

URETERAL ECTOPIA IN DOGS

Mariana Pereira Alves DVM, surgical intern, MyVet Referrals (under the guidance of Ciarán Jones MVB MS DECVS DACVS-SA and Javier Rincón Álvarez LdoVet MVM DECVS MRCVS) provides an overview of ureteral ectopia in dogs

This article provides a comprehensive review of ureteral ectopia in dogs, detailing its clinical presentation, diagnostic strategies, and treatment modalities. Two case reports are included to exemplify the clinical approach and outcomes associated with this congenital condition.

Introduction

Ureteral ectopia is a rare condition among dogs, however, it stands as the primary cause of juvenile urinary incontinence within this species.^{1,2} It is considered a congenital anomaly of the urinary system that develops as a consequence of an embryologic malformation, leading to improper differentiation and migration of the mesonephric and metanephric ducts.^{2,3}

The term ectopic ureter (EU) refers to any ureteral orifice that is distally displaced, entering at any site other than the trigone of the bladder. The abnormal ureteral termination can occur in the bladder neck, urethra, vagina, vestibule or rectum.³

Ectopic ureters can be unilateral or bilateral. Anatomically, these are classified either as intramural or extramural. In the intramural EUs, the ureter enters the bladder at the correct location, the trigone. However, it continues its course submucosally, ultimately opening at various locations along the genitourinary tract.^{1,4} In contrast, extramural EUs completely bypass the trigone of the bladder, generally entering the genitourinary tract at a sharp angle.^{1,2} More than 95 per cent of EUs in dogs are reported to be intramural.^{1,4} Concurrent congenital abnormalities are often reported in dogs with EUs. Among the most common are hydronephrosis, urethral sphincter mechanism incompetence (USMI), and the presence of a pelvic bladder. Less frequently, patients may also exhibit ureteral stenosis,

ureterocele, hydroureter, and anatomical anomalies of the genitourinary tract (such as renal dysgenesis or agenesis and vestibulovaginal septal remnants).^{2,4}

Signalment and clinical signs

Dogs affected with EUs typically exhibit intermittent or continuous urinary incontinence since birth, although these signs may not be noted until later in life in some cases. The severity of the incontinence is variable and can be positional, with some animals only showing signs of nocturia, and worsening when the animal is recumbent.^{1,5}

Female dogs are over-represented and often experience a more pronounced urinary incontinence. Conversely, EUs are rare in male dogs and, when present, clinical signs can be absent, possibly due to the increased length of the urethra.^{1,6} Several breeds have been identified as having a higher risk of ureteral ectopia. These include the Golden Retriever, Labrador Retriever, Siberian Husky, West Highland White Terrier, Newfoundland, Miniature and Toy Poodle, Entlebucher Mountain Dog, and Soft Coated Wheaten Terrier.⁷

Diagnosis

A complete blood cell count, biochemical profile, and urinalysis with culture and sensitivity (obtained ideally via percutaneous ultrasound-guided cystocentesis) are recommended in dogs with suspected EUs, since urinary tract infections occur frequently in these patients and treatment/stabilisation is desirable preoperatively.¹ Numerous methods of diagnostic imaging have been used to assess EUs in dogs. These include radiographic excretory urography, fluoroscopic excretory urography, abdominal ultrasonography (US), computed tomography (CT) excretory

