Pacific Tide

An informational newsletter

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About our Author

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Dr. Pressel received her Doctorate in Veterinary Medicine from Colorado State University in 2000. Her internship at Veterinary Care Animal Hospital in Albuquerque followed, and was completed in 2001. She remained in Albuquerque in general practice for one year before pursuing her residency training in internal medicine at Iowa State University which she completed in 2005. She became board certified that same year. She has published several articles and participated in a number of presentations and lecture series. Dr. Pressel's special interests include gastroenterology, oncology, and hematology. She is active in regional and national veterinary societies, as well as a participant, on the local level, in agility, obedience, and therapy dog visitation. She joined PVSES in June 2007, and shares her life with her kitty, Nutmeg, and her Golden Retrievers, Cedar & Safari.

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Leptospirosis—A Case Study

Case study: Faun (9 month old FI Husky mix) presented to me with a 2 week history of PU/PD, hyporexia and recent onset of vomiting. Blood work performed by her local veterinarian 3 days previously was within normal limits aside from a mild elevation in phosphorus (7.7, thought to be age related) and hyposthenuria (1.005) with an inactive sediment and negative urine culture. My physical exam was unremarkable except that Faun was thin and the owner reported that she was much smaller than her littermates. We started with a resting cortisol which was normal (6.2) and ruled out Addison's disease and bile acids which were also near normal with a post of 19 (normal is less than 14.9) making a portal systemic shunt or microvascular dysplasia unlikely. An abdominal ultrasound was scheduled for a few days later. At presentation for ultrasound, the owner noted that the PU/PD had resolved, she continued to be hyporexic with a very picky appetite and had developed halitosis. Physical exam confirmed halitosis but was otherwise within normal limits without evidence of abdominal pain. Wondering if she might have ingested foreign body that was now causing more problems, the ultrasound was performed. This revealed bilateral renomegaly with a hyperechoic texture and peri-renal fluid suggestive of leptospirosis or a toxic insult. The rest of the ultrasound exam was within normal limits. Blood work was repeated and confirmed severe azotemia (BUN 177, Crea 14.6, phosphorus 12) and her leptospirosis PCR was positive on both urine and blood. Faun was treated in our ICU with aggressive IV fluids. On day 3 of therapy, she developed oliguria at which point we started a lasix CRI. Over the next 48 hours, her azotemia continued to improve slowly and she continued to do well. On day 6, she finally became polyuric without the use of lasix and her azotemia began to drop more substantially. At this point, Faun was receiving fluids at a rate of 5x maintenance for over 24 hours. These were then tapered over the last 24 hours before she was discharged.

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Leptospirosis is caused by a spiral bacteria found throughout the environment. This bacterium is divided into at least 10 different serovars which are important to the dog. Cats are generally considered resistant to infection although it can rarely occur. Leptospirosis and the associated serovars are maintained in nature by sub-clinically infected domestic animals and wildlife such as rats, mice, raccoons, opossums and skunks. The disease is spread from these animals to dogs through contaminated water, soil and food. Many of the patients that we have treated at Pacific Veterinary Specialists are dogs with no known direct exposure to wildlife. I assume their exposure has come from the environment with wildlife crossing through back yards on a regular basis even in urban areas. Some clients have a water feature in their yard, as is the case for Faun, or pots with collection systems that retain water. The incubation period can be anywhere from a few days to several weeks, even up to a month. Faun has likely been infected for up to 3 weeks based on when she developed her clinical signs.

Most dogs in our area that have contracted leptospirosis present in acute renal failure with azotemia noted on blood work. The degree of azotemia is variable depending on advancement of disease. In Faun's case, she was likely already infected when she presented last week but her renal values were normal. The degree of azotemia may initially be minimal but become worse in time, especially without aggressive therapy. In other cases, the azotemia is more severe and immediate hospitalization with aggressive therapy should be recommended. The key is to maintain an index of suspicion in these cases and recommend recheck blood work if clinical signs persist or worsen. Some serovars of leptospirosis will cause acute liver

failure but the incidence of these appears to be comparatively low in our area. Most patients treated at Pacific Veterinary Specialists have been in acute renal failure. We treat approximately 10 cases per year and most seem to present during this time of year or later in the winter. However, we have seen cases throughout the year and therefore, almost all cases of acute renal failure are tested by our emergency doctors because leptospirosis is a treatable cause of renal failure.

