



Case report

Entrapment of a jejunocecostomy anastomosis in the epiploic foramen in a horse

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Abstract

A mare aged 9 years underwent surgical correction of a small intestinal volvulus using a side-to-side, hand-sewn jejunocecal anastomosis. Nine months after the jejunocecostomy, the horse developed colic signs and ultrasonographic examination revealed gas in the large colon in the upper right flank region and several enlarged loops of the small intestine in the lower right flank area. The differential diagnosis was right dorsal displacement of the large colon or small intestinal strangulation. The exploratory celiotomy found epiploic foramen entrapment (EFE) of the jejunocecostomy anastomosis, including parts of the distal jejunum and cecum. Manual reduction of herniation of the bowel in the epiploic foramen (EF) was impossible and the horse was euthanized. The postmortem gross finding revealed the enlarged edematous at the distal end of the jejunum and the initial body portion of the cecum had passed into the EF in the right-to-left (antegrade) direction. To the authors' knowledge, this is the first report of the antegrade epiploic foramen entrapment of a jejunocecostomy bowel part and this may be one of the complications encountered during the long-term survival period of a surgical jejunocecostomy in horses.

Keywords: Epiploic foramen entrapment, Horse, Jejunocecostomy, Surgical colic

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INTRODUCTION

The epiploic foramen (EF) is the passage between the peritoneal space and the cavity of the omental bursa (Nickle et al., 1973; Sisson, 1975; Constantinescu and Constantinescu, 2004). The length of the narrow epiploic ring, slit-like opening is approximately 4 cm or approximately two fingers' width (Freeman, 1997). The anatomical boundaries of the EF are the gastropancreatic fold caudoventrally, the portal vein ventrally and the caudate lobe of the liver cranio-dorsally (Freeman and Pearn, 2015). Furthermore, the opening of the omental bursa is oval shaped and the vestibule of the omental bursa is not far off the floor of the ventral abdomen (Freeman and Pearn, 2015). Freeman and Pearn (2015) proposed that the funnel-like shape of the omental vestibule could be a part of motile bowel passing through the EF.

Epiploic foramen entrapment (EFE) is an important diagnosis in colic horses (van Bergen et al., 2021). Many horses encountering colic with EFE have had to be euthanized during the operative period due to poor prognosis (Proudman et al., 2002) or because of unmanageable intraoperative bleeding from vessels (Livesey et al., 1991; van Bergen et al., 2021), as well as due to the development of endotoxemia (Archer et al., 2004). The rates of survival to discharge as well as for long-term survival (1 year) of horses after the surgical correction for an EFE are 95 and 50 percent, respectively (Archer et al., 2004; Freeman and Schaeffer, 2005).

EFE in a horse is the term commonly used and is created by the movement of an intestinal segment through the EF (Hackett, 2013). Generally, the herniation direction of the intestinal segment can occur with bowels passing from the omental bursa through the foramen (left-to-right direction) or with bowels passing from the foramen into the omental bursa (right-to-left direction) (Turner et al., 1984; Vasey, 1988; Segura et al., 1999; Archer et al., 2004; Schambourg, 2021). However, most EFE patterns are in the left-to-right direction (Turner et al., 1984; Vachon and Fischer, 1995; Hackett, 2013; Grzeskowiak et al., 2017; van Bergen, 2019). Furthermore, the entrapped intestinal segment from EF colic cases is mainly the small intestine (Vasey, 1988; Livesey et al., 1991; Vachon and Fischer, 1995; Archer et al., 2004, van Bergen, 2019). Notably, the entrapped small bowel at EF has been regularly reported with an ileum portion. (Vasey, 1988; Vachon and Fischer, 1995; Archer et al., 2004; van Bergen et al., 2019) To the authors' knowledge, there have been four published reports of EF herniation from parts of the large colon (Foerner et al., 1993; Steenhaut et al., 1993; Segura et al., 1999; Schambourg et al., 2021) and only one EFE published report of the apex of the cecum in a mare (Grzeskowiak et al., 2017).

