



**Camilla Pegram**  
BVetMed MRes MRCVS

*Camilla graduated from the Royal Veterinary College in 2015 and worked in first opinion small animal practice until 2017. She returned to the RVC to complete a Master of Research degree in Companion Animal Epidemiology within the VetCompass™ team, studying the associations between neutering and urinary incontinence in bitches under primary veterinary care in the UK. She now works on a VetCompass™ project exploring disorders within dog breeds.*



**Jon Hall**  
MA VetMB CertSAS DipECVS MRCVS

*Jon graduated from the University of Cambridge in 2004 and spent several years in small animal practice. He became a European and Royal College specialist in small animal surgery in 2015, worked as a lecturer at the University of Cambridge until 2017, and is now senior lecturer at the University of Edinburgh.*



*\*Suggested Personal & Professional Development (PPD)*

## INCONTINENCE

# The diagnosis, risk factors and treatment of urinary incontinence in dogs

Urinary incontinence (UI) is defined as the involuntary escape of urine during the storage phase of micturition. UI affects approximately 3.1 per cent of female dogs and 0.9 per cent of male dogs under primary veterinary care in the UK<sup>2,3</sup>. UI can be a distressing condition, with a negative effect on the relationship between pets and owners<sup>4</sup>. Importantly, dogs can suffer from an increased risk of urinary tract infection and urine scald<sup>5</sup>. Accurate diagnosis, recognition of risk factors and evidence based treatment of UI improves animal welfare and owner satisfaction.

## Diagnosis

Dogs usually present either as puppies with congenital UI or as adults with acquired UI<sup>6</sup>. Unilateral or bilateral ectopic ureter is the most commonly reported cause of UI in puppies (<6 months). Urethral sphincter mechanism incompetence (USMI) is the most common condition in adult dogs, with neutered females being over-represented<sup>6</sup>.

Diagnostic evaluation of dogs with UI, ideally to determine the exact underlying cause, should begin with a complete history, a physical examination, neurological examination, urinalysis (dipstick and specific gravity) and urine culture. Depending on these results, further tests may include serum biochemistry and haematology (in particular, to evaluate renal function and for exacerbating/concurrent metabolic disease), ultrasonography and/or radiographic studies (+/- contrast) to evaluate the urinary tract (kidneys, ureters, bladder) for anatomical or acquired abnormalities<sup>1</sup>.

Distinguishing USMI from other forms of UI relies on the clinical history, exclusion of other potential causes, contrast radiography and, in the referral setting, urethral pressure profilometry (UPP) to assess the strength of sphincter contraction. A presumptive diagnosis, however, is often made

based on response to USMI specific treatment<sup>1,7</sup>.

## Risk factors Female dogs

UI is a complex and multifactorial condition, with neutering, breed, body-size, docking, obesity and age all variously reported as risk factors<sup>2,7</sup>. Affected bitches have been described as having more caudally positioned bladder necks, shorter urethras, and lower urethral tone than continent bitches<sup>7</sup>.

An association between neutering bitches and an increased risk of developing USMI has been widely reported, however the evidence supporting this association was identified as weak in a systematic review<sup>8</sup>. Subsequent epidemiological studies have aimed to provide stronger evidence based on larger numbers<sup>2,9</sup>.

The pathophysiological mechanisms behind associations between neutering and UI are not fully understood, however, changes in tissue structure, collagen content, vasculature, oestrogen receptors and alterations in follicle-stimulating hormone and luteinizing hormone concentrations are all thought to play a role<sup>10</sup>.

Associations between the age at neuter and later development of UI have been investigated, with some weak evidence that UI risk in the bitch decreases as the age at neuter increases up to 12 months of age; there is no evidence of an effect after this age<sup>8,11</sup>. An association between timing of neuter relative to first oestrus and development of UI in the bitch remains unclear. A systematic review evaluating conflicting information identified no evidence for an association between UI and occurrence of oestrus before neuter<sup>8</sup>.

Breed, increasing bodyweight and increasing age have been identified as risk factors associated with UI diagnosis. Breeds at greatest risk of UI diagnosis include the Irish setter, dobermann, bull mastiff, rough collie, Dalmatian and boxer<sup>2,9</sup>.

## Male dogs

There have been fewer studies exploring risk factors for UI in male dogs, since the condition is less common in males than females (one per cent versus three per cent prevalence). A recent study identified that breeds with highest odds of incontinence in male dogs included the bull mastiff, Irish red setter, fox terrier, bulldog

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and boxer. Increased odds of urinary incontinence were also associated with increasing age and being insured.

However, in contrast to female dogs, there was no association between UI and neutering or bodyweight<sup>3</sup>.

### Treatment Clinical management

Owners that seek veterinary advice because their dog is urinary incontinent are generally seeking a solution to the problem. Anatomical abnormalities such as ectopic ureter may require surgical correction, particularly if there is evidence of developing hydronephrosis and/or pyelectasia/hydronephrosis. If there is concurrent UTI, surgical correction should be postponed if possible while the infection is treated to minimise the risk of postoperative complication. Occasionally, considerable improvement in UI and even hydronephrosis are seen with treatment. Up to 50 per cent of dogs with ectopic ureter can have some degree of congenital USMI. Medical therapy of acquired UI is often successful (to treat

presumed USMI), however it is important that any underlying disease resulting in polyuria and/or a concomitant cystitis is diagnosed and correctly treated in the first instance. Surgical treatment for USMI may be recommended if patients are non-responsive or refractory to medical treatment, if side effects develop, or if owners are reluctant to administer long-term medication<sup>12</sup>. However, concerns regarding cost, complications or an owner cost/benefit analysis (for example, age of dog vs perceived life expectancy vs morbidity of condition vs surgery) may mean that owners decide surgical intervention is not for them.

