Ileocolic intestinal intussusception in a dog with leptospirosis

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Introduction

Leptospirosis is a zoonotic infection causing clinical and subclinical disease in dogs, humans, and other mammalian species. Although more than 200 different Leptospira interrogans serovars have been identified (11), the serovars most commonly isolated from dogs with clinical leptospirosis in Southern Germany are L. grippotyphosa and L. saxkoebing (3). However, vaccines currently available in Germany only include the serovars L. canicola and L.icterohaemorrhagiae. They lack the ability to build up a sufficient protective immune response against other serovars, therefore explaining clinical disease in regularly vaccinated dogs (3, 16).

The best known maintenance hosts for leptospira serovars are rodents (17), and an increase in the prevalence of cases seems to be linked to higher average rainfalls (19). This might explain why male outdoor working or herding dogs in rural areas are found to carry an increased risk for infection (19, 20).

Clinical signs associated with canine leptospirosis often include non-specific symptoms such as fever, anorexia, vomiting, and lethargy, and clinical signs of hepatic and renal failure such as icterus, polyuria/polydipsia, and anuria (3, 6, 7, 17). Typical clinical features also seem to depend on the serovars involved in infection (4). Other less common clinical signs include dyspnoea, cough, diarrhoea, abdominal pain, muscle pain, and stiffness (10, 17).

The patient described in this case report presented with acute hepatic icterus and renal failure. In addition to these common clinical signs of canine leptospirosis, the dog developed intestinal intussusception as a rare complication associated with the infection.

Case history

Patient and anamnesis

A 1.5-year-old male castrated German shepherd dog was presented to the emergency service of the Clinic of Small Animal Medicine, Ludwig-Maximilian-University Munich, with a 3-day history of vomiting, anorexia, polydipsia, and lethargy. On the day before presentation the owner had noticed icteric mucous membranes. On the day of presentation the dog had passed bloody diarrhoea once. He was regularly vaccinated and dewormed and lived on a farm with free access to the outdoors. One other dog living in the same household appeared clinically healthy.

Clinical and laboratory examination

On presentation the patient was lethargic and thin with a body condition score of 2/9, and an increase in the prevalence of cases seems to be linked to higher average rainfalls (19). This might explain why male outdoor working or herding dogs in rural areas are found to carry an increased risk for infection (19, 20).

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Clinical and laboratory examination

On presentation the patient was lethargic and thin with a body condition score of 2/9. Physical examination revealed severe dehydration estimated as 8%, icteric mucous membranes, and a body temperature of 38.2 °C. Auscultation showed tachycardia (140/bpm), but normal and regular heart sounds and normal lung sounds. Capillary refill time was 2–3 seconds, and the femoral pulse was regular but weak. The abdomen was very tense and painful on palpation, and the dog defecated fresh blood during the examination.

Laboratory work was performed and the complete blood count revealed mild thrombocytopenia, severe neutrophilia with a left shift, monocytosis, and lymphopenia. Serum chemistry analysis showed increased liver enzyme activities, severe bilirubinemia, severe azotaemia, and moderate hyperglycaemia. Venous blood gas analysis revealed a lactic acidosis, and electrolyte abnormalities consisted of hyponatraemia, hypocalcaemia, hyperphosphataemia, and hypochloraemia. A prolonged prothrombin-time, increased d-dimers, and thrombocytopenia indicated disseminated intravascular coagulation (DIC). Urine analysis showed proteinuria, glucosuria, haematuria, and bilirubinuria.

Treatment

Because the dog showed signs consistent with hypovolemic shock, fluid therapy was initiated with balanced, buffered, isotonic crystalloid solution (Sterofundin®, B. Braun Melsungen AG) and urine output was monitored by an indwelling catheter and a closed collection system. The dog was given a unit of fresh frozen plasma for DIC treatment (8 ml/kg BW), pain medication (buprenorphin,
Temgesic®, Essex Pharma GmbH, 0.01 mg/kg BW q 6 h i. v.), and amoxicillin-clavulanic acid (Augmentin®, GlaxoSmithKline: 20 mg/kg KM q 8 h i. v.). Before antibiotics were administered, urine was collected by catheterization and submitted for a Leptospira spp. PCR.

**Sonographic examination**

Because of the gastrointestinal signs and the painful abdomen abdominal ultrasound was performed. The exam revealed splenomegaly with a homogeneous parenchyma, mild hepatomegaly with slightly generalized hyperechoic parenchyma, a hyperechoic wall of the gall bladder, and kidneys with normal architecture but slightly hyperechoic cortices. In the right cranial abdomen the intestine showed an onion-like appearance with two double walls indicating intestinal intussusception (Fig. 1). Because of the guarded prognosis of intestinal intussusception complicating suspected leptospirosis, the owners elected euthanasia and post-mortem examination was performed.

