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Case Report

Hemoperitoneum secondary to cecocolic dilation in a pregnant mare

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ABSTRACT

Hemoperitoneum is known as the abnormal accumulation of blood within the abdominal cavity, most commonly caused by gastrointestinal bleeding, abdominal abscesses, liver tumors, migration of parasitic larvae (*Strongylus vulgaris*), direct trauma and blood clotting disorders. Lethargy, anorexia, weakness, muscle twitching, sweating, hyperthermia, tachycardia, tachypnea, and the accumulation of free fluid in the abdomen were the most commonly recorded signs. In this report, a pregnant mare was diagnosed with hemoperitoneum secondary to cecocolic dilatation, due to corn ingestion. The protocol for clinical treatment and tests varies in similar reported cases. Due to this, the present report discusses the outcome of a clinical case and suggests a medical protocol -based on evidence – for treatment in a pregnant mare. The treatment was aimed to stop the bleeding, while normalize or maintain a stable blood pressure and provide supportive therapy. The mare presented colic pains due to fermentation of the corn, which were solved in few hours. The final abdominal ultrasonogram showed intra-abdominal hypoechoic fluid and living fetus.

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1. Introduction

Hemoperitoneum is the abnormal accumulation of blood within the abdominal cavity. As Conwell et al. [1] define, causes of hemoperitoneum may include gastrointestinal bleeding, abdominal abscesses, liver tumors, migration of parasitic larvae (*Strongylus vulgaris*), direct trauma and coagulation disorders.

Mogg et al. [2] reported a case of postpartum hemoperitoneum in a mare and Tweedie et al. found hematoperitoneum in two mares with granulosa tumors [3]. Tweedie et al. [3] explained that a careful examination of the patient is required besides specialized diagnostic techniques, an even then it is not always possible to establish the etiology.

A rupture of the uterine artery near or after delivery could cause hemoperitoneum in pregnant mares. Bleeding of the reproductive

tract in pregnant mares has a morbidity rate of 3% and represents a 40% mortality rate. The bleeding tends to occur during the first 48 h after birth, and other structures may also be affected such as the internal iliac artery and terminal aorta [3,4].

Some of the clinical signs the patient may present are lethargy, anorexia, weakness, muscle twitching, sweating, hyperthermia, tachycardia, tachypnea, and accumulation of free fluid in the abdomen. The main visible symptom is moderate abdominal pain in 78% of the cases, and only 7% have severe abdominal pain. Diagnostic tests include; abdominocentesis, exploratory laparotomy, abdominal fluid cytology, abdominal ultrasound and transrectal palpation [1,4].

Knowledge of the pathophysiology and physiological response to the hemorrhage is important to distinguish the clinical signs that characterize other pathologies (acute abdomen). A detailed and effective diagnosis plan is vital to identify the hemoperitoneum and avoid irreversible damage or death.

The protocol for clinical management and diagnostic tests vary in reported cases. Due to this, the present report discusses the handling of hemoperitoneum through a clinical case and suggests a medical protocol-based on evidence – for treatment in horses. In this study, the Problem-Oriented Medical Record (POMR) approach was applied to the clinical protocol.

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2. Case presentation

2.1. Animal description

On October 14th, 2014, an 8-year-old Appaloosa breed equestrian patient was admitted to the Veterinary Hospital of Large Species of the Autonomous University of the State of Mexico, (UAEM), with a zootechnical function to walk, with an approximate gestation period of 5 months and weighing 442 kg.

2.2. Case history

The owner reported that the mare escaped from the barn and ate excessive amounts of corn. Approximately at 4:00 pm, the horse began to show signs of severe abdominal pain (colic). At the place of origin, a dosage of 500 mL of vegetable oil given orally (PO), beer PO (traditional and empirical treatment) and 20 mL of intravenous Dipyrone were administered to the animal, but the patient continued with severe pain. The owner then decided to contact the UAEM Veterinary Hospital of large species.

2.3. Physical and laboratory examinations

Upon hospital admission, the mare showed intense pain, making it difficult to handle. It wallowed and banged itself against the trap gate and ground. The animal was uncontrolled, a sedative was administered to facilitate the physical examination.

Heart rate was 58 BPM, which is 18 beats above the normal physiological range (20–40 beats per min) indicating tachycardia. Respiratory rate was 38 BPM, also 18 breaths above the normal physiological range (12–20 bpm) confirming tachypnea. Mucous membrane was congested. Capillary refill time was >2 sec. Rectal temperature was 38.6 °C, slightly above normal ranges of 37.5–38.5 °C for adult horses.

