Case Report Rapport de cas

Postsurgical segmental mesenteric ischemic thrombosis in a horse

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Abstract — A 16-year-old, Lusitanian stallion was admitted to the Veterinary Teaching Hospital with a 12-hour history of signs of abdominal pain. Exploratory celiotomy was performed due to an inguinal hernia, and a second celiotomy was performed in response to the abdominal pain. The horse was euthanized and mesenteric venous thrombosis was diagnosed and considered likely due to peritonitis and systemic inflammatory response syndrome (SIRS).

Résumé — Thrombose ischémique mésentérique segmentaire post-chirurgicale chez un cheval. Un étalon Lusitanien âgé de 16 ans a été admis à l'hôpital d'enseignement vétérinaire avec une anamnèse de 12 heures de douleurs abdominales. Une coeliotomie exploratoire a été réalisée en raison d'une hernie inguinale et une deuxième coeliotomie a été réalisée en réponse à la douleur abdominale. Le cheval a été euthanasié et une thrombose de la veine mésentérique a été diagnostiquée et considérée probablement attribuable à une péritonite et au syndrome de la réaction inflammatoire systémique (SRIS).

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Case description

A 16-year-old, Lusitanian stallion was admitted to the Veterinary Teaching Hospital of the University of Extremadura with a 12-hour history of signs of abdominal pain. Initial findings on physical examination included enlargement of the left testicle, heart rate of 58 beats/min (bpm), respiratory rate of 20 breaths/min, temperature 36.9°C, and abdominal sounds decreased on both sides. Transabdominal ultrasonography identified distended loops of small intestine in the lower caudal portion of the abdomen and in the left inguinal ring.

Results of laboratory tests indicated that the horse had mild serum hyperlactacidemia (2.1 mmol/L, reference value: < 2 mmol/L), hyperbilirubinemia [78.5 μmol/L; reference interval (RI): 8.6 to 35.9 μmol/L], and hyperfibrinogenemia (24.8 μmol/L; RI: 5.9 to 11.8 μmol/L). Analysis of peritoneal fluid revealed hyperlactacidemia of 3.1 mmol/L (reference value: < 2 mmol/L) as the only abnormality detected.

Exploratory celiotomy revealed a strangulated nonreducible inguinal hernia. The hernia was corrected through an inguinal incision over the external inguinal ring. A ventral midline celiotomy was performed to allow intra-abdominal traction on the bowel. The segment affected was the distal part of the jejunum, about 20 cm cranial to the ileum. A routine castration of the left testicle was done. The appearance of the bowel didn't improve after correction of the strangulation and decompressing distended small intestine by massaging fluid out of it; therefore, jejunojejunostomy was performed after resection of approximately 73 cm of jejunum. A sterile Penrose drain was applied 20 cm proximal to the anastomosis site. The end-to-end anastomosis was closed by a two-layer continuous pattern with polyglycolic acid Safil™ 3-0 (Braun Aesculap, Barcelona, Spain) for the submucosa and mucosa, followed by a Cushing pattern in the seromuscular layer. The vessels were sealed by the LigaSure™ (Valleylab, Tyco International Healthcare, Boulder, Colorado, USA) vessel sealing system. Before closing the abdominal incision, the small intestine was decompressed by massaging its contents into the cecum. After the surgery the entire intestine was normal in color, had peristalsis, and was not distended. The linea alba was closed with polyglycolic acid, Safil™ 5 suture material (Braun Aesculap) in a continuous pattern. Subcutaneous tissue was closed with polyglycolic acid Safil® 2/0 (Braun Aesculap) in a continuous pattern and the skin was closed with staples.

Treatment consisted of Lactated Ringer's solution administered IV with calcium and potassium chloride at a maintenance rate, flunixin meglumine (FINADYNE; Shering Plough SA, Madrid, Spain), 0.5 mg/kg body weight (BW), q12h, polymixin B (Polimixina, Oristá, Barcelona, Spain), 5000 IU/kg BW, q12h, lidocaine (Lidocaína Braun, B. Braun Medical SA, Rubí, Spain), 0.05 mg/kg BW per minute, benzyl penicillin sodium (Penilevel; ERN, Barcelona, Spain), 22 000 IU/kg BW, q6h, gentamicin (Ganadexil; INVESA, Esplugues de Llobregat, Spain), 6.6 mg/kg BW, q24h, erythromycin (Pantomicina;

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Figure 1. The second surgery revealed distension of the small intestine, necrotic bowels, and a clear line between healthy and injured intestine.

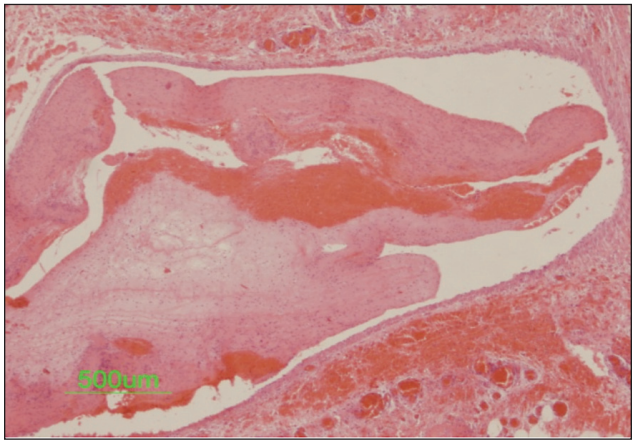

Figure 3. Microscopic appearance of a large clot in the mesenteric vein. Hematoxylin and eosin stain

CEVA Salud Animal, Barcelona, Spain), 2.2 mg/kg BW, q6h, and omeprazole (GASTROGARD; Mérial, Lugo, Spain), 4 mg/kg BW, q24h. The stallion recovered from surgery without reflux and pain but subsequently signs of pain developed and the stallion began refluxing gastric contents 3 d after surgery. At this time, the heart rate was 80 bpm, the respiratory rate 28 breaths/min, and abdominal sounds decreased on both sides. The mucous membranes were congested (dark red).