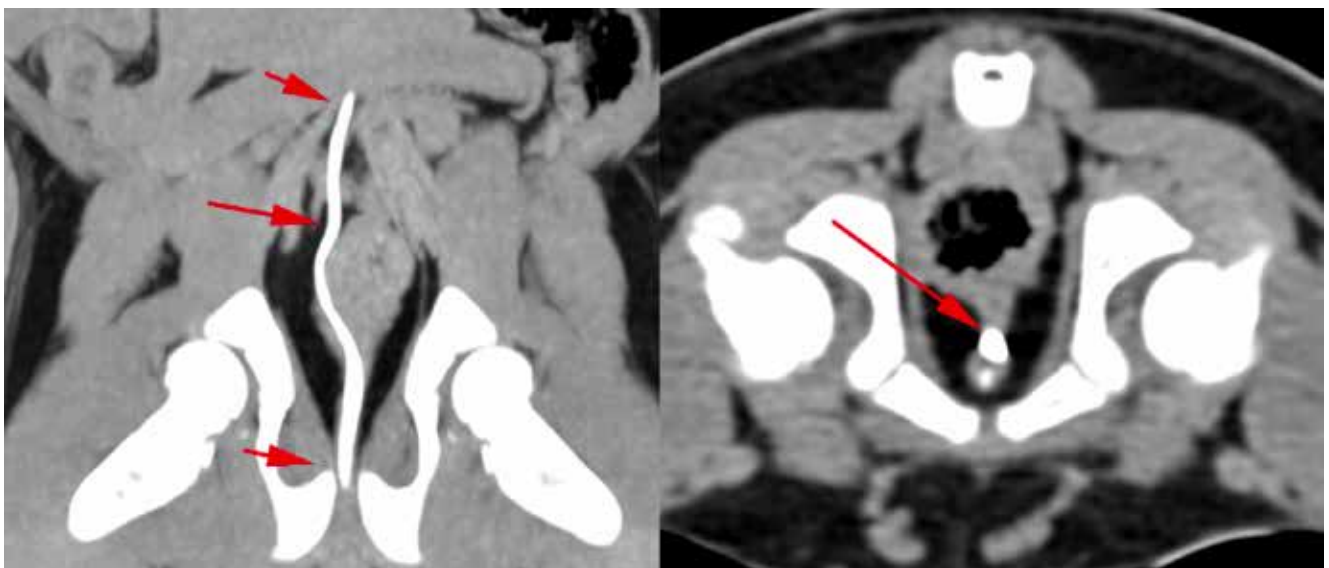


Figure 1. Right intramural ectopic ureter noted on CT.