A decrease in the sounds from the left and right quadrants was found, suggesting the presence of paralytic ileus. Abdominal distension was observed, waist circumference was shown at 1.92 m. The mare had sweating and the vulva showed a hematoma and reddish mucous secretion.

A blood test was done for a hematocrit measurement (htt), resulting in 0.30 l/l, below the averaged range (0.32–0.52 l/l). Total plasma protein of 6.4 g/dL (6–8 g/dL) was found within normal physiological range.

The physical examination was concluded and the patient still showed severe pain with a poor response to an alpha-2 adrenergic agonist.

2.4. List of problems

1. Abdominal distension
2. Abdominal pain
3. Bulbar abnormal discharge
4. Congested mucous membrane
5. Hyperthermia
6. Tachycardia
7. Tachypnea
8. Decreased bowel sounds
9. Vulva hematoma with bloody mucus
10. Ingestion of vegetable oil
11. Poor response to adrenergic alpha2 agonist
12. Sweating

2.5. Main list

- I. Abdominal distension (1, 2, 4, 6, 7, 8, 10, 11, 12)
- II. Abdominal pain (3, 6, 7, 9, 11)

2.6. Differential diagnosis

1. Greater colon impaction, 2. Large colon torsion 3. Uterine torsion
4. Hemoperitoneum, 5. Strangulation of the small intestine

2.7. Diagnosis planning

Upon hospital admission, the patient's physiological signs were out of range. Xylazine HCl was administered IV (1.1 mg/kg), being a sedative of choice for its alpha2 agonists properties, analgesia and muscle relaxation. The full dosage was administered every 5 min during five consecutive times with no response (sedation).

Later on, a dose of 40 µg/kg of Detomidine was intravenously administered. Since this drug is a strong sedative and pain killer, it allowed us to perform the physical examination, testing and treatments, which included a rectal palpation, catheter placement, nasogastric tube, cecocentesis, paracentesis and ultrasound examination. While performing the nasogastric tube, large amounts of corn were obtained, confirming the consumption of such grain. A second rectal palpation was performed in which no obvious pathological changes were detected.

The ultrasound examination was performed using a Digital ultrasonic diagnostic imaging system, model DP 22000 for veterinary use 100–240, 50/60 Hz, 3.5 MHz transducer, semi-convex. Ultrasonography revealed severe distention and thickening of the small (Fig. 1), and large intestines.

2.8. Final diagnosis

Cecocolic dilation.

2.9. Treatment planning

Butorphanol 0.03 mg/kg was given IV as analgesic (Tourbo-gesic®, Zoetis, Es), and a nasogastric emollient of Dioctyl sulfosuccinate sodium (DSS) was administered at a 5% dose of 10–20 mg/kg in 6 L of water (Seguril®, Sanofi, Es). This was administered once to the gastric easily decompose and remove the gastric content via tube.

In regards to the abdominal distention, a cecocentesis was performed in the right side area between the last rib and the tuber coxae to release the cecal gases. The area was previously shaved and aseptically prepared for a local blockage of 2% lidocaine solution (Xilocaína® Astra Chem, Mx, 5 mL) and deepened with a 16G catheter. Crystalloid fluid therapy 2 L/h was started, in a total of



Fig. 1. Ultrasonogram showing severe distention and thickening of the small bowel. Image taken from ventral left flank.

25 L of Harman solution (Solucion ht Pisa®, Pisa Lab, MX), which provides an ionic concentration of mEq/L, sodium 131, potassium 5, calcium 4, chloride 111, lactate 29.

Afterwards, the mare was walked.
Additionally:

1. A medical examination was performed every 2 h
2. Hartman solution 2 L/h with Ca (20 mL/L) and KCl (1 mL/L) was given intravenously
3. Ranitidine (1.5 mg/kg) IV every 8 h (Ranitid®, Brovel lab, Mx)
4. Flunixin meglumine (1.1 mg/kg) every 6 h intravenously (Meglumine®, Tornel lab, Mx)
5. Gentamicin (6.6 mg/kg) every 24 h intramuscularly (Gentamicina-100®, Wittney, Mx)
6. Hematocrit measurement and total plasmatic protein every 8 h
7. Three liters of vegetable oil every 24 h were given orally (in 2 occasions)
8. Water administered by nasogastric tube

2.10. Evolution of the case

Tachycardia, pale mucous membranes, capillary refill 2 sec, and mild pain were present during the first day of treatment. The patient defecated semi-formed feces with a quiet, alert and receptive attitude. We performed an ultrasound examination, observing free fluid with echogenic characteristics, suggesting free blood with turbulence that confirmed active hemoperitoneum.

