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Gastric Dilatation and Volvulus in a Red Panda (*Ailurus fulgens*)

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Abstract

A 12-year-old male red panda (*Ailurus fulgens*) was evaluated for acute onset inappetence, staggering, collapse, and tachypnea. Gastric dilatation and volvulus (GDV) was diagnosed by radiography, abdominal ultrasonography, and exploratory celiotomy. Torsion of the stomach was corrected and an incisional gastropexy performed to prevent recurrence. No organs were devitalized, no other abnormalities detected, and the red panda recovered fully within 72 hours.

Introduction

Gastric dilatation and volvulus (GDV) in red pandas (*Ailurus fulgens*) is apparently uncommon. The 2000-2001 red panda studbook, describes a 6-year-old female that died acutely of complications related to gastric torsion and heartworm infection.¹ The Potter Park Zoo (Lansing, MI) website reports a 10-year old male panda that died during surgical treatment for GDV.²

We report our experience with successful surgical management of a 12 year old male red panda with GDV.

Clinical Report

A 12 year old, 7.6 kg, intact male red panda was admitted with an acute, 24 hour history of inappetence and tachypnea. Two hours before admission, the panda had collapsed and was unconscious for 20 minutes, then on regaining consciousness, had signs of polydipsia. The panda was kept in an indoor/ outdoor exhibit with a female red panda. A commercial high fiber pellet supplemented with a mix of sweet potatoes, bananas, and blueberries fed was fed twice daily. No other medical problems had been recorded.

The panda appeared depressed, but was able to walk out of his kennel. After sedation (oxymorphone, 0.13 mg/kg; ketamine, 13 mg/kg; and midazolam, 0.6 mg/kg intramuscularly

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[IM]) an intravenous [IV] catheter was placed. Fluid therapy (balanced crystalloid solution and hetastarch) was administered to correct hypovolemia. Anesthesia was induced with propofol (0.6 mg/kg IV) and maintained with isoflurane in oxygen.

On physical examination while anesthetized, rectal temperature was low (36.1°C, reference value³: 38 ± 0.78°C), gingival mucus membranes were pale pink, with a capillary refill time of > 2 seconds. A large fluid-filled mass was palpated in the distended abdomen. There were no other abnormal findings on physical examination.

Hypoalbuminemia (2.0 g/dL, reference interval⁴: 3.2 ± 0.4 g/dL), azotemia (60 mg/dL, reference interval³: 27 ± 10 g/dL), and hypokalemia (2.8 mmol/L, reference interval³: 4.1 ± 0.6 mmol/L) were identified on serum biochemical profile. There was neutrophilic leukocytosis (17.52 × 10³/μL; reference interval³: 7.6 ± 3.2 × 10³/μL).

No thoracic abnormalities were identified; however, a large soft-tissue mass occupying the peritoneal space and causing deviation of most organs (Fig. 1) was identified on abdominal radiographs. On abdominal ultrasonography, there was a large thin-walled ~19 × 14 cm mass extending from the caudal margins of the liver to the cranial aspect of the bladder. The mass was filled with a mixture of anechoic fluid and thin echogenic strands of material. It was displacing the liver cranially and the spleen caudally and to the right. Based on imaging findings, an abnormally enlarged gastrointestinal organ or a large fluid-filled abdominal mass was suspected.

Before exploratory celiotomy, within 2 hours of admission, additional oxymorphone (0.13 mg/kg IV) was administered for analgesia and cefazolin (22 mg/kg IV). Upon entering the abdominal cavity, the large fluid-filled mass was identified as the stomach, with the greater omentum draped over the fundus. The stomach was torsed 180° and the spleen was on the right side of the abdomen, consistent with GDV. The stomach was rotated to correct the torsion and decompressed through an orogastric tube. There was no evidence of vascular compromise or necrosis of the stomach or spleen, and no other abnormal findings in the abdominal cavity. Right-sided incisional gastropexy was performed using 2-0 polypropylene suture in a simple continuous pattern, suturing the incised gastric serosa to the incised transversus abdominis muscle in 2 lines. The abdomen was closed layers. Hypotension during anesthesia was managed by IV fluids, hetastarch, and a continuous rate infusion of dobutamine (2.4 mg; 0.15 mg/kg/h IV).