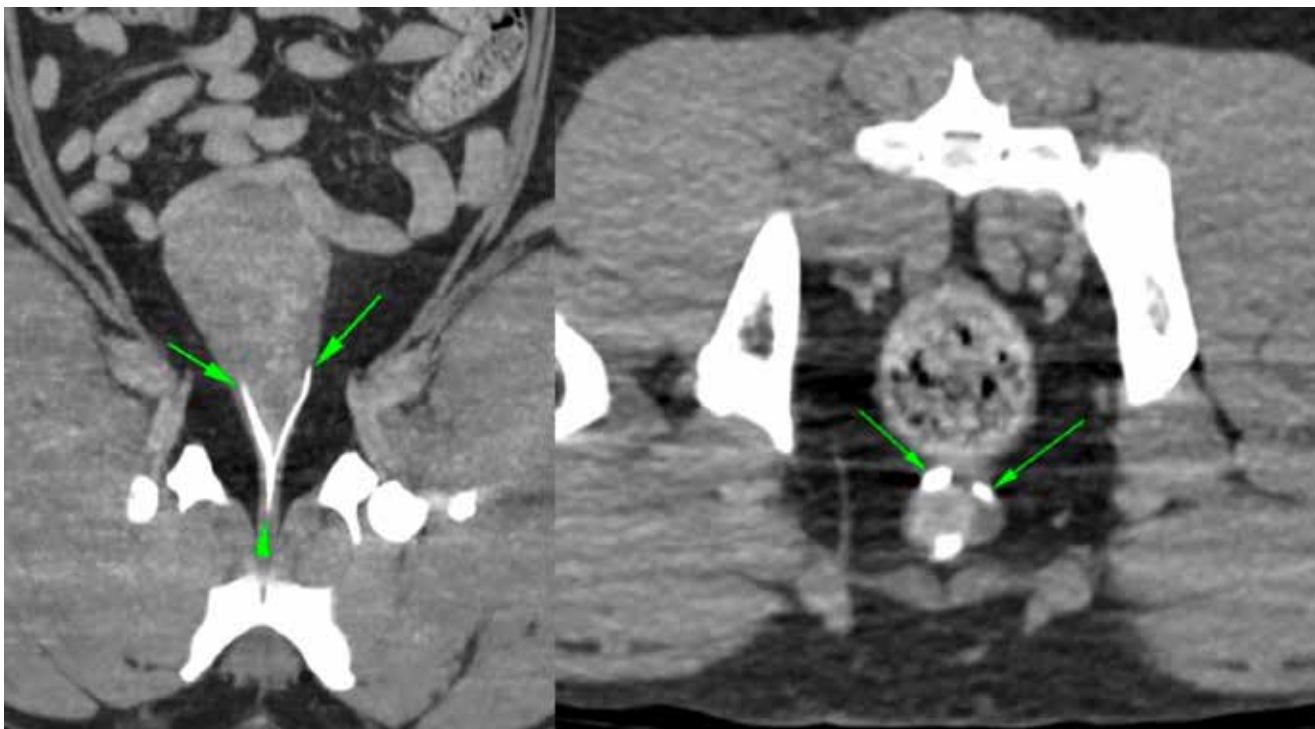


Figure 2. Bilateral intramural ectopic ureters noted on CT.

urography and cystoscopy.¹

- Radiographic excretory urography has been relied upon to identify EUs, with multiple radiographic views often being required to assess the distal ureters adequately. The location of the EU orifice is correctly identified in 66 to 78.2 per cent of cases, with fluoroscopy shown to improve sensitivity since it has the additional advantage of tracking ureteral peristalsis.^{5,6}
- Abdominal US has recently been shown to have a sensitivity of 93.5 per cent when identifying dogs with ureteral ectopia.⁶ US allows a thorough assessment of the upper urinary tract and common concurrent abnormalities associated with EUs, without the need for general anaesthesia or the administration of contrast agents. Nevertheless, this imaging modality also has some limitations. It is highly operator-dependent and, in some cases, the presence of acoustic shadowing or a pelvic bladder (when the neck of the bladder is intra-pelvic) makes it difficult to conduct a detailed evaluation.^{6,7}
- CT excretory urography (CTEU) and four-dimensional CTEU are considered superior for the diagnosis of canine EUs when compared to the imaging modalities described above, with a reported sensitivity of 73 to 100 per cent and 97 per cent, respectively.^{6,8} Bolus tracking techniques and furosemide administration to increase ureteral detectability have been used in the traditional CTEU protocols in order to improve readers' confidence and diagnostic accuracy. 4D-CTEU is available in the latest generation of multi-slice CT scanners, enabling image data to be reconstructed spatially and temporally, which allows the meticulous following of the ureteral anatomy and, therefore, improves surgical planning and decision-making.⁹
- Cystoscopy has been described as the gold standard for the diagnosis of EUs in dogs, with a reported sensitivity of 100 per cent. This imaging modality enables the operator

to thoroughly evaluate the distal urogenital structures, which is crucial to identify other congenital abnormalities that may contribute to ongoing incontinence. It also allows definitive treatment of intramural EUs at the time of diagnosis.^{3,6} Performing a cystoscopy in male dogs can be technically challenging, with the use of a small diameter flexible scope or a perineal approach being described as alternatives.⁶

Currently, in MyVet, our diagnostic approach in dogs with EUs involves a combination of these techniques, namely CT and cystoscopy or fluoroscopy and cystoscopy.

Treatment

Treatment of choice for dogs with ureteral ectopia is surgical correction. The traditional surgical procedures include a neoureterostomy or a neocystoureterostomy, both requiring exposure of the bladder lumen via a ventral cystotomy. Neoureterostomy can be performed either by ligation of the distal ectopic segment or resection of that distal portion and revision of the urethral-trigone area. Neocystoureterostomy, which is usually reserved for extramural EUs, includes transection of the EU distally and anastomosis of the proximal segment into the body of the bladder.^{1,2,5} These techniques are associated with significant postoperative morbidity. Some of the most common complications include persistent incontinence, scarring of the urethral sphincter secondary to the surgical approach, hydronephrosis, and the general risks associated with open abdominal surgery, with surgical revision being required in certain cases.^{1,2} Minimally invasive therapies have been recently described and are currently considered the preferred treatment for intramural EUs. Cystoscopic-guided ablation of the EU has been reported using either endoscopic laser or scissors.^{4,10} Once the intramural ectopic path has been identified cystoscopically, its ventral aspect should be transected as cranially as possible so that the ureteral orifice is relocated

