Glendale Animal Hospital
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Leptospirosis

Basics

OVERVIEW

- "Leptospirosis" is caused by disease-causing members of the bacterial genus *Leptospira*
- Sudden (acute) and long-term (chronic) diseases of dogs (mainly inflammation of the kidney [known as "nephritis"] and inflammation of the liver [known as "hepatitis"]) and other animals, including cats, although rarely
- Dogs—serovars causing disease vary by geographic region, recent serovars of concern in the United States include *Leptospira grippotyphosa*, *Leptospira autumnalis*, and *Leptospira pomona*; "serovars" are subdivisions of a species that are different from other strains
- Dogs—ideally vaccines should include representative serovars found in the geographic region where the dog lives

SIGNALMENT/DESCRIPTION OF PET

Species

- Dogs
- Rarely cats

Mean Age and Range

- Young dogs—more likely to exhibit severe disease
- Old dogs with adequate protection from vaccinations—seldom exhibit clinical disease, unless exposed to a serovar not in the vaccine

Predominant Sex

- Traditionally, male dogs more commonly affected; disputed by recent reports

SIGNS/OBSERVED CHANGES IN THE PET

- Vary with age and immune status of the pet, environmental factors that affect *Leptospira* survival, and disease-causing nature of the infecting serovar
- May have no clinical signs

Very Sudden (Peracute) Disease to Disease with Signs over a Moderate Amount of Time (Known as "Subacute Disease")

- Fever
- Sore muscles
- Stiffness
- Shivering
- Weakness
- Lack of appetite (known as "anorexia")
- Depression
- Vomiting

- Rapid dehydration
- Diarrhea—with or without blood
- Yellowish discoloration to the gums and other tissues of the body (known as “jaundice” or “icterus”)
- Spontaneous cough
- Difficulty breathing (known as “dyspnea”)
- Increased thirst (known as “polydipsia”) and increased urination (known as “polyuria”) progressing to production of no urine (known as “anuria”)
- Bloody vaginal discharge
- Death—without clinical signs

Very Sudden (Peracute) to Sudden (Acute) Disease

- Rapid breathing (known as “tachypnea”)
- Rapid, irregular pulse
- Poor blood flow in the capillaries (smallest blood vessels; condition known as “poor capillary perfusion”)
- Vomiting blood (known as “hematemesis”)
- Passage of blood in the bowel movement or stool (known as “hematochezia”)
- Black tarry stools, due to the presence of digested blood (known as “melena”)
- Bleeding in the nose and nasal passages (known as “epistaxis” or a “nosebleed”)
- Widespread small, pinpoint areas of bleeding (known as “petechia”); bruises or purplish patches under the skin, due to bleeding (known as “ecchymoses”)
- Reluctance to move, overly sensitive to pain or touch (known as “hyperesthesia”) along the spine, stiff gait
- Inflammation of the moist tissues of the eyes (known as “conjunctivitis”)
- Inflammation of the nose (known as “rhinitis”)
- Blood in the urine (known as “hematuria”)
- Mildly enlarged lymph nodes (known as “lymphadenopathy”)

Long-Term (Chronic) Disease

- May have no apparent illness
- Fever of unknown origin
- Increased thirst (polydipsia) and increased urination (polyuria)—long-term (chronic) kidney failure

CAUSES

- Dogs—*Leptospira canicola*, *Leptospira icterohaemorrhagiae*, *Leptospira pomona*, *Leptospira grippotyphosa*, *Leptospira copenhagenii*, *Leptospira australis*, *Leptospira autumnalis*, *Leptospira ballum*, and *Leptospira bataviae*
- Cats—L*eptospira canicola*, *Leptospira grippotyphosa*, *Leptospira pomona*, and *Leptospira bataviae*

RISK FACTORS

Transmission

- Direct—host-to-host contact via infected urine, postabortion discharge, infected fetus/ discharge, and sexual contact (semen)
- Indirect—exposure (via urine) to a contaminated environment (such as vegetation, soil, food, water, bedding) under conditions in which *Leptospira* can survive
- Disease agent—*Leptospira* serovar, each with its own disease-causing factors, infectious dose, and route of exposure
- Leptospirosis in companion animals often is the result of spillover from disease occurring in wildlife (many different types of mammals) in the area; wildlife may act as “hosts” and maintain the different serovars

Host Factors

- Vaccine—protection is serovar-specific; prevents clinical disease as a result of specific serovar; may not prevent kidney colonization of *Leptospira* and subsequent shedding of the bacteria in the urine; serovars not included in the vaccine may infect and cause disease in vaccinated pet
- Outdoor pets or hunting dogs—exposure of moist tissues of the body (mucous membranes) to water; exposure of abraded or water-softened skin increases risk of infection