In response to this, 27 mL of formalin was administered intravenously in 1L of saline solution as support to stop bleeding. The mare subsequently presented tachycardia and a capillary refill time of 3 sec. These were the only two physiological signs presented outside normal range. Hematocrit and total plasma protein measurements were performed (Fig. 2).

The first hematocrit result was 0.30 l/l beneath normal physiological values (0.32–0.52). Subsequent monitoring of this result led to a gradual decreased hematocrit measurement, as shown by the following readings: 0.25 l/l, 0.21 l/l, 0.28 l/l, 0.18 l/l and 0.16 l/l, during 17:00 h.

A simultaneous PPT reading recorded a minimum of 3.8 g/dL (hypoproteinemia), corresponding to hypovolemia and acute blood loss. This data suggested acute bleeding.

During the first 12 h, tachycardia (68 bpm) and normal respiratory rate (16 bpm) were registered. In the following 24 h., the tachycardia decreased (50 bpm) and a normal respiratory rate of 14 bpm was present (Fig. 3). As for the early hours of the third day, a 46 bpm heart rate was recorded and a 15 bpm respiratory rate was seen.

Ultrasound images showed, a secondary colic pathology (Figs. 4–6).

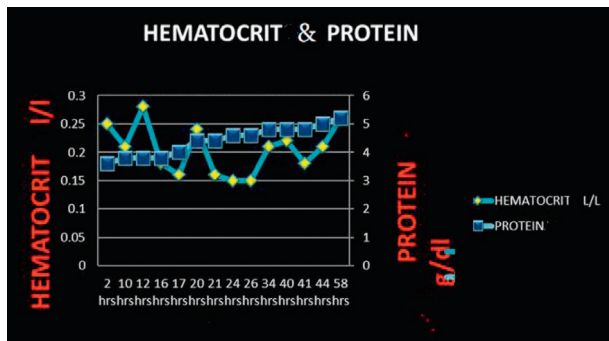


Fig. 2. Results of the hematocrit and total plasma protein measurements.

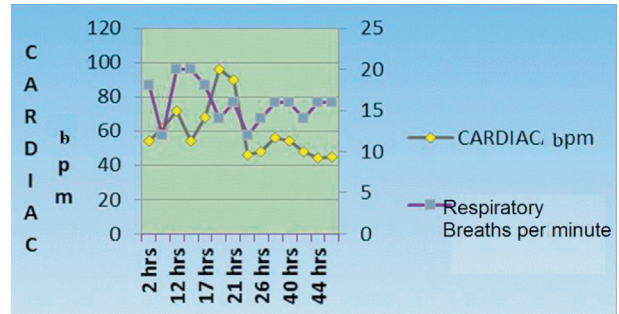


Fig. 3. Patient’s cardiac and respiratory frequency (beats per minute = bpm) during the first 44 h post treatment.

Blood counts gave evidence of secondary colic pathology, indicating decreased hematocrit and hemoglobin, normochromic anemia according to MCHC values, and also an apparent thrombocytopenia. Hypoproteinemia and leukopenia due to lymphopenia – monocytopenia was also observed, which related to the acute intra-abdominal blood loss and/or may be manifested by platelet consumption (Table 1).

Signs of hypotension such as the blood count results, the 54 bpm tachycardia, the 22 bpm tachypnea, pale mucous membranes, and capillary refill of 3 sec, all suggested hemoperitoneum.

Paracentesis revealed whole blood with a hematocrit of 0.28 l/l and PPT 3.8 g/dL, from which we deduced that blood is peripheral with hypoproteinemia.

Blood pressure was taken in three readings with a 2 h interval, the average was 88/45 mmHg, indicating hemodynamic blood pressure (Table 2).

The decrease in blood pressure was associated with a hypovolemic state or bleeding, hence the blood volume ejected from the left side of the heart through aorta to the body is not the same amount back to the right side of the heart through the vena cava, which increases heart rate and decreases cardiac output, which in turn decreases tissue perfusion.

2.11. Medical discharge

On October 17th, the mare was discharged with complete recovery. Heart rate of 48 bpm, respiratory rate of 14 bpm, positive right and left motility, capillary refill of 2 sec, pale mucous membranes, hematocrit of 0.26 l/l and PPT of 5.2 g/dl were recorded.



Fig. 4. Ultrasonogram showing free fluid with low-level echoes, suggesting hemoperitoneum. The image was taken at the ventral abdomen, 15 cm caudal to the xiphoid cartilage.