(continued on page 579)



Figure 3. Transection of the EU wall under cystoscopic visualisation.

into the urinary bladder trigone. For unilateral EUs, the contralateral normal ureteral papilla can be used as a landmark.⁵ The equipment must always be under direct endoscopic visualisation and targeted ventrally, to avoid inadvertent perforation of the lateral ureteral wall and subsequent uroabdomen.^{3,5,10} Fluoroscopy may be used intra-operatively to characterise the EU conformation and assess the correct location of the newly-formed ureteral orifice within the bladder, reducing the risk of urethral tears.^{2,10} Proposed advantages of cystoscopic-guided surgery include its minimally-invasive nature, which allows shorter hospitalisation times and quicker recoveries, and the ability to perform diagnosis and treatment under the same anaesthetic period, as previously mentioned.^{2,10} These minimally-invasive techniques are also associated with fewer complications (both minor, such as dysuria and haematuria; and major, like uroabdomen) and with a lower incidence of incontinence recurrence after EU correction compared to open procedures.^{2,4}

Disadvantages of the non-invasive procedures include the high cost of the equipment required – including fluoroscope, endoscopic equipment, and laser unit (if used) – and the technical difficulty of these procedures which often have a steep learning curve even for highly skilled clinicians, making them less available than traditional surgery.¹⁰

The outcomes following surgical intervention show wide disparity, with an average success rate of at least 75 per cent being generally advised in most recent publications.¹¹ Even in cases where postoperative persistent incontinence occurs, patients can be effectively managed medically, either using α -adrenergic stimulants (i.e., phenylpropanolamine) or oestrogen compounds that increase the sensitivity of α -adrenergic receptors in the urethra.¹ Regardless of the outcome, since this condition is congenital, removing affected individuals from breeding programmes should always be considered by owners.¹

Case reports

Case One

A 13-week-old, female, Labrador Retriever was referred for assessment of urinary incontinence since birth, with history of being able to pass urine consciously but leaking almost constantly.

On clinical examination, the patient was bright and alert and all her vital parameters were within normal limits. A urine staining was noticed on the caudal aspect of her hind limbs and abdomen, with no evidence of urine scalding.

- No significant abnormalities were detected on haematology and biochemistry panels.
- A CT excretory urography was performed under sedation. The kidneys and urinary bladder were unremarkable. The left ureter had a single opening into the urinary bladder trigone and the right ureter was mildly dilated, with a single intramural opening into the cranial urethra (see red arrows, Figure 1).

Case Two

A three-year-old, neutered, female, Golden Retriever presented with a history of urinary incontinence, likely present since she was just a puppy but worsening considerably over time, especially after being spayed at two years of age. The owner reported that the episodes were more prevalent at night time and, over the last few days, the patient was producing urine with a strong odour. Medical management with phenylpropanolamine was attempted by the referring veterinarian, with no improvement observed.

- No significant abnormalities were detected on haematology and biochemistry panels.
- A CT excretory urography was performed under sedation. The kidneys and urinary bladder were unremarkable, with a normal size, shape and excretory attenuating pattern. Both ureters were well followed to the level of the bladder

(continued on page 582)

(continued from page 579)

Breeds such as the Golden Retriever are at higher risk of developing ureteral ectopia.

trigone, where they both assumed a caudal direction along the dorsal wall of the bladder, joining caudal to the bladder neck at the level of the proximal urethra (see green arrows, Figure 2), compatible with bilateral intramural ectopic ureters.

Surgical treatment

Both patients were anaesthetised, positioned in dorsal recumbency, and aseptically prepared. Both received IV antibiotics (cefuroxime) before the procedure.

A rigid cystoscope was inserted into the vestibule and the urinary and reproductive tracts were assessed for abnormalities prior to advancement into the urethra, with constant irrigation of 0.9 per cent saline solution.

After cystoscopic identification of the ectopic ureteral opening(s), flexible endoscopic scissors were inserted through the instrument sheath. The jaws of the scissors were advanced under endoscopic visualisation to transect the ventral wall of the EU (see Figure 3). This process was progressively repeated until the new ureteral orifice was levelled with the contralateral normal opening in Case One (unilateral) or until both orifices were considered well-positioned within the bladder trigone region in Case Two (bilateral).

