



SMALL BOWEL INCARCERATION IN THE EPIPLOIC FORAMEN IN A HORSE: CASE REPORT

ENCARCERAMENTO DE INTESTINO DELGADO EM FORAME EPIPLÓICO EM EQUINO: RELATO DE CASO

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ABSTRACT

Equine colic is one of the main emergencies in large animal clinical practice, responsible for high morbidity and mortality rates. Horses are more predisposed to this condition due to several factors, such as the presence of specific digestive tract conditions. Among the types of colic described, one that stands out is that caused by incarceration in the epiploic foramen, characterized by the herniation of intestinal segments through the foramen of Winslow, which can significantly compromise the vascularization of the affected intestinal segment, resulting in serious consequences. Other factors that can predispose to incarceration through the foramen, such as advanced age, excess weight, and manifestations of stereotypy (aerophagia). The aim of this report is to describe the therapy adopted and the results obtained, in order to contribute to the clinical and surgical practice of large animals, highlighting the importance of early diagnosis and appropriate treatment, which is carried out through surgical intervention.

Keywords: Aerophagia. Surgery. Colic. Digestive.

RESUMO

A cólica equina é uma das principais emergências na clínica de grandes animais, sendo responsável por altas taxas de morbidade e mortalidade. Os equinos estão mais predispostos ao acometimento por essa patologia devido a diversos fatores, como, por exemplo, a presença de particularidades no trato digestório. Entre os tipos de cólica descritos, destaca-se a causada por encarceramento no forame epiplóico, caracterizada pela herniação de segmentos intestinais através do forame de Winslow, o que pode comprometer significativamente a vascularização do segmento intestinal afetado, resultando em graves consequências. Existem, ainda, outros fatores que podem predispor ao encarceramento através do forame, como idade avançada, sobrepeso e manifestação de quadros de estereotípias (aerofagia). Objetiva-se com o presente relato descrever a terapêutica adotada e os resultados obtidos, visando contribuir para a prática clínica e cirurgia de grandes animais, destacando a

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importância de um diagnóstico precoce e um tratamento adequado, que é realizado por meio de intervenção cirúrgica.

Palavras-chave: Aerofagia. Cirurgia. Cólica. Digestório.

INTRODUCTION

Equine farming is responsible for generating jobs in different sectors, contributing significantly to the functioning of the Brazilian economy. It is worth noting that, according to the Brazilian Institute of Geography and Statistics (2023), there are more than five million and seven hundred thousand equines in Brazil, being considered one of the largest herds in the world, second only to China, Mexico and the United States.

One of the main conditions that directly affect the productivity and health of equines is equine colic syndrome. The condition is characterized by acute or chronic abdominal pain that alters the animal's behavior, and may be caused by excessive gas production in the cecum, gastric torsion or intestinal obstruction. It is reported as one of the main emergencies in veterinary medicine care (Bueno et al, 2023), representing one of the main causes of death in equines.

Among the types of colic, we can mention colic caused by incarceration of the epiploic foramen. This type of colic falls under the strangulation, displacement, and torsion causes, occurring due to the incarceration of a gastrointestinal structure in a natural orifice of the abdominal cavity, which can significantly compromise blood flow and lead to serious consequences. The epiploic foramen is a small natural opening in the abdominal cavity of horses, 4 cm wide. This orifice exists to allow the passage of structures such as the portal vein, hepatic artery, common bile duct, and caudal vena cava (Freeman and Pearn, 2015).

Some factors may be associated with incarceration of the epiploic foramen, such as aerophagia habits, weight, and atrophy of the caudate lobe in older animals. These conditions, according to Silva (2013), promote an increase in the diameter of the foramen of Winslow, favoring the displacement of the small intestine through this orifice.

This article aims to describe the adopted therapy and the results obtained, contributing to the clinical and surgical practice of large animals, highlighting the importance of early diagnosis and appropriate treatment, which is carried out through surgical intervention. Furthermore, it seeks to improve the knowledge of veterinarians regarding the aforementioned pathology, considering that it is a frequently underdiagnosed condition.

RELATO DE CASO

A 9-year-old male Quarter Horse weighing 432 kg was referred to the Renato de Andrade Veterinary Hospital, located at R. Palácio do Itamaraty, 1647, Jardim Niemeyer, Montes Claros, Minas Gerais, 39404-600, latitude: -16.7286406, longitude: -43.8582139 after presenting with symptoms characteristic of colic syndrome.