### Medical treatment of female dogs

The majority of bitches with USMI are treated medically<sup>12</sup>. Two classes of drugs are commonly used:  $\alpha$ -adrenergic and oestrogenic compounds. Phenylpropanolamine (PPA) is a non-selective  $\alpha$ -agonist drug licensed in the UK for long-term management of USMI in the bitch. PPA directly stimulates smooth muscle of the internal urethral sphincter,

resulting in increased sphincter tone and subsequent alleviation of UI<sup>13</sup>. Response rates of up to 97 per cent and minimal side effects have been reported. However, overdose has been associated with cardiac toxicity and treatment can result in an increased diastolic and mean arterial blood pressure. Therefore, blood pressure monitoring is advised in dogs with concurrent cardiovascular disease<sup>14</sup>.

Oestrogenic compounds, such as oestriol, can be used as an alternative to PPA or in combination. Oestrogens may improve smooth muscle contractility and sensitivity to  $\alpha$ -adrenergic stimulation. Response rates of up to 83 per cent and minimal side effects have been reported. However, excessive quantities of oestrogenic compounds

have been associated with aplastic anaemia and should be used with caution in intact bitches that may have a risk of developing pyometra<sup>15</sup>.

More recently, gonadotropin-releasing hormone (GnRH) analogues have been evaluated for efficacy in the treatment of USMI because LH and FSH (which are controlled by GnRH) have been linked to USMI. After five weeks of treatment with a GnRH analogue, the frequency of UI was reduced by 71 per cent in affected bitches<sup>16</sup>. The effect of GnRH immunisation for the treatment of USMI was recently evaluated. Continence was only maintained in 44 per cent of bitches, with side effects reported in 90 per cent of bitches<sup>17</sup>. Therefore, further evaluation of GnRH analogues as a treatment for USMI is warranted.

### Medical treatment of male dogs

Medical management is less effective in male dogs than in female dogs. Phenylpropanolamine, oestriol and androgens have each been used to treat USMI in male dogs, however less than 50 per cent of male dogs respond to therapy<sup>18</sup>. It has been suggested that this is due to differences in the anatomy, histology and hormone receptors of the bladder and lower urinary tract in male dogs compared to female dogs<sup>3</sup>.

### Surgical treatment of female dogs

Surgery aims to achieve one of three goals: to increase urethral resistance, relocate

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the bladder neck to an intra-abdominal position, and increase urethral length. However, increasing urethral length through reconstruction techniques is highly technically demanding and few cases will be suitable for this procedure<sup>12</sup>.

Artificial sphincters, which aim to increase urethral resistance, have recently been described with promising results. A complete continence rate of 36.4 per cent to 67.0 per cent has been reported, but studies have involved relatively small case numbers<sup>19</sup>. Artificial sphincters have the advantage that additional inflation of the cuff can be performed months to years after implantation to adjust changes in incontinence, without the need for further medication. The disadvantages, however, include the risk of urethral obstruction<sup>12</sup>.

Colposuspension, which aims to relocate the bladder neck to an intra-abdominal position, has traditionally been the most popular surgical procedure. First documented by Holt in 1985, a complete continence rate of 56 per cent, with an 11.3 per cent risk of complications has been reported. Urethropexy has the same aim as colposuspension, but the bladder is repositioned more directly by anchoring the urethra to the prepubic tendon. A success rate of 56 per cent was reported using this procedure, with the majority of the remaining bitches showing improvement. The complication rate was 21 per cent, however the majority of these were mild and resolved spontaneously without specific treatment. Cystourethropy



has been reported, however this method alone only temporarily restored continence in the majority of patients.

More recently, the outcome of combined urethropexy and colposuspension for the management of USMI has been assessed. It was reported that 70 per cent of bitches had complete resolution of clinical signs and that the surgery was not associated with major complications, with

only 10 per cent of bitches having mild transient dysuria postoperatively. If complete continence is not achieved, adding in medical therapy can result in an improvement<sup>12</sup>.

Comparing outcomes of different surgical procedures is difficult, owing to varying study case numbers and different hospital protocols. Therefore, there is currently no consensus on which surgical procedure is most effective – if any. Prospective comparison of these techniques is needed to decide whether there is a difference in clinical outcome<sup>19</sup>.

#### Surgical treatment of male dogs

There are limited reports of surgical outcome in male dogs. Urethropexy, collagen

injections into the bladder neck, prostatopexy and vas deferensopexy have been described with varying successes reported<sup>20</sup>. ■

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# PPD Questions

- What is the most common cause of UI in adult dogs?
  - ureteral ectopia
  - urethral sphincter mechanism incompetence (USMI)
  - bladder neoplasia
  - detrusor instability.
- Which group are most at risk of USMI?
  - entire males
  - entire females
  - neutered males
  - neutered females.
- Which two risk factors that have been identified for UI diagnosis in female dogs were NOT recently identified for male dogs?
  - age and neuter status
  - bodyweight and breed
  - bodyweight and neuter status
  - age and breed.
- Of the medical treatments for USMI in female dogs, oestriol has been reported to have the highest success rate.
  - true
  - false.
- Which surgical procedure involves the compression of the bladder neck against the pubic brim using sutures anchored in the vagina and encircling the prepubic tendon either side of the urethra to improve urinary continence?
  - colposuspension
  - transvaginal tape
  - artificial urethral occlusion
  - urethropexy.

1.B 2.D 3.C 4.False 5.A.

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