

# BACTERIAL INFECTION OF THE LOWER URINARY TRACT

## BASICS

### OVERVIEW

- Result of bacterial colonization of the urinary bladder and/or upper portion of the urethra (the tube from the bladder to the outside, through which urine flows out of the body); the lower urinary tract includes the urinary bladder and the urethra

### SIGNALMENT/DESCRIPTION of ANIMAL

#### Species

- Dogs and cats
- More common in dogs than in cats

#### Mean Age and Range

- All ages affected, but occurrence increases with age because of a greater frequency of other urinary tract problems (such as urinary stones [known as “uroliths”], prostate disease, and tumors) that increase the likelihood of secondary bacterial infection of the urinary tract
- Uncommon in cats 6 years old or younger; common in cats 10 years old or older

#### Predominant Sex

- More common in female than in male dogs
- Occurrence in male and female cats is similar

### SIGNS/OBSERVED CHANGES in the ANIMAL

- None in some patients
- Frequent voiding of small volumes of urine (known as “pollakiuria”)
- Difficulty or painful urination (known as “dysuria”)
- Urgency to urinate (or an apparent loss of ability to control urination during periods of confinement)
- Urinating in places that are not customary (such as in the house)
- Bloody urine (known as “hematuria”) and cloudy or malodorous urine in some patients
- Sudden (acute) infection—bladder or urethra may seem tender on palpation during physical examination
- Palpation of the bladder may stimulate urination
- Long-term (chronic) infection—wall of the bladder or urethra may be thickened or abnormally firm
- Secondary infection—signs related to the underlying problem

### CAUSES

- Most common bacteria that cause lower urinary tract infection—*Escherichia*, *Staphylococcus*, and *Proteus* (more than half of all cases)
- Common bacteria that cause lower urinary tract infection—*Streptococcus*, *Klebsiella*, *Enterobacter*, *Pseudomonas*, and *Corynebacterium*

### RISK FACTORS

- Conditions that cause the urine to remain in the bladder for prolonged time periods (known as “urine stasis”) or incomplete emptying of the bladder
- Conditions that disrupt normal lower urinary tract lining defenses (those properties that protect the lower urinary tract from bacterial colonization)
- Conditions that reduce or bypass anatomic and functional barriers to bacteria moving up the urinary tract (such as loss of muscle tone or length of the urethra)
- Conditions that compromise the antibacterial properties of urine itself (such as changes in urine pH or concentration and low levels of urea and certain organic acids)

## TREATMENT

### HEALTH CARE

- Treat as outpatient, unless another urinary abnormality (such as urinary tract blockage or obstruction) requires inpatient treatment

### ACTIVITY

- Unrestricted
- Regulating urination to coordinate with antibacterial drug treatments may improve therapeutic efficacy

### DIET

- Restrictions not necessary, but may be indicated for other urinary tract diseases (such as kidney failure or urinary tract stones [urolithiasis])

### **SURGERY**

- Except when another urinary tract disorder requires surgical intervention, management of bacterial infection of the lower urinary tract does not involve surgery

## **MEDICATIONS**

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

- Antibiotics—suggested antibiotics include penicillin for *Staphylococcus*, *Streptococcus*, or *Proteus*; trimethoprim-sulfadiazine for *Escherichia coli*; cephalexin for *Klebsiella*; tetracycline for *Pseudomonas*
- Bacterial culture and sensitivity testing provides identification of bacteria present in urine and information about antibiotics to which the bacteria is susceptible; if the infection does not respond as expected to the first antibiotic prescribed, base choice of antibiotics on results of sensitivity test
- Antibacterial drugs usually are most effective when given every 8 hours; however, fluoroquinolones and trimethoprim-sulfa products are effective when given every 12 hours—give antibiotics and any other medications as directed by your pet’s veterinarian
- For sudden (acute), uncomplicated bacterial infection of the lower urinary tract—treat with antimicrobial drugs for 7 to 10 days; long-term (chronic) bacterial infection of the bladder (known as “cystitis”) may need treatment for up to 4 to 6 weeks; duration of treatment for complicated lower urinary tract infection depends on the underlying problem
- Low-dose, bedtime antibacterial therapy can be used to prevent infections in animals that have frequent recurrence of bacterial infections; the drug should be given after the animal has urinated for the last time each evening
- **Other possible antibiotics include enrofloxacin** and nitrofurantoin, as well as ceftiofur, gentamicin, or amikacin, which must be given by injection

## **FOLLOW-UP CARE**

### **PATIENT MONITORING**

- When the beneficial effects of the antibiotic treatment is in doubt, culture the urine 2 to 3 days after starting treatment—if the drug is effective, the bacterial culture will be negative
- Continue treating at least 1 week after resolution of blood in the urine (hematuria); white-blood cells or pus in the urine (known as “pyuria”); and protein in the urine (known as “proteinuria”)—failure of urinalysis findings to return to normal while an episode of urinary tract infection is being treated with an effective antibiotic (that is, as indicated by negative urine culture) generally indicates some other urinary tract abnormality (such as urinary stones [uroliths], tumor)
- Rapid recurrence of signs when treatment is stopped generally indicates either another urinary tract abnormality or that the infection extends into some deep-seated site (such as the prostate or kidney)
- Successful cure of an episode of urinary tract infection is best demonstrated by performing a bacterial culture of the urine 7 to 10 days after completing antibiotics
- Animals being given low-dose bedtime antibiotics for frequent re-infection should have a bacterial culture of the urine performed every 1 to 2 months

### **PREVENTIONS AND AVOIDANCE**

- Avoid indiscriminate use of urinary catheters
- Animals with frequent re-infection can be given bedtime therapy to prevent re-infection

### **POSSIBLE COMPLICATIONS**

- Associated health risks include development of urinary tract stones (urolithiasis) and extension of infection to other portions of the urinary tract (such as the kidneys) or beyond to the blood (known as “septicemia”), to the spine (known as “diskospondylitis”), and to the heart (known as “bacterial endocarditis”)
- Failure to detect or treat effectively may lead to bacterial infection/inflammation of the kidney (known as “pyelonephritis”) or formation of a particular type of urinary tract stone (known as “struvite uroliths”)

### **EXPECTED COURSE AND PROGNOSIS**

- If not treated, expect infection to persist indefinitely
- Prognosis for animals with uncomplicated lower urinary tract infection is good-to-excellent
- Prognosis for animals with complicated infection is determined by the prognosis for the underlying abnormality

## **KEY POINTS**

- Following recommendations for treatment and follow-up evaluations is crucial for optimum results

