Jejunal obstruction caused by an intramural hematoma secondary to focal eosinophilic enteritis

Maria Vergara Ariztia[1] and Russell Freeland[1]

[1]Hagyard Equine Medical Institute

March 27, 2024

Abstract

Focal eosinophilic enteritis in horses is an idiopathic disease that can cause acute abdominal pain. It is characterized by infiltration of eosinophils into the equine intestinal tract. Intramural hematoma of the small intestine is also a poorly understood disease. This case report describes a surgical colic in a 9-year-old mare that had jejunal obstruction caused by an intramural hematoma secondary to focal eosinophilic enteritis. Diagnosis was confirmed by histopathological results showing eosinophilic infiltration and subserosal granulomas that contained large numbers of hemosiderin-laden macrophages. Damage to the mucosal barrier of the intestine may have led to an immunologic reaction and subsequent eosinophilic enteritis. While the cause of the eosinophilic enteritis is unknown, our hypothesis in this case was an underlying hypersensitivity such as food allergy may have played a role based on literature and histopathological examination.

Case report:

M. Isabel Vergara[1]*, Russell Freeland[1]

[1]Hagyard Equine Medical Institute, 4250 Iron Works Pike, Lexington, KY, 40511

*Corresponding author email:*ivergara@hagyard.com*

Keywords : horse, eosinophilic enteritis, intramural hematoma, jejunal obstruction, colic

Summary

Focal eosinophilic enteritis in horses is an idiopathic disease that can cause acute abdominal pain. It is characterized by infiltration of eosinophils into the equine intestinal tract. Intramural hematoma of the small intestine is also a poorly understood disease. This case report describes a surgical colic in a 9-year-old mare that had jejunal obstruction caused by an intramural hematoma secondary to focal eosinophilic enteritis. Diagnosis was confirmed by histopathological results showing eosinophilic infiltration and subserosal granulomas that contained large numbers of hemosiderin-laden macrophages. Damage to the mucosal barrier of the intestine may have led to an immunologic reaction and subsequent eosinophilic enteritis. While the cause of the eosinophilic enteritis is unknown, our hypothesis in this case was an underlying hypersensitivity such as food allergy may have played a role based on literature and histopathological examination.

Introduction

Focal eosinophilic enteritis in horses has been described since 1990 as an idiopathic disease that can cause acute abdominal pain (Brosnahan, 2020). It is characterized by infiltration of eosinophils into the equine intestinal tract . This disease has been identified in 6% of horses undergoing exploratory laparotomy due to colic (Bont et al., 2016). Young horses between 0 and 5 years of age are at greatest risk of this disease .

1

Eosinophilia in horses is uncommon. This may relate to tissue predilection and the short transit time from marrow to target tissue (Sharkey and Overmann, 2015). The principal function of eosinophils is to destroy a target pathogen, commonly the helminth parasite; however, they also have other roles in the gastrointestinal and respiratory disease, skin, and other body systems which are poorly understood .

Intramural hematoma of the small intestine is also a poorly understood disease. It has been described in less than 1% of surgical colic. Horses present with typical signs of intestinal obstruction (Orr et al., 2022).

This case report describes the history, signalment, treatment, diagnosis, and favorable outcome of a thoroughbred mare with eosinophilic enteritis and secondary intramural hematoma obstruction.

Case details

A 9-year-old Thoroughbred mare, three months pregnant, was referred to Hagyard Equine Medical Institute with a history of mild to moderate colic signs. Prior to arrival, 12 ml of flunixin meglumine was administered. Upon arrival, the mare was quiet, alert, and responsive. Mucous membranes were pink and moist with two seconds capillary refill time. Vitals demonstrated a heart rate of 44 beats per minute, respiratory rate of 16 breaths per minute, and temperature of 100.3°F. A nasogastric tube was placed yielding no net reflux. An intravenous catheter was placed aseptically in the left jugular vein.

Abdominal ultrasonography revealed a gas distended stomach, one distended loop of small intestine (6cm) with normal wall thickness (<2mm) on ventral midline, and in the same area another loop of small intestine associated with a circular mixed echogenicity (Fig 1 and 2). Abdominocentesis showed a mildly serosanguinous fluid, a lactate of 4.8 mmol/L (normal reference range: <2 mmol/L) and a total protein of 2.2 gm/dl (normal reference range:<2.5 gm/dl). Cytology was normal, with a few white blood cells seen, primarily polymorphonuclear (PMN) neutrophils, non-degenerated, and occasionally macrophages. Moderate red blood cells were also seen. There was no plant, fecal material or bacteria seen. Blood lactate was 1 mmol/L (normal reference range: <0.7 mmol/L). Due to ultrasound exam findings, exploratory celiotomy was recommended.