Environmental Factors

- Warm and moist environment; wet season (high rainfall areas) of temperate regions; low-lying areas (marshy, muddy, irrigated); warm humid climates of tropical and subtropical regions
- Environmental temperature range—7–10dgC (44.6–50dgF) to 34–36dgC (93–96dgF)
- Water—organism survives better in stagnant than in flowing water; neutral or slightly alkaline pH
- Organism survives 180 days in wet soil and longer in standing water
- Dense animal population—kennels and urban settings; increases chances of urine exposure
- Exposure to rodents and other wildlife

Treatment

HEALTH CARE

- Sudden (acute) severe disease—inpatient; extent of supportive therapy depends on severity of disease; kidney failure requires closely monitored, medically induced increased production of urine (known as “diuresis”)
- Dehydration and shock—intravenous fluids (such as lactated Ringer's solution)
- Severe bleeding—blood transfusion may be needed in association with treatment for the blood-clotting disorder, known as “disseminated intravascular coagulopathy” or DIC
- Production of only small amounts of urine (known as “oliguria”) or no urine (known as “anuria”)—initially rehydrate; then give medications to increase production of urine (known as “diuretics”); peritoneal dialysis (a type of dialysis in which fluids are put into the abdomen and the lining of the abdomen [known as the “peritoneum”] acts as a filter to remove waste products from the blood; after a certain amount of time, the fluids and waste products are removed from the abdomen) may be necessary

ACTIVITY

- Suddenly (acutely) ill pets and pets with the presence of bacteria in their blood (known as “bacteremia”) or generalized disease caused by the spread of bacteria in the blood (known as “septicemia” or “blood poisoning”)—restricted activity; cage rest; monitoring; and warmth

DIET

- Severely ill pets—often have lack of appetite (anorexia); provide nutrition through intravenous feeding for prolonged anorexia

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

- Procaine penicillin G—an antibiotic; administer until kidney function returns to normal
- Dihydrostreptomycin—an antibiotic; administer for 2 weeks to eliminate organism from kidney tissues; try streptomycin if no kidney failure (drug not available everywhere)
- Doxycycline—an antibiotic; administer for 2 weeks; use alone to clear *Leptospira* from the blood and urine
- Ampicillin or amoxicillin—antibiotics; may be used instead of penicillin; administer for 2 weeks
- Erythromycin—an antibiotic

Follow-Up Care

PATIENT MONITORING

- Monitor bloodwork and urinalysis for kidney function and monitor bloodwork for liver function and electrolytes
- Monitor bloodwork (blood urea nitrogen [BUN] and serum creatinine) and urine specific gravity in dogs with kidney failure for indication of prognosis

PREVENTIONS AND AVOIDANCE

- Vaccine (dogs)—whole-cell bacterin vaccines contain the serovars *Leptospira canicola* and *Leptospira icterohaemorrhagiae* (some also now include *Leptospira pomona* and *Leptospira grippotyphosa*); promotes immunity to these serovars and protection from overt clinical disease; serovar specific; does not promote protection against other serovars present in nature; may not prevent colonization of the kidneys of *Leptospira*, resulting in a long-term (chronic) carrier state; a "carrier state" is one in which the animal has no signs of disease, but harbors *Leptospira* and can transmit it to other animals
- Newer subunit vaccine contains the serovars *Leptospira pomona*, *Leptospira icterohaemorrhagiae*, *Leptospira grippotyphosa*, and *Leptospira canicola*; claims are made that the vaccine provides protection from clinical disease and prevents kidney colonization of *Leptospira*
- Vaccines—vaccinate dogs per current label recommendations; bacteria-induced immunity lasts only 6–8 months and is serovar specific (no cross-protection outside of the serogroup); revaccination at least yearly; vaccinate dogs at risk (such as dogs that hunt, show dogs, and dogs with access to water/ponds) every 4–6 months, especially in areas where *Leptospira* is found (known as "endemic areas"); the veterinarian will assess the risk of exposure and will recommend a vaccination protocol for your pet
- Kennels—strict sanitation to avoid contact with infected urine; control rodents; monitor and remove carrier dogs until treated; isolate affected dogs during treatment; "carrier dogs" are infected, but have no signs of disease—they harbor *Leptospira* and can transmit it to other animals
- Activity—limit access to marshy/muddy areas, ponds, low-lying areas with stagnant surface water, heavily irrigated pastures, and access to wildlife

POSSIBLE COMPLICATIONS

- Blood-clotting disorder (disseminated intravascular coagulopathy)
- Liver and/or kidney dysfunction may be permanent
- Inflammation of the iris and other areas in the front part of the eye (known as "uveitis")
- Abortion

EXPECTED COURSE AND PROGNOSIS

- Most infections are subclinical or long-term (chronic); a "subclinical infection" is one in which the animal is infected, but has no signs of disease
- Prognosis guarded for sudden (acute) severe disease

Key Points

- Leptospirosis has zoonotic potential from contaminated urine of affected dogs and their environment; "zoonotic diseases" can be passed from animals to people