The diagnosis of leptospirosis uses 2 different methodologies; antibody titers and real PCR. Antibody titers are often negative within the first week of illness and paired titers are recommended when you get negative results and still suspect disease. These samples should be collected 2 weeks apart. A four fold increase in the titer confirms infection although the rise may be blunted by antibiotic therapy. Many of the serovars will cross react and therefore confirming the actual pathogenic serovar can be difficult. Thankfully, successful therapy is not serovar dependent . The use of PCR methodology can also be used to confirm infection. This test looks for actual organisms, either dead or alive, within blood and urine. It is more likely to be positive early in disease and might be more useful in the acute setting. Because it is impossible to know when a dog has been infected, paired blood and urine samples should be submitted for testing. The concentration of bacteria will be higher in the blood during the first 10 days of illness after which time the urine will have higher concentrations. Samples for PCR testing must be collected prior to any antibiotic therapy as even a single dose of ampicillin or doxycycline can eliminate the bacteria from the blood and urine. A recent study published in JAVMA (May, 2013) showed 100% negative results in dogs that had received antibiotics prior to testing.

Treating dogs with leptospirosis can be very rewarding as many of them will survive. However, treatment is intensive and is probably best suited to a 24 hour facility. These patients require aggressive fluid therapy at usually very high rates, regular blood pressure monitoring (hypertension is common), regular blood work to monitor electrolytes as well as response to therapy, gastric protectants, anti-emetics and, of course, antibiotics. Doxycycline is considered the mainstay of therapy to clear both the acute, active form and the chronic, carrier state. However, most patients in the initial phases do not tolerate oral medications and intravenous doxycycline can be a vesicant if vascular leakage occurs. Therefore, intravenous ampicillin is often used until the dog can tolerate oral medications. The initial phase of therapy involves correcting dehydration and promoting diuresis. It is during this phase that many dogs will become anuric or oliguric and require more aggressive treatment such as furosemide, usually as a constant rate infusions (CRI), mannitol and sometimes. The next phase of therapy occurs when the patient becomes polyuric as the dog's kidneys begin to repair themselves. Fluid rates during this phase can be very high, up to 3-5 times maintenance or higher. The final phase of treatment starts when the dog's azotemia resolves or plateaus. At this point, the high rate of fluids must be tapered over 24-48 hours to allow the body time to re-equilibrate. This entire treatment process can take anywhere from a few days to two weeks; the average is 6-8 days for the patients treated at Pacific Veterinary Specialists.

Some patients fail to respond to routine aggressive IV fluid therapy and will remain anuric despite all attempts to convert them back to a polyuric state. These patients can often benefit from hemodialysis which we are lucky to have available for our patients at UC Davis. This level of therapy is very expensive and the client will be expected to leave a substantial deposit ($8000 to $10,000) to start treatment. However, if you have a client that is committed, these patients can often be saved and should be referred as early as possible for best results. I referred one patient after 24 hours of care in our ICU. He developed respiratory compromise secondary to anuric renal failure yet made a full recovery after a few days on a ventilator and over a week receiving hemodialysis. These dogs can fully recover and go on to live healthy lives.

Most patients are discharged with daily SQ fluids which are tapered over several weeks while closely monitoring recurrence of azotemia. All dogs must be treated for 2 weeks with doxycycline to clear the chronic carrier state from the kidneys. This will help prevent spread of the infection to the environment. If the dog

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is still not eating well at the time of discharge, amoxicillin can be used until their appetite improves enough to tolerate doxycycline. Recommendations are that dogs that have contact with the patient also be treated with a 2 week course of doxycycline. To help control the spread of infection, owners should be encouraged to limit urination to areas away from water and areas where other people, especially children, and animals have access.