Both dogs were discharged the following day with a two-week course of antibiotics (amoxicillin and clavulanic acid) and anti-inflammatories (meloxicam).

Follow-up

Case One

At the two-week postoperative check, the patient was still exhibiting signs of urinary incontinence, with the owner reporting urine dribbling every so often and occasional presence of wet patches in the areas where she had laid down. A urine sample, collected via cystocentesis, was sent for culture showing no bacterial growth. The patient was started on phenylpropanolamine twice daily.

Two months after starting the medication, the owner was contacted by phone for a follow-up, during which he reported that the dog continued to show moderate signs of urinary incontinence. It was mutually agreed to maintain

the current treatment and monitor the patient until her first oestrous cycle. Should the clinical signs persist beyond this point, the owner was advised to reach out for further evaluation.

Case Two

Two weeks post surgery, the patient had regained full continence and there was no need to add further adjuvant therapies.

Conclusion

The outcome of these two patients aligns with the findings described in the recent literature. Data shows that dogs with severe preoperative incontinence, such as the patient in Case One, are less likely to become completely continent after surgery.¹¹ The persistence of incontinence observed in this case may be due to decreased bladder capacity, anatomical anomalies (i.e., presence of a pelvic bladder), or associated USMI.²

Patient from Case Two started exhibiting signs of urinary incontinence after being spayed which confirms that neutering can be an additional instigating factor, as it can decrease urethral tone.¹¹

Unilateral versus bilateral ureteral ectopia does not correlate with the severity of incontinence nor does it seem to impact the effectiveness of treatment.¹⁰ This is consistent with our results, as the dog in Case Two became fully continent following surgical correction of bilateral disease.

A recent study suggests that dogs that are continent after surgery have a good long-term prognosis even if medical treatment is needed, while dogs that fail to respond to surgical EU correction are less prone to respond to medical management and have a worse prognosis.² Further treatment options can be explored to enhance continence in the long term, including surgical treatments such as colposuspension (to position the bladder neck in an intra-abdominal position and increase urethral length), cystopexy or placement of an artificial urethral sphincter. It is advisable to reserve these options for dogs that have reached maturity as, in some cases, incontinence may improve after the first or second oestrus cycle.¹²

(continued on page 584)

(continued from page 582)

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READER QUESTIONS AND ANSWERS

1. WHAT IS THE PRIMARY CAUSE OF JUVENILE URINARY INCONTINENCE IN DOGS?

- A. Ureteral ectopia
- B. Bladder stones
- C. Urinary tract infections
- D. Kidney failure

2. WHICH BREEDS ARE AT HIGHER RISK OF DEVELOPING URETERAL ECTOPIA?

- A. German Shepherd, Beagle, Rottweiler
- B. Golden Retriever, Labrador Retriever, Siberian Husky
- C. Dalmatian, Boxer, Shih Tzu
- D. Dachshund, Pomeranian, Chihuahua

3. WHICH TREATMENT IS PREFERRED FOR INTRAMURAL ECTOPIC URETERS IN DOGS?

- A. Open abdominal surgery
- B. Cystoscopic-guided ablation
- C. Nephrectomy
- D. Ureteral stenting

4. WHAT IS THE PRIMARY PROPOSED ADVANTAGE OF CYSTOSCOPIC-GUIDED SURGERY FOR TREATING INTRAMURAL ECTOPIC URETERS?

- A. Lower equipment cost
- B. Necessity of multiple surgical interventions
- C. Higher risk of major complications
- D. Minimally-invasive nature with shorter hospitalisation times and quicker recoveries

5. WHAT MEDICAL MANAGEMENT OPTIONS ARE SUGGESTED FOR DOGS WITH PERSISTENT INCONTINENCE AFTER SURGICAL CORRECTION OF ECTOPIC URETERS?

- A. Antibiotics and diuretics
- B. Corticosteroids and antihistamines
- C. α-adrenergic stimulants and oestrogen compounds
- D. Beta-blockers and calcium channel blockers

ANSWERS: 1A, 2B, 3B, 4D, 5C.