**Pathological examination**

Main findings at necropsy were diffuse haemorrhage into pleura, mediastium, lung parenchyma, endocardium, and subcutaneous tissue, intussusception of ileum into the colon over a length of 20 cm (Fig. 2), bloody content in small and large intestinal lumen, and a swollen spleen.

Histopathology revealed haemorrhage and spleen and liver, haemorrhagic infarction with oedema and necrosis of the intestinal wall, and detection of a high number of bacteria on the intestinal surface and in the propria at the location of the intussusception. The kidneys showed moderate to severe interstitial infiltration of lymphocytes and plasma cells, and thrombosis with beginning organization in several renal vessels. Because of advanced autolysis at time of necropsy no statement about tubulonecrosis or hepato-cellular dissociation could be made. This may explain the negative result of silver stain (Warthin-Starry) for detection of leptospires, too. In the liver few microthrombi were detected. Additionally, there were no histological changes in the intestine indicating parvovirus infection or parasitosis.

After the urine PCR returned positive for *Leptospira* spp., the second dog in the household was treated with doxycycline for 3 weeks because infection of this dog could not be excluded although the animal continued to appear clinically healthy.

**Discussion**

Intestinal intussusception represents a rare clinical complication of leptospirosis in an adult dog. It is mainly mentioned as a potential problem in puppies with this infection (7, 17), until recently Schweighauser et al. (15) published a case series of five dogs developing intestinal intussusception as a consequence of leptospira serovar “australis” induced acute renal failure. Although gastrointestinal signs such as vomiting, diarrhoea, and abdominal pain have been described before in dogs with leptospirosis (3, 5, 12), intussusception is an uncommon clinical complication of this infection. Intestinal intussusception in dogs is a problem often associated with acute gastroenteritis in mostly young dogs. Median age of 29 dogs diagnosed with intestinal intussusception was 4.6 months (13). Ileocolic and jejunojejunal intussusceptions were the most common locations identified in retrospective studies (9, 14), and infectious agents, most of all canine parvovirus, were found to be the primary predisposing factors for this condition (14). Although the aetiology of intestinal intussusception remains unclear in many cases, it is suspected that local changes in intestinal wall homogeneity, a change in the intestinal diameter, or a mechanical abnormality in combination with intestinal inflammation may influence local motility and finally lead to intussusception (14).

The patient described in this case report certainly belonged to a high risk group more likely to develop leptospirosis, since several typical environmental characteristics applied to this case. As a
young male outdoor herding dog living in a rural environment, he had free access to potentially infectious rodents, farm animals, or contaminated water sources (14, 19, 20).

Many clinical signs and laboratory abnormalities detected in this case were typical changes frequently seen with leptospirosis, therefore already raising the suspicion for this disease at the time of presentation. Severe azotaemia and increase in serum activity of liver enzymes and bilirubin concentrations are frequently seen in dogs with leptospirosis-induced hepatic icterus and acute renal failure (3, 10). Furthermore thrombocytopenia and elevated d-dimers were detected in this case indicating severe DIC. Vasculitis can probably also explain panhypoproteinaemia in this case. Since different virulence factors and toxins are expressed during a leptospirosis infection (8), vascular destruction, oedema, haemorrhagic diathesis, and disseminated intravascular coagulopathy can occur (10). As an additional diagnostic feature, the increase in echogenicity of the renal cortex detected in this case has previously been described in dogs with leptospirosis-induced acute renal failure, although it does not represent a specific finding for the infection (2).

However, diagnostic testing is needed to confirm the diagnosis. In this case, diagnosis of leptospirosis was established by PCR analysis of a urine sample, indicating that the dog was shedding the organism because of renal infection. The urine sample was handled with particular care and protection measures due to the zoonotic potential of the disease. Unfortunately, typical tubulonecrosis, hepatocellular dissociation and presence of leptospiroses within tissues could not be confirmed histologically due to advanced autolysis at time of necropsy. PCR testing is reported to have good sensitivity and specificity and often the organism can be found before a serum antibody response is detectable (1, 6). It would have been interesting to additionally obtain information about the serovar causing infection in this case, because different serovars are know to have certain organ predilection influencing clinical signs and outcome (3, 4, 10), and L. australis infection has been reported before to induce intestinal intussusception (15). Unfortunately due to a laboratory error antibody detection could not be performed.

Conflict of interest
The authors confirm that they do not have any conflict of interest.

Conclusion for practice
Intestinal intussusception represents an uncommon presentation of canine leptospirosis and clinicians should be aware of this potential complication. Therefore it should be recommended to perform a thorough ultrasonographic examination of the abdomen in dogs suspected of leptospirosis infection, if vomiting and abdominal pain are observed as potential indicators of intestinal intussusception.

References