Leptospirosis is a zoonotic disease which can be a concern for staff. The risk of exposure is significantly decreased after 24 hours of appropriate therapy with either ampicillin or doxycycline but it is recommended that the urine not be handled for an additional 3-5 days. A negative urine PCR indicates a lack of spirochetes in the urine and indicates that special handling may no longer be necessary. It is recommended that staff wear gloves, gowns and eye protection if splashing urine is of concern. Whenever possible, these patients should be housed in ground level cages and not on the floor for improved cleaning. Many of these patients may have a need for indwelling urinary catheters in order to effectively monitor ins and outs. Urinary catheters should be maintained with a closed collection system and the urine collection bag should have a disinfectant added to it prior to disposal. If the patient is being taken outside to urinate, a specific area should be designated for that patient, preferably in the sun (UV light kills leptospirosis), and a 10% bleach solution should be poured over the top of the spot where they urinate. Patient bedding can be laundered using standard practices but staff should be encouraged to use gloves when handling all contaminated laundry. Finally, to help protect cremation staff, bodies should be labeled with "DX leptospirosis" in the unfortunately event that they die during treatment.

In summary, any dog presenting with evidence of acute renal failure in California should (probably) be tested for leptospirosis, regardless of individual risk factors. The potential for exposure is high, even in dogs that never leave their own backyards. Vaccination with a product that carries 4 different serovars is recommended as a means for protection. In the past, there has been an impression among veterinarians that this vaccine has a high rate of allergic reactions. It is now known that the incidence of allergic reactions is not related to just this vaccine. Individual risk factors should be discussed with each client and an informed decision made based on that conversation.

Update January 2, 2014: Faun was discharged from the hospital after 8 days of therapy. She was eating fairly well throughout her stay and never really acted very sick. This is relatively uncommon as most of the cases we treat are very affected by their azotemia. At the time of discharge, she was still azotemic and plateaued with a BUN of 139 and Crea of 5.3. This is also unusual in that in most cases the azotemia will usually be closer to normal when they plateau. Faun's response is likely due to the chronic nature of her illness prior to diagnosis. She has been receiving SQ fluids twice daily at home and is doing well and has gained almost 5 pounds since discharge despite a continued picky appetite. Her lab work remains relatively static with a BUN 109 and Crea 5.4. We also submitted leptospirosis titers from insurance purposes and found that she has very high titers for 3 different serovars due to cross reaction. The interpretation from Michigan State University suggests that she was likely infected by the serovar Bratislava but this will take time to prove. Based on recommendations from MSU, we plan to repeat this test in 2-3 months. At that time, we can expect that the cross reacting serovar titers will have dropped and the infecting titer will remain high.

Our Doctors

Internal Medicine
Kelly Akol, DVM, DACVIM (SAIM)
Merrianne Burtch, DVM, DACVIM(SAIM)
Michelle Pressel, DVM, DACVIM (SAIM)

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Tom LaHue, DVM, DACVS
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Lillian Good, DVM, DACVECC

Cardiology
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Dermatology
Katherine Doerr, DVM, DACVD

Radiology (VRS)
Larry Kerr, DVM, DACVR
Mark Lee, DVM, DACVR

Emergency
Christian Robison, DVM
Kim Delkener, DVM
Mark Saphir, DVM
Jessica Kurek, DVM

Behavior
Jan Brennan, DVM (practice limited to behavior)

About Our Hospitals

Pacific Veterinary Specialists was founded to provide high quality, specialized medical care to companion animal patients. Our practice is dedicated to serving the veterinary community as a partner in total patient care. We offer comprehensive specialized services including endoscopy, Doppler ultrasound, surgery, 24-hour ICU care, and emergency and critical care. Our staff is committed to providing compassionate and thorough medical care that meets the needs of the patient, client, and referring veterinarian. In September 2011 we opened PVSM and offer internal medicine, oncology, dermatology and cardiology Tuesday through Thursday in Monterey. Behavior consultations by appointment are available on Mondays.

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