Hematologic analyses revealed a peripheral white blood cell (WBC) count of $3.5 \times 10^3/\mu L$, (RI: 6 to $12 \times 10^3/\mu L$), hematocrit of 48.4% (RI: 32% to 48%) and total protein of 40 g/L (reference range: 53 to 73 g/L). Serum biochemical abnormalities included high fibrinogen concentration (25.0 μmol/L), slightly high creatinine concentration (176.8 μmol/L; RI: 44.2 to 150.3 μmol/L), high total bilirubin concentration (211.0 μmol/L), slightly high lactate concentration (2.4 mmol/L) and low potassium concentration (2.3 mEq/L; RI: 3 to 5 mEq/L). Abdominocentesis yielded peritoneal fluid with a total protein concentration of 40 g/L (reference value: < 25 g/L), WBC count of 27 600/mm^3 (RI: 500 to 5000/mm^3), lactate concentration of 7.6 mmol/L (reference value: < 2.5 mmol/L), and glucose concentration 0.89 mmol/L (RI: 4.2 to 7.1 mmol/L).

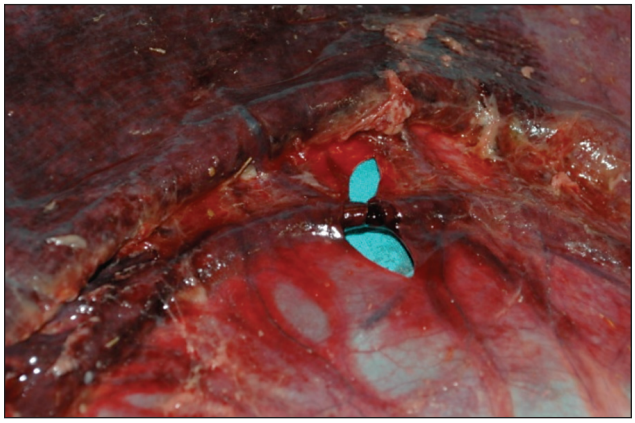

Figure 2. Macroscopic appearance of a large clot inside the mesenteric vein.

After the results of the tests had been examined, and because of persistent signs of abdominal pain, an exploratory celiotomy was performed (3 days after the first one), which revealed several thrombi in the mesenteric veins. The small intestine had several infarcts and extensive lesions (Figure 1). There were 3 separate affected segments each longer than 1 m. The anastomosis site was not affected and was separated by about 5 m from the first affected segment. It was suspected, however, that there might have been a leak at the anastomosis site, which caused the peritonitis. Severe peritonitis and intestinal ischemia were confirmed at surgery. Due to the seriousness of the lesions the horse was euthanized and samples were submitted for histopathological studies (Figures 2 and 3).

Discussion

Mesenteric venous thrombosis (also known as visceral venous thrombosis) is a rare but lethal form of mesenteric ischemia in humans (1). Warren and Eberhard (2) reported that intestinal infarction resulted from ischemia due to venous thrombosis, and they reported a mortality rate of 34% in human patients with venous thrombosis after resection. The concept of Virchow's triad explains the disease as a secondary complication after endothelial lesions, flow alterations, or hypercoagulation states. Mesenteric ischemia (MI) can be classified as acute (AMI) or chronic (CMI) depending on the progression of clinical signs (3). As well, there are classifications according to the origin (arterial or venous) and physiopathology (obstructive or not obstructive) (4). Traditionally, AMI was associated with low output cardiac flow, decreases in blood flow, and/or hypovolemic shock (5).

The risk of acute mesenteric venous thrombosis increases in human patients with hypercoagulable states (e.g., polycythemia vera, protein C and S deficiencies) (6–8), visceral infection (9), portal hypertension (10), perforated viscus (11), blunt abdominal trauma (12), malignancy (13), and previous abdominal surgery (open or laparoscopic) (14,15). High mortality (20% to 50% in humans) might be due to late diagnosis and presence of factors such as disseminated intravascular coagulation (DIC) or systemic inflammatory response syndrome (SIRS) (16). Horses usually develop thrombosis secondary to migration of

larvae of *Strongylus vulgaris* (17,18) and rarely thrombosis may be a cause of rectal perforation (19). Parker et al (20) reported 2 cases of infarction of segments of intestine other than at the site of obstruction of the primary celiotomy in a retrospective evaluation of repeat celiotomies in 53 horses, but they didn't specify whether it was as a consequence of venous or arterial thrombosis. Other authors described vascular injury associated with strangulating obstructions of the equine large colon such as thrombosis of the mesenteric colic vessels (21). Intestinal infarction has been associated with mesenteric vascular thrombotic disease in horses, but it was the consequence of cranial mesenteric artery thrombosis (22). No parasites were observed in this horse and the possible causes of AMI were peritonitis and SIRS.

We recommend that postsurgical segmental mesenteric ischemic thrombosis be included in the differential diagnoses of abdominal pain after surgery. Horses with small intestine diseases or peritonitis might be susceptible to developing secondary thrombosis. CVJ

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