The mare was sedated with xylazine (1.1 mg/kg, IV) and butorphanol (0.02 mg/kg, IV) and then induced using ketamine (2.2 mg/kg, IV) and diazepam (0.05 mg/kg, IV). General anesthesia was maintained using isoflurane and 100% supplemental oxygen. The ventral abdomen was aseptically prepared.

An approximately 20 cm ventral midline skin incision was made cranially from the umbilicus with a number 10 scalpel blade and continued through the subcutaneous tissue and the line-alba. Abdominal exploration revealed approximately 1.5 feet of dark red, distended loop of small intestine in the distal one-third of the jejunum (Fig 3). Significant orad jejunal distension was present.

Due to the nonviable appearance, an end-to-end jejunojenunostomy was performed. First, the mesenteric vessels were double ligated using 2-0 polydioxanone proximal and distal to the affected segment. A $\frac{1}{4}$" penrose drain was placed surrounding the small intestinal lumen via a stab incision through the mesentery proximal and distal to the proposed resection location. The mesentery was transected using a Metzenbaum scissor at the level of the ligations previously performed. After that, the affected portion of the small intestine was transected using a number 10 scalpel blade at approximately 60 degrees from the mesenteric attachment, making the mesenteric portion longer than the antimesenteric, to create a large stoma and preserve blood flow to the antimesenteric side. Finally, the anastomosis of both ends of the small intestine was performed using a single-layer interrupted Cushing pattern at the mesenteric and antimesenteric borders using 2-0 polydioxanone.

A sample of the affected jejunum was submitted to the University of Kentucky Veterinary Diagnostic Lab for histopathology (Fig 4).

.

Histopathology results

Sections of the submitted sample of jejunum contained moderate to large numbers of eosinophils and fewer

mononuclear cells within the mucosa and submucosa. Also present within the submucosa and between the circular and longitudinal layers of tunica muscularis was mild to moderate edema and moderate to marked amounts of hemorrhage, which extended into the serosa and mesentery. The vessels within the serosa and mesentery were markedly dilated and engorged with blood and fibrin. An area between the longitudinal and circular layers of the tunica muscularis had proliferative fibrovascular tissue and was partially separated. Several small and large caliber arteries exhibited myxomatous changes and myointimal bodies within the intima and subintimal layers of the vessels.

Treatment

Before surgery, the mare received 30 ml of gentamicin (6.6 mg/kg SID) and 24 ml of penicillin G potassium (22,000 IU/kg QID) intravenously (IV), and 1 ml of tetanus toxoid intramuscularly (IM).

The mare was hospitalized for five days post operatively, with her vitals being constantly monitored, which remained normal throughout the entire period. Postoperative treatment consisted of 30 ml of gentamicin every 24 hours for four days, 22,000 IU of penicillin G potassium every six hours for four days, 6ml of flunixin meglumine IV, every 12 hours for six days, 1000lb dose of omeprazole for six days and altrenogest 12ml orally every 24 hours.

The mare received two days of maintenance fluid therapy intravenously. Furthermore, a lidocaine 2% CRI was given on the first day, starting with 35 ml in 15 minutes and followed by 75ml per hour. Cryotherapy with ice boots on all four legs was applied during the first two days.

Complete blood cell count, chemistry, fibrinogen, and Serum Amyloid A (SAA) were performed on days three and five, showing normal parameters. SAA was the only parameter affected with 2837.00 mcg/ml (normal range 0 – 20 mg/L).

On the sixth day, the mare was discharged on normal feed with exercise restrictions, including stall rest for three weeks, followed by small paddock turnout for four weeks.

Outcome

A month after surgery, the mare aborted her fetus and developed forelimb laminitis. After five months, the laminitis deteriorated and therefore the owner elected for human euthanasia. For the case report purpose, a necropsy was performed. Samples of the jejunum were submitted for histopathology and showed jejunitis and serositis. The distal jejunum showed multiple granulomas. The histopathology results found the submucosa to be mildly edematous with a mild increase in collagenous tissue. Moderate to large numbers of eosinophil infiltrates were identified within the submucosa, from immediately subjacent to the lamina propria to the muscular tunics. The serosa was thickened, with fibroplasia, and there were serosal and subserosal granulomas that contained large numbers of hemosiderin-laden macrophages.

Discussion

Eosinophilic enteritis is an uncommon disease in horses. The number of case reports described in the literature is scant. The disease is characterized by the infiltration of eosinophils into the equine intestinal tract, producing one or several circumferential mural bands in the small intestine that cause obstruction .

In this case report, ultrasonography showed distended loops of small intestine and an unknown structure associated with a small intestine lumen with a mixed echogenicity material. The surgical findings indicated the mixed echogenicity was a mural hematoma, focally present, and collapsing the lumen of the involved jejunum. The few case reports in the literature showed surgical findings of striking hyperemic, circumferential bands with histological evidence of submucosal edema, mucosa swelling, and hemorrhage (Bont et al., 2016).