On initial clinical examination, the animal was found to have signs of abdominal pain, characterized by a gaze directed towards the flank and excavation, in addition to presenting with intense pain. In the evaluation of vital parameters, a heart rate of 80 bpm and a respiratory rate of 24 rpm were observed. The ocular and oral mucous membranes were normally colored, and the capillary refill time was less than 2 seconds. Auscultation of the digestive tract revealed an absence of intestinal motility in the left flank and hypomotility on the right side.

Nasogastric intubation was performed on the animal, which identified the presence of bloody reflux. At the end of the clinical examination, it was observed that the animal presented with aerophagia, a stereotypy resulting from stress, very common in horses that have excessive stabling.

Due to the clinical signs presented and the complexity of the case, supportive therapy was initially chosen, with the aim of minimizing the clinical signs presented, in which medications such as 1.1 mg/kg Xylazine 10% (IV), 22,000 IU/kg Agrosil (IM), 6.6 mg/kg Gentamicin (IM), 1 mg/kg Lidocaine 10% (IV), 100 g/animal Sedacol (IV), 18 mg/kg Transamin (IV), 0.1 mg/kg Morphine (IV), 150 ml Bioxan (IV), tetanus antitoxin (IM), fluid therapy (IV) with lactated Ringer's solution were used. Although

subjected to drug therapy, the animal did not show improvement in its clinical condition and remained refractory to the established analgesia protocol.

Given the clinical picture presented, exploratory celiotomy was chosen, since the animal presented with persistent intense colic, unresponsive to analgesia, associated with the presence of reflux with bloody content in the tube. For the surgical procedure, 1.1 mg/kg of Xylazine 10% and 0.1 mg/kg Diazepam were used as pre-anesthetic medication, 2.2 mg/kg Ketamine for induction, and maintenance with inhalational anesthesia using Isoflurane.

During surgery, a pre-umbilical incision of approximately 20 centimeters was made to allow adequate exposure of the digestive system. Displacement and incarceration of the small intestine in the epiploic foramen was observed. To correct the clinical picture, traction of the affected segment was performed, assessing its viability, followed by repositioning of the segments in the abdominal cavity.

Considering the surgical procedure performed, a postoperative plan was instituted based on the use of medications such as: 1 ml Ketamine (IM), 0.02 mg/kg Detomidine (IV), 22,000 IU/kg Agrosil (IM), 6.6 mg/kg Gentamicin (IM), 25 mg/kg Sucralfate (PO), 6 mg/kg Cimetidine (IV), 25 mg/kg Dipyrone (IV), Procinetokinetic with the use of 40 ml Lidocaine, 20 ml Calcium, 10 ml Potassium Chloride diluted in 500 ml of Ringer's lactate (IV), 5 ml/100 kg Bionew (IV), 1.1 mg/kg Flunixin (IV), 1 g/kg DMSO (IV), 7.5 mg/kg Pentoxifylline (PO), 4 mg/kg Omeprazole (PO), 10 g Organew (PO), 50 IU/kg Heparin (SC), 0.1 mg/kg Firocoxib (IV), 1 sachet L-glutamine (PO), 20ml Valerian and Tryptophan (PO).

After 10 days of hospitalization, the animal showed significant improvement in its clinical condition. During the treatment period, positive responses to the instituted drug therapy were observed; the animal showed more active and responsive behavior without signs of pain or abdominal discomfort. At the end, complete stabilization of the general condition and establishment of gastrointestinal functions were observed, and the animal was discharged.

DISCUSSION

Colic syndrome is one of the most common conditions in equine clinics, as these animals have a greater predisposition to the condition due to anatomical aspects and particularities of the digestive tract (Silva and Travassos, 2021). The clinical signs of colic syndrome are generally nonspecific and variable, which makes it impossible to define the type of colic based solely on the symptoms presented (Albuquerque et al, 2020).

According to Nahun et al. (2015), heart rate can be considered an important parameter in assessing pain intensity, with its increase being directly proportional to the increase in pain and potentially indicating a worse prognosis. In lesions in the initial phase, the heart rate tends to remain at its normal value of 28 to 40 bpm. In cases where the animal has simple obstructions, the frequency usually increases to 40 to 70 bpm. And in initial strangulation injuries, the heart rate tends to vary from 50 to 90 bpm, and in a more advanced stage from 70 to 120 bpm.