Fig. 5. Ultrasonogram showing distended loops of small intestines (ID) floating in free fluid with low-level echoes (LIQ).



Fig. 7. Abdominal ultrasonogram showing intra-abdominal hypoechoic fluid and living fetus (white arrow).



Fig. 6. Ultrasonogram showing floating echogenic omentum in complex free fluid with hyperechoic masses suggesting organized hemoperitoneum. Image obtained from the ventral Quadrant.

Table 1
Patient's CBC values.

	Results	Reference values	Low
Hematocrit	26.8	32.0–52.0%	•
Hemoglobin	8.3	11.0–19.0 g/dL	•
MCHC	31	30.0–36.9 g/dL	•
WBC (leukocytes)	5.2	6.0–12.5 10 ⁹ g/dL	•
Granulocytes	3.8	2.8–8.0 10/L	•
Lymphocyte/Monocyte count	1.4	2.1–7.0 10/L	•
Platelets	83	90–350 10/L	•
Fibrinogen		2–4 g/dL	•
Plasma proteins	4.4	6–8 g/dL	•

Table 2
Blood pressure recordings in the mare.

1	2	3	
88 mmHg	87 mmHg	91 mmHg	× 88
44 mmHg	45 mmHg	46 mmHg	× 45

The mare presented a regular food intake and normal fecal amount and consistency in accordance with the living fetus (Fig. 7).

3. Discussion

Hemoperitoneum is a rare disease in horses, however when diagnosed, it can be fatal. There are few studies available on the subject and most are retrospective [2]. Effective diagnostic methods normally used include: abdominal ultrasound to observe free fluid in the area, paracentesis – with the aim of examining the characteristics of intra-abdominal fluid, hematocrit and blood counts.

There are other invasive alternatives such as laparoscopy and exploratory laparotomy, performed in specific cases, which by their nature and cost are rarely recommended [3].

The treatment was aimed to stop the bleeding, while normalize or maintain a stable blood pressure and provide supportive therapy. This would prevent the horse from losing more than 30% of blood volume, resulting in a severe loss that could lead to death. Most of the previous studies focused on the importance of fluid therapy to restore intravascular volume in case of hemorrhagic shock. Using of isotonic crystalloids, and colloid and/or blood products increase cardiac output. In the case of anemia, correct the hypoproteinemia or clotting factors.

It is important to increase the volume of circulating blood using isotonic crystalloid as lactated Ringer with hypertonic solutions such as sodium chloride. The use of drugs such as anti-fibrinogens are efficient for coagulation and hemostasis, while the tissue is repaired by the angiogenic factor. These also aid clot formation, however, are not efficient for internal bleeding caused by coagulopathy. The most commonly used are aminocaproic acid and tranexamic acid. Formaldehyde IV has shown positive results in external bleeding, although there is no scientific information to support its use in internal bleeding [2,4].

In this medical case, the diagnosis was hemoperitoneum secondary to cecocolic dilatation. The mare presented colic pains due to fermentation by corn ingestion, which were solved in few hours. The hematocrit measurement showed a dramatic downfall, and the ultrasound showed free fluid in the abdomen. The blood count and paracentesis confirmed the bleeding. These procedures are mentioned in the cited references [2,4].

Emollients were administered after an abdominal distension was observed. A cecocentesis was performed to release gas from the cecum, with the intention of reducing dilation. A normochromic anemia, thrombocytopenia, hypoproteinemia and leukopenia were recorded due to acute intra-abdominal blood loss.

Paracentesis was also performed to obtain an accumulated blood sample in the abdomen, this being a procedure referred as part of the diagnosis in common literature.

Blood pressure readings were performed, showing an average of 88/45 mm/Hg, reflecting a hemodynamic hypotension which is associated with a hypovolemic state and decreased cardiac output, hence affecting tissue perfusion. To stabilize the patient, perfusion and oxygenation must be improved, through enhancing: hemostasis with plasma volume expanders such as isotonic and hypertonic crystalloids, colloids and/or blood substitutes, which in this case, resulted in positive results.

When discharged, the mare presented heart rate, respiratory rate, and hematocrit within normal ranges. Presence of a living fetus and absence of the free intra-abdominal fluid were the recorded ultrasonographic findings.

4. Conclusions

This report describes a case of hemoperitoneum secondary to cecocolic dilatation in a pregnant mare. Careful diagnosis and early treatment are essential for good outcome of the case.

Competing interests

The authors declare that there is no conflict of interest.

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