The intramural hemorrhage found in this case had caused an obstruction and necrosis in the affected segment. The cause of the hemorrhage is unknown, and it is believed that it is secondary to eosinophilic enteritis. The necrosis of the affected segment has not been described in literature as a characteristic of focal eosinophilic enteritis . However, the intramural hemorrhage and the consequent obstruction caused necrosis in this case

due to the decreased blood flow into the affected segment. Intramural hematomas in humans are not frequent, but the few cases described are often attributable to a complication of anticoagulant therapy and less common bleeding diatheses, abdominal trauma, infarction, and vasculitis (Yoldas et al., 2013).

Eosinophilia in horses has been attributed to internal parasitism, cutaneous habronemiasis, systemic hypersensitivity reaction, lymphosarcoma, and eosinophilic leukemia (Sharkey and Overmann, 2015). Internal parasitism is the leading cause of eosinophilia in horses ; but in this case, no specimen was detected. Eosinophilic enteritis has been associated with geographical regions and seasons, most commonly between late spring and early fall. In the United States, the seasonal distribution of cases corresponds to the grazing period, suggesting a dietary association .

Eosinophilic enteritis has been attributed to food allergies in humans. Patients report intense pain in the abdomen that did not respond to treatment. Biopsies of these patients were sent to histopathology, confirming eosinophilia in the ileum and unspecific colitis. After the results, the patients were treated with corticosteroids and mesalamine (5-aminosalicylic acid (5-ASA), medication used to treat ulcerative colitis and showed significant improvement (Laud et al., 2020).

Food allergies in horses can produce immunologic reactions. The allergen must breach the intestinal mucosal barrier to expose it to the immune system. An abnormal immune response can lead to hypersensitivity. Typically, the gastrointestinal system has different mechanisms to avoid this breach. However, in some cases, such as in older horses where the mucosal barrier has begun to degenerate, or in animals with gastrointestinal diseases that have damaged the intestinal barrier, macromolecules can pass through and reach the immune system .

Finally, while the underlying cause of the enteritis and subsequent hematoma is unknown in this case, we hypothesize that due to the age of the mare and the season in which the disease developed, an underlying hypersensitivity such as food allergy may have played a role based on literature and histopathological examination. Damage to the mucosal barrier of the intestine may have led to an immunologic reaction and subsequent eosinophilic enteritis. Enteritis led to a loss of integrity of the associated vasculature as indicated by the myxomatous change seen on histopathology. Ultimately these vessels began leaking into the wall of the jejunum, subsequently causing mural hematoma and obstruction resulting in necrosis of the segment. Furthermore, the last histopathology report showed that the mare continued to produce eosinophilic infiltration in the submucosa and granulomas that contained hemosiderin-laden macrophages in the serosa. In conclusion, as hypothesized previously, due to a possible hypersensitivity, it is suspected that the mare would have developed eosinophilic enteritis and secondary intramural hematoma again.