Another parameter that should be taken into consideration in the evaluation of the animal is the presence of intestinal motility, given that its decrease or absence indicates impairment of the physiological peristaltic movements of the intestine, which may be associated with obstructions, distensions or impairment of intestinal blood flow, which may be an indication of a more serious condition that requires immediate attention in the evaluation and clinical management of the horse Nahun et al. (2015). The presence of gastric reflux is a relevant clinical finding that can be characterized by its coloration, which varies from yellowish-green to reddish-brown, fetid odor, and alkaline pH (Arroyo et al, 2018). In the case described, enterogastric reflux with bloody content was observed, evidencing the return of intestinal contents to the stomach, indicating an alteration in normal intestinal transit. This phenomenon probably occurred as a result of the displacement of a portion of the intestinal loop, which may have caused a partial obstruction or impairment of intestinal motility, explaining the presence of enterogastric reflux.

In clinical cases of colic, some animals may require a dose of xylazine or lidocaine to modulate pain. Alpha-2 agonist medications, such as xylazine or

detomidine, can be administered intravenously, intramuscularly, subcutaneously, and sublingually (in the case of detomidine). Xylazine, when administered at doses of 1.1 mg/kg IV or IM, shows potential in controlling abdominal pain, with a duration of up to 45 minutes. Its short duration of action allows for repeated assessments of the patient's condition without masking clinical signs. The duration and intensity of the sedative and analgesic effect are dose-dependent, as are the adverse effects resulting from the administration of the agent (Jarosinski et al, 2021).

Another medication used in initial treatment due to its analgesic potential was morphine. Its mechanism of action is based on binding to μ -type (μ) opioid receptors, which are responsible for activating descending inhibitory pathways in the central nervous system (CNS) and inhibiting nociceptive afferent neurons in the peripheral nervous system (PNS), reducing nociceptive transmission and contributing to effective pain control (Murphy; Bechman; Barrett, 2022).

During therapy, it is important to restore blood volume and electrolytes. The initial replacement fluid should be an isotonic and crystalloid fluid, such as Ringer's Lactate or an equivalent solution containing a bicarbonate precursor (Ribeiro Filho et al., 2020). Sedacol is indicated in the treatment of colic in horses because it is able to promote a restoration of acid-base balance and improve the coalescence of intestinal gases, favoring the aggregation of bubbles and consequently their elimination. Thus contributing to a reduction in abdominal distension.

Another important measure is the use of antibiotics, which will act prophylactically and therapeutically, mainly in situations where there is a risk of bacterial translocation, abdominal contamination, or the need for surgical intervention, in which, corroborating with M. McMaster et al (2015), Agrosil was chosen at a dose of 22,000 IU/kg and gentamicin at a dose of 6.6 mg/kg. In addition, Bioxan was also administered intravenously, a vitamin and mineral complex that helps in the treatment and prevention of physical exhaustion caused by exertion, dehydration, and anemia.

Tranexamic acid, commercially known as Transamin, is a synthetic amino acid that acts by inhibiting fibrinolysis through the reversible blocking of lysine binding

sites to plasminogen molecules. In this context, its use is applied in situations involving a risk of internal bleeding, such as in cases of intestinal injuries, hemorrhagic colitis or torsions, as well as in the postoperative period of abdominal surgeries in horses (Kumar et al; 2013).

When performing a clinical examination of an animal suspected of having colic syndrome, a methodology should be followed in order to rule out differential diagnoses, taking into account, mainly, the level of pain, the presence or absence of gastrointestinal motility and cardiovascular parameters, and whether the animal responds to treatment (Rhodes and Madrigal, 2021).

After making the diagnosis and taking initial measures, the veterinarian must determine whether the treatment is clinical or surgical. The decision to subject the animal to exploratory celiotomy is based primarily on the ability to control pain and abnormalities identified by physical examination and diagnostic procedures. This procedure is performed on animals that present with a clinical picture of uncontrollable pain, as in the case described. In addition, the continuous production of gastric reflux or the deterioration of physical parameters may also suggest a celiotomy (Marshall and Blikslager, 2019).

Due to the severity of the clinical picture presented, characterized by intense and continuous colic unresponsive to analgesia, exploratory celiotomy was performed, which revealed displacement and incarceration of the small intestine in the epiploic foramen. The diagnosis of the aforementioned pathology can only be obtained through exploratory celiotomy, where it will be possible to observe the displacement and incarceration of the affected intestinal segment through the epiploic foramen (Archer et al, 2004).

Treatment of colic due to epiploic foramen incarceration is performed through surgical correction. The surgical intervention is performed by means of gentle traction applied alternately to the afferent and efferent segments at the level of the foramen, milking them to facilitate their removal without rupturing the foramen or adjacent structures, in addition to analyzing the viability of the incarcerated segment

(Auer; Stick, 2019). Furthermore, surgical treatment should be associated with drug therapy, which is instituted based on the animal's clinical condition.

