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News

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LEPTOSPIROSIS

Leptospirosis continues to be a significant clinical presence in canine medicine since its resurgence this past decade. In addition to an increased number of cases, more diverse clinical presentations are being recognized. Selection of appropriate vaccines and interpretation of serologic results in the presence of vaccinal titers are emerging issues in clinical practice.

Epidemiology

Leptospirosis is caused by a spirochete, a motile spiral-shaped bacteria. Distribution is worldwide. Two species of leptospire are primarily responsible for disease in dogs. *Leptospira interrogans* includes the serovars bratislava, autumnalis, icterohemorrhagiae, pomona, canicola and hardjo. A second species, *Leptospira kirschneri* contains the serovar grippityphosa. Each serovar has a known reservoir host of one or more species. These reservoir hosts may be subclinically infected and shed organisms for months to years.

When other susceptible species, or incidental hosts, become infected with that serovar they become acutely ill. For example, reservoir hosts for *L. kirschneri*, serovar *grippityphosa* are the vole, raccoon, skunk and opossum. When dogs are infected with this serovar as incidental hosts they become ill. Dogs, however, are the reservoir hosts for *L. interrogans*, serovar *canicola* which can cause clinical disease in horses, cows and pigs. Although reservoir hosts may develop illness, disease in incidental hosts is more severe, shedding periods are shorter, and transmission between animals is less likely.

Infection occurs by direct contact with leptospire from infected animals. Infected urine, venereal contact, bite wounds and ingestion of infected tissues are all possible routes of transmission. Indirect spread from contact with contaminated soil and food may also result in infection. The organism may survive for days to months in warm, moist environments.

Seropositive cats have been identified, but little clinical disease has been reported in this species, as cats appear to be relatively resistant to leptospirosis.

Pathogenesis

Once infected animals become bacteremic, leptospire multiply in the kidney, liver, spleen, central nervous system, ocular tissue and genital tract. In dogs, serovars canicola and grippityphosa result in more renal dysfunction, whereas serovars icterohemorrhagiae and pomona produce more hepatic damage. Reservoir hosts may be subclinically infected and shed organisms for months to years after recovery. Dogs with protective titers may have mild, inapparent illness or no clinical signs. In susceptible animals, however, the acute phase of illness may result in acute renal failure. Leptospiral toxins result in hepatic necrosis and subsequent cholestasis and hyperbilirubinemia. Vascular endothelial damage during the bacteremic phase can result in disseminated intravascular coagulation and thrombocytopenia. Although hemolysis is uncommon in dogs, a case of refractory hemolytic anemia with positive leptospire serology responded to treatment for leptospirosis. Cattle infected with *L. interrogans*, serovar *pomona* frequently develop hemoglobinemia and hemoglobinuria from a hemolytic toxin produced by that serovar.

Although dogs appear to make a full recovery with appropriate treatment, chronic disease can be a sequela of acute leptospirosis. Compensated chronic renal failure may follow acute renal failure. Hepatocellular damage and altered hepatic immune response may lead to chronic hepatitis.

Clinical Signs

Dogs with leptospirosis commonly present with fever, anorexia, polydipsia, vomiting and dehydration. Hyperesthesia may result from renal, muscle or meningeal pain. Coagulopathies may lead to epistaxis, petechiae, hematemesis or melena. It is important to recognize that leptospirosis may be subclinical, or that it may present as chronic illness. Thus, leptospirosis should be included in the differential diagnosis in dogs with fever of unknown origin or with renal or hepatic disease of unknown etiology. Two dogs presenting for evaluation of polyuria and polydipsia

LEPTOSPIROSIS (CONT'D.)

without concurrent signs of illness, one four months old and one middle-aged, tested positive for leptospirosis and responded to treatment. Clinical awareness and appropriate test selection led to a resolution of their disease; but these animals could easily have been misdiagnosed as having congenital renal disease or interstitial nephritis.

Diagnosis

Common hematologic changes include neutrophilic leukocytosis and thrombocytopenia. BUN and creatinine may be elevated. Renal failure may occur alone, as with serovar grippotyphosa infections, or concurrently with hepatic disease. Elevations in total bilirubin, serum alkaline phosphatase, ALT and AST may be present. Hyperamylasemia and elevated lipase may occur due to increased release from hepatic and intestinal tissue and decreased renal excretion. Urinalysis frequently reveals cellular casts, proteinuria, bilirubinuria and glucosuria resulting from tubular damage.