ORCID

Isabel Vergara*https://orcid.org/0009-0006-0805-2173*

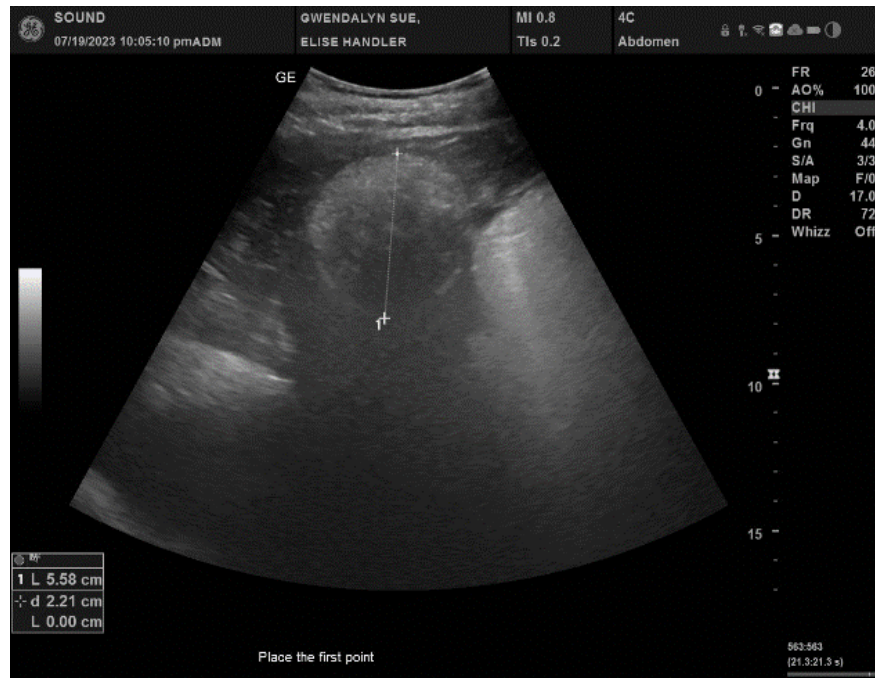Russell Freeland*https://orcid.org/0009-0003-2939-7056*
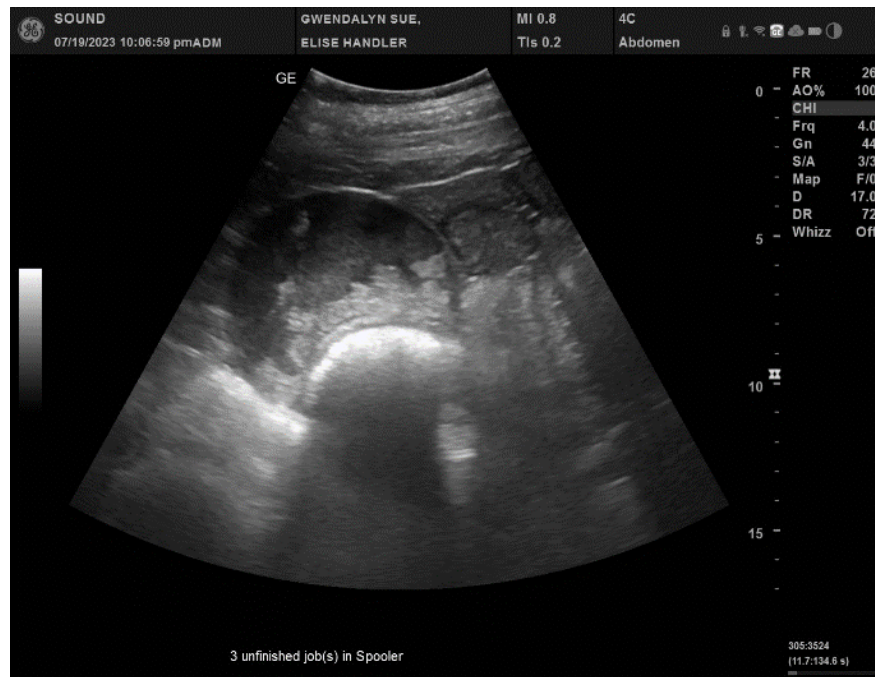
Figure legends

Fig 1. Distended loop of orad small intestine (normal diameter (d) range <2cm).

Fig 2. Distended small intestine showing a mixed unknown echogenicity
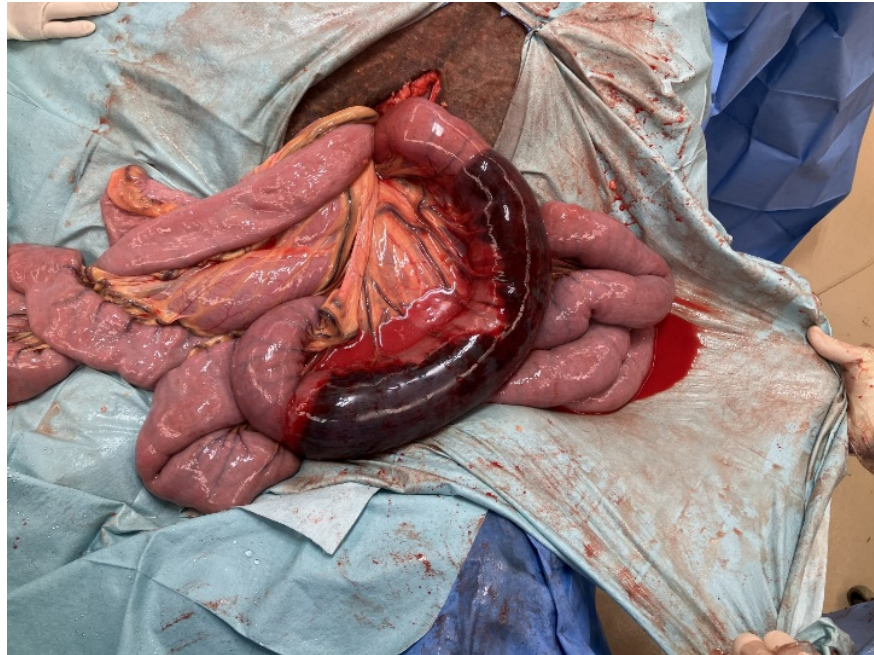
Fig 3. Intraoperative image showing affected jejunum segment with associated hematoma.

Fig 4. Opened sample of affected jejunum with hemorrhagic gelatinous material