Post-surgical infections are common occurrences, even in surgeries considered clean but contaminated, such as exploratory celiotomy. Therefore, post-operative management includes the administration of anti-inflammatory drugs to control pain, as well as the use of antibiotics to prevent infections, with the choice of medication determined by the type of surgical procedure performed (Gandini et al, 2022).

Flunixin meglumine was administered at a dose of 1.1 mg/kg to reduce the inflammatory process and promote visceral analgesia (Ferreira et al, 2024). DMSO (dimethyl sulfoxide) was administered to reduce inflammation and platelet aggregation, aiding in the penetration of active ingredients and scavenging free radicals.

Furthermore, the use of proton pump inhibitor medications, such as omeprazole, is recommended for the protection of the gastric mucosa, especially in situations where there is concomitant use of anti-inflammatory drugs. Another medication used is cimetidine, which plays an important role in reducing gastric acid secretion and is indicated for the prevention of ulcers. Sucralfate, on the other hand, acts by promoting the formation of a protective biofilm on the gastrointestinal mucosa, in addition to exerting a buffering effect on hydrochloric acid by stimulating the endogenous production of bicarbonate (Kubecova, 2011).

Given the potential for non-selective NSAIDs to cause gastric mucosal lesions, the use of COX-2 selective NSAIDs is seen as a safer alternative. Therefore, firocoxib was chosen due to its lower incidence of adverse gastrointestinal effects. The use of pentoxifylline, as described by Granic et al (2018), aimed to reduce cytokine release in order to promote better red blood cell perfusion through erythrocyte modulation. Furthermore, supplements such as Bionew, which provides nutritional and antioxidant support, can also be administered, aiding in tissue recovery and maintaining adequate blood perfusion.

Ketamine has been an effective alternative in postoperative colic for controlling intense visceral pain. Its mechanism of action is based on the blockade of NMDA receptors, allowing for modulation of pain perception, and is useful in animals that do not show a satisfactory response to the use of conventional NSAIDs or opioids. Furthermore, the administration of ketamine allows for a reduction in the dose of other analgesic drugs, minimizing associated adverse effects (Lump and Jones 2017).

The use of prokinetic medications plays a fundamental role in inhibiting neurons responsible for reducing motility and stimulating the contraction of intestinal segments. In horses, lidocaine has been the most widely used prokinetic drug in routine postoperative colic care; its combination with Ringer's lactate, calcium, and potassium has complementary effects, promoting a reduction in abdominal discomfort, accelerating the recovery of intestinal transit, and minimizing the risk of complications (Salem, Proudman, and Archer, 2016; Freeman, 2019).

Colic due to entrapment of the epiploic foramen is a condition with a low incidence or is often underdiagnosed when compared to other causes of colic in horses. This type of colic may be associated with a stereotypy known as aerophagia. Aerophagia is a generally acquired habit, relatively common in horses, regardless of breed or sex, in which the animal, resting its incisor teeth on a fixed object, performs an arching and flexing movement of the neck, causing the animal to swallow a certain amount of air, which ends up generating an increase in abdominal pressure, predisposing these animals to the incidence of this pathology (Freeman and Pearn, 2014).

Vachon and Fischer, 1995; Archer, Freeman, Doyle, Proudman, Edwards, conducted a retrospective study in 2014 associating the habit of aerophagia with a higher probability of intestinal segment incarceration in the epiploic foramen. For the study, they used records from the University of Illinois Veterinary Hospital and the University of Liverpool Veterinary Hospital, where, respectively, between the years 1994 to 2002 and 1991 to 2001, they found that 68% and 49% of the animals had the habit of aerophagia before undergoing surgery due to intestinal segment incarceration in the epiploic foramen.

There is no evidence of a preventive method for epiploic foramen incarceration. However, according to Alves (2020), early referral to surgical centers and effective postoperative care are ways to reduce the risk of death in patients with this pathology.

FINAL CONSIDERATIONS

Acute abdomen syndrome is reported as one of the main emergencies in veterinary medicine care, representing one of the main causes of death in horses. Therefore, knowledge of the anatomical and pathophysiological mechanisms involved is essential, since understanding the causes, clinical symptomatology, and predisposing factors is of paramount importance, as it is through the sum of these factors that an early diagnosis can be obtained and appropriate treatment established.

The association between the management of horses with their stereotyped behaviors and the development of colic due to entrapment of the epiploic foramen should be highlighted. Understanding the risk factors and the possible impacts of management and stereotyped behaviors on the occurrence of this pathology is extremely important so that preventive measures and effective treatment can be adopted.

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