Microscopic agglutination testing (MAT) is the standard serologic test for leptospirosis. Cross reactivity between serovars is common, and the serovar with the highest titer is assumed to be the strain causing clinical disease. The screening serum dilution is typically 1:100. Negative serology in the first 7-10 days after infection is common, and repeated serology in 2-3 weeks may be necessary to confirm the diagnosis. An accurate vaccination history is helpful in interpreting titers. Although vaccinal titers can be very high immediately after vaccination, titers tend to fall quickly. Vaccinal titers can be as high as 1:400 in animals evaluated more than twelve weeks after vaccination. Vaccines contain more than one serovar, and titers for all serovars from a vaccine are expected to be comparable in magnitude.

Therapy

Successful therapy is dependent on aggressive supportive care and appropriate antibiotics. Penicillin and its derivatives are the drugs of choice for leptospiremia. Procaine penicillin G can be given at a dose of 40,000 u/kg IM or SQ BID. Adjusting the dose for animals in renal failure can be accomplished by dividing the dose by the serum creatinine concentration. Animals that do not need parenteral antibiotics can be treated with oral amoxicillin. After 14 days or resolution of the azotemia, the patient can be changed to doxycycline (5 mg/kg q 12 hr) to eliminate the carrier state. Recommendations between 2 and 6 weeks have been given for this phase of therapy; and it is likely that at least one month of doxycycline is appropriate.

Supportive care with IV fluids is indicated in many dogs to treat dehydration and promote diuresis. Oliguria and anuria are treated with osmotic diuretics, furosemide, and dopamine after correcting dehydration. Peritoneal dialysis has been necessary in some cases to support the patient until renal function is restored.

Vaccination

Presently, although vaccination is available for four strains of leptospirosis, there is no cross-protection between vaccinal serovars. There are two bivalent vaccines; serovars grippotyphosa and pomona are paired in one, and serovars canicola and icterohemorrhagiae in the second. There is also a quadri-

valent vaccine containing all four available serovars. More information is needed regarding prevalence and incidence of various serovars. At the present time, practitioners need to rely on knowledge of the incidence of the various serovars in their geographic area and the risk factors of each patient. The vaccines presently available are bacterins, which are relatively allergenic for the patient. As always, the risk:benefit ratio must be evaluated for each patient prior to vaccination.

Public Health

Leptospirosis is a zoonosis. Urine from infected animals is infectious, and veterinary personnel should avoid contact with it by using gloves to handle infected animals, and masks and goggles when cleaning contaminated areas to avoid infection with aerosolized bacteria. Recovering animals should not urinate in areas where people frequent. Iodophor disinfectants are effective against bacterial contamination in the environment. One part bleach in 10 parts water can also be used.

Leptospirosis has not been a federally reportable disease since 1995, and the Centers for Disease Control (CDC) has no current published statistics on human incidence. When leptospirosis was federally reportable, 10-25% of human cases had an identified canine source. Please note that some states, including California and Louisiana, list leptospirosis as a reportable disease. The CDC is not aware of an increased incidence in people correlating to the present increase in canine cases, however, they acknowledge that their data may be incomplete (underdiagnosed and underreported). Human infection associated with treatment of infected dogs appears to be rare.

References: Greene CE et al, *Infectious Diseases of the Dog & Cat*, 2nd ed, 1990, pp. 273-281; *Manual of Clinical Microbiology*, 7th ed, ASM Press, 1999, pp. 739-745; Ross LA, Rentko V, *Leptospirosis*, CVT XIII, WB Saunders, 2000, ppg. 308-310.

LAB TIP

BIOHAZARDOUS CONTAINERS

Federal Aviation Administration (FAA) regulations require that all specimens containing formalin and/or other such hazardous material be transported in non-breakable, leakproof containers. All biopsy specimens **MUST** be submitted in containers which comply with these regulations. Biopsy containers can be requested from the Antech Dispatch Office (1-800-755-4725) or Customer Service (1-800-745-4725). Any specimens submitted in non-complaint containers may be subject to delays, as our couriers have been instructed not to accept any biopsy specimens which do not meet FAA shipping guidelines.

Non-Compliant Containers include the following:

- All glass containers
- Plastic containers with non-threaded lids (i.e., plastic snap on lids or Tupperware type sealing lids).
- Plastic bags containing formalin.
- Any leaking specimens.

Safety is one of our highest priorities and we appreciate your cooperation in this matter.