{Base Deficit}$) given over 30 minutes will also help redistribute potassium intracellularly while also managing severe metabolic acidosis. The author will use bicarbonate if the pH is less than 7.1 or there are clinical manifestations of severe metabolic acidosis. Onset time is similar to insulin/dextrose.
- Urinary diversion via a urinary catheter or cystostomy tube has a very slow effect on lowering serum potassium concentration and is generally delayed until hemodynamic stability has been achieved. If possible, the use of an end-hole catheter, or cutting off the closed end of a red rubber or Foley catheter, will make subsequent wire access for urethral stent placement easier.

INDICATIONS AND PATIENT SELECTION FOR URETHRAL STENT PLACEMENT

Fortunately, dogs and cats with neoplastic urethral obstruction and urethral stricture often have gradual and progressive signs of lower urinary tract obstruction such that clients usually recognize signs of lower urinary tract disease before complete obstruction occurs. Once stabilization has been performed, the cause of the urethral obstruction must be determined. A comprehensive discussion of the causes and diagnostic techniques used for workup of dogs and cats presenting with urethral obstruction is beyond the scope of this article. In general, a combination of historical findings; physical examination findings, including a rectal examination to evaluate the pelvic urethra and a vaginal examination in females; radiographic; ultrasonographic; urethrocystoscopic (with biopsy); and positive contrast urethrocystographic imaging allow for the determination of the underlying cause of the lower urinary tract obstruction.

Urethral stents may be placed for the following conditions:

- Urethral obstruction due to transitional cell carcinoma, prostatic carcinoma, leiomyoma, or other neoplastic conditions of the urethra.
- External urethral compression secondary to metastatic intrapelvic lymphadenopathy.
- Benign urethral obstruction associated with previous urethral trauma (including iatrogenic), previous surgery, reflex dyssynergia, and proliferative urethritis.

Of critical importance before stent placement is the conclusive determination that the patient is indeed obstructed. Animals with lower urinary tract neoplasia often have

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