

Tufts Clinical Case Study: Treatment of Leptospirosis/Acute Renal Failure Drs. Mary Labato and Linda Ross

Hemodialysis has been shown to decrease the morbidity and mortality of dogs with leptospirosis-induced acute renal failure. In the following case, two hemodialysis sessions greatly shortened the patient's hospitalization. The likelihood of the patient surviving with traditional medical management of intravenous fluid therapy and antibiotics was extremely guarded. Hemodialysis served as a bridge to allow her kidneys to recover from the initial insult.

Gabby, a 9-year-old spayed female Labrador retriever mix, was presented to her local veterinarian on December 3, 2002, with a history of anorexia and lethargy of three days' duration. Gabby also seemed to be in pain and had difficulty climbing the stairs. Her temperature was normal, and she had vomited once. Blood work revealed azotemia and hyperphosphatemia (BUN 101 mg/dl, creatinine 9.1 mg/dl, phosphorus 17.7 mg/dl). There were mild to moderate elevations in liver enzymes (SAP 2415 U/l, AST 164 U/l). A CBC revealed a PCV of 44 percent and WBC of 13,600 with 12,784 neutrophils and 254,000 platelets.

Gabby was referred to Tufts University School of Veterinary Medicine for the management of acute renal failure (ARF). Gabby's initial treatment consisted of intravenous fluids, Pepcid, and ampicillin. Additionally, a urinalysis, urine culture, and leptospirosis titers were submitted. The urinalysis revealed isosthenuria, mild glucosuria, and granular casts. The urine culture was negative, and initial leptospirosis titers were negative except for a 1:200 titer to *L. pomona*. The owners lived in an area with wetlands and abundant wildlife. There was no known history of toxin exposure.

By the second day of hospitalization, Gabby was vomiting more frequently, had gained two pounds, and urine production was decreased. Thoracic radiographs revealed a moderate to severe interstitial pattern with a nodular component consistent with uremic pneumonitis. Gabby was started on a continuous rate infusion of metaclopramide and furosemide. Rechecked blood work revealed that the BUN had increased to 176 mg/dl, there was an increase in ALT to 217 U/l, and albumin was slightly decreased. A coagulation profile was performed and revealed a greatly prolonged PTT of 46.3 sec (normal 8.9-16.3 sec) and increased fibrin degradation products (FDPs). Gabby was treated with vitamin K, fresh frozen plasma, and heparin for her coagulopathy and impending DIC.

Due to the rapid deterioration in Gabby's renal function, her owners elected hemodialysis. Gabby underwent two dialysis sessions on December 5 and 6. On December 7, her BUN was 39 mg/dl, creatinine 3.0 mg/dl and phosphorus 7.6 mg/dl. Her liver enzymes remained mildly elevated. Gabby continued to gradually improve and her vomiting resolved; her appetite returned on December 10. When Gabby was discharged on December 11, her BUN was 22 mg/dl and creatinine was 1.9 mg/dl. Phosphorus and albumin had returned to normal levels, although liver enzymes were still mildly elevated. The DIC had resolved. Convalescent leptospirosis titers on December 11 were positive at 1:6400 *L. pomona* and 1:400 *L. bratislava*.

Gabby was discharged on ampicillin, doxycycline, and subcutaneous fluids. There may be residual damage to her kidneys as subsequent rechecks have demonstrated a slight increase in serum creatinine levels. Nonetheless, Gabby continues to feel well.

Hemodialysis is a highly technical procedure that can be a major benefit to certain animal patients. It is approximately eight times more efficient than peritoneal dialysis in removing solutes from the blood, and therefore provides better physiologic support for the patient. In addition, the procedure is usually done by a specially trained (hemodialysis) technician, as compared to peritoneal dialysis, which is usually performed by ICU or emergency room technicians.

Although hemodialysis can be life saving, the morbidity and mortality of animals with acute renal failure is still considerable. People with ARF who are dialyzed still have mortality rates of approximately 50 percent, and there is no reason to expect that animals will be different. Many of the complications and deaths do not occur because of the dialysis itself, but because it is performed on an extremely ill population of patients.

Hemodialysis can be done on both dogs and cats. Cats, however, do less well with the procedure because of technical limitations of hemodialysis machines as well as differences in feline physiology.

Hemodialysis may be indicated for dogs and cats that suffer from one of several problems. The primary indication is oliguric or anuric acute renal failure of any cause. Because of the costs and potential complications of hemodialysis, it is usually not indicated in animals that are polyuric. These animals are best handled with standard IV fluid therapy protocols. However, for animals with documented ARF that remain severely uremic even with fluid therapy, hemodialysis may be an option to support them while giving their kidneys time to repair.

Leptospirosis is a common cause of ARF in certain areas of the U.S., including New England. As with other causes of ARF, hemodialysis can be beneficial in those animals that become oliguric or anuric, or that remain severely uremic despite conventional therapy. In addition, hemodialysis machines can be readily disinfected after use, so the infectious cause of this type of ARF does not pose an obstacle.

The outcome for dogs with ARF treated with hemodialysis was recently reported. Of 124 cases, the overall survival was 41 percent. Only 18 percent of dogs with toxic nephropathy (most from ethylene glycol) survived, while 70 percent of those with infections (76 percent of those with leptospirosis) survived. This data illustrates the importance of determining the etiology of ARF for an accurate prognosis.

If you have a case where hemodialysis maybe indicated, please call the Renal Service at Tufts University School of Veterinary Medicine at 508-839-5395, X-84681.

In addition, Tufts' Foster Hospital for Small Animals is once again offering Extracorporeal Shock Wave Lithotripsy services. If you have patients with renoliths, ureteroliths, or cystic calculi and are interested in treating them with lithotripsy, please contact the Tufts Renal Service at 508-839-5395, X-84681.

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