Recovery from anesthesia was uneventful; a balanced crystalloid solution (240 mL subcutaneously) was administered during anesthetic recovery. The panda was ambulating within 2 hours of recovery and eating within 4 hours. Famotidine (0.5 mg/kg, subcutaneously every 12 hours) was administered to neutralize gastric pH and buprenorphine (40 μg/kg, subcutaneously every 8 hours) for analgesia. The next day, the panda continued to eat, had normal defecation, was ambulating normally, and was discharged. Buprenorphine and famotidine were administered for another 24 hours and was then discontinued because the keeper thought the buprenorphine diminished the panda's appetite and activity. Within 72 hours, the red panda's appetite returned to normal. Activity

was restricted for 10-14 days and 14 months later, no complications or other health problems had occurred.

Discussion

Risk factors for GDV in dogs are incompletely understood⁵ but include low body condition score, feeding one meal daily, rapid food prehension, and a fearful temperament.⁵ Stress is the only factor shown to precipitate an acute episode of GDV.⁵ Dry foods containing oil or fat (e.g., sunflower oil, animal fat) as one of the main ingredients are also associated with a significant 2.4-fold increased risk of GDV.⁶ No sudden changes in the red panda's diet or environment preceded the development of GDV. GDV is most commonly reported in older (>7 years old) large and giant breed dogs,⁷ with male dogs considered to be at greater risk, though both sexes are susceptible.⁵ Interestingly, this panda and the other 2 cases we identified were 6-12 years old, possibly indicating a similar age predisposition in pandas.

The typical clinical presentation for GDV in dogs is abdominal distention and pain, loss of appetite, ptyalism, retching or vomiting, and acute collapse.⁷ The red panda's clinical signs of acute collapse and abdominal distension were consistent with a diagnosis of GDV; however, abdominal distension was not appreciated until the panda was anesthetized. Both dogs and red pandas have a single stomach and simple digestive tract.^{8,4} Diagnosis of GDV in dogs is based on the appearance of a "double bubble" on abdominal radiographs with the dog in right lateral recumbency. The gas-filled pylorus is located dorsal and slightly cranial to the gas-filled gastric fundus. A compartmentalization line between the pylorus and fundus that represents folding of the pyloric antral wall onto the fundic wall is frequently observed.⁹ In the right lateral abdominal radiograph of this panda, the stomach appeared as a large circular soft tissue structure with gas, presumptively in the pylorus, superimposed dorsally. These findings are consistent with a diagnosis of GDV.

There have been several studies evaluating risk factors associated with mortality in dogs treated for GDV. The factor most consistently associated with an increased mortality is increased time from onset of clinical signs to admission for treatment^{10,11}, highlighting the importance of a rapid diagnosis and surgical correction. Other reported risk factors for death include increased rectal temperature, presence of acute renal failure, gastric wall necrosis, combined splenectomy and partial gastrectomy, hypotension at any time during hospitalization, peritonitis, sepsis, presence of cardiac arrhythmias, elevated plasma lactate levels, and disseminated intravascular coagulation.^{10,11}

Common causes of morbidity in captive red pandas include dental disease, hypothyroidism, hepatic and renal disease, cardiac disease, and canine distemper virus infections.¹² This report of GDV and 2 other cases, we identified in red panda, heighten awareness that GDV should be considered as a possible underlying cause in acutely-ill red pandas, presenting with any of the following signs: anorexia, increased respiratory effort, ataxia, abdominal distension, or collapse. Abdominal radiographs are recommended to confirm the diagnosis followed by corrective surgery for the best possible prognosis.

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Figure 1.

Abdominal radiographs. A) right lateral projection showing a large soft tissue mass displacing the liver cranially; the intestines dorsally, caudally, and to the left. Also note that superimposed with the dorsocaudal aspect of the mass is a circular accumulation of gas, presumptively located within the pylorus. B) ventrodorsal projection showing a large circular soft tissue mass displacing the liver cranially and the intestines caudally and to the left.