Generally, the predisposing factors of EFE in horses suggested in the literature are middle age (Vachon and Fischer, 1995) and stereotypical windsucking and cribbing (Archer et al., 2004; van Bergen, 2019). Furthermore, the association between cribbing, intra-abdominal pressure and EFE has been proposed for investigation (Albanese et al., 2013). To date, only a few studies have investigated the risk factors of EFE in horses to assist in understanding its causality and prevention.

Although there is no specific diagnostic technique before an exploratory laparotomy, ultrasonography is the most common preliminary diagnostic

method, with ultrasonographic identification of wall thickening of the enlarged intestinal loop at the right cranial abdomen in the imaging region of the duodenum and liver suggesting the specific preoperative diagnosis of EFE in horses (Scharner et al., 2002; Freeman, 2002). However, the final diagnosis of EFE depends on the exploratory laparotomy or the necropsy (Vasey, 1988; Livesey et al., 1991). Thus, surgical treatment is commonly used with manual reduction of the incarcerated intestine by gentle traction of efferent and/or afferent bowels (Vasey, 1988). There has also been occasional reporting of the recurrence of EFE after surgical correction (Archer et al., 2004, Grulke et al., 2020), for which the recurrence rate after surgical treatment was at least 3% of surviving horses. (van Bergen et al., 2019). To date, from the authors' knowledge, there has been no report of entrapment of the cecum sacculations with jejunocecostomy anastomosis in the EF. Hence, the purpose of this article was to describe the clinical examination information and surgical findings of a long-term survival jejunocecostomy in a horse with signs of colic caused by entrapment of the jejunocecostomy anastomosis together with cecum sacculations in the EF.

CASE DESCRIPTION

Case History

A mare aged 9 years underwent surgical correction of a small intestinal volvulus using a complete ileocecal bypass on 18 August 2021 at the Kasetsart University Veterinary Teaching Hospital (KUVTH), Kamphaeng Sean, Thailand. Consequently, the ischemic length of the aboral jejunal segment (30 cm) and the majority of the ileum were resected and a side-to-side, hand-sewn jejunocecostomy between the dorsal and medial cecal bands was performed (Freeman and Schaeffer, 2010; Hackell, 2013). The anastomosis length of the attached jejunum and cecum stoma was 10 cm (Freeman, 1997). After the surgery, the horse developed postoperative reflux which was spontaneously resolved and had a small incisional hernia but did not show any signs of colic. Thus, an abdominal bandage was advised for conservative treatment of the hernia.

Present Illness:

The horse was referred again to KUVTH for colic signs on 27 May 2022, 9 months after the operation, with a history of colic of 8 h duration. Formerly, the horse had been treated with flunixin meglumine, butorphanol, xylazine and 10 L of polyionic fluid solution IV. The private veterinarian also carried out gastric lavage to remove the gastric content before referring the horse to the hospital.

Clinical Examination:

On admission, the horse presented signs of severe abdominal pain, mild gastric impaction examined by gastric siphoning, a rectal temperature of 37.6 C and respiratory and heart rates of 24 and 48 beat per min, respectively. The capillary refilling time and mucous membrane were within normal limits. The packed cell volume was 24 percent, the plasma protein was 7.0 g/dL and

blood lactate was 7.1 mmol/L. The intestinal motility from auscultation was decreased, especially around the lower left flank that produced no intestinal sound. Ultrasonographic examination, following the FLASH protocol for colic horse examination (Busoni et al., 2011), showed an accumulation of gas in the large colon in the right flank region. Furthermore, several loops of small intestine were identified in the lower right flank area with a diameter range of 3–5 cm based on the ultrasound images. The rectal examination initially revealed the displacement of the cecum and right dorsal displacement of the large colon. For case information history, the horse also had an oval-shaped, ventral incisional abdominal hernia with the length and width of the hernial ring being approximately 20 and 10 cm, respectively. Manual palpation of the hernial mass did not suggest adhesion between the hernial content and the ventral abdominal wall. During case observation, the horse did not respond to the second medical treatment with flunixin and xylazine combination (continued lying down and rolling) after admission at the hospital. Therefore, the decision to perform surgery was based on signs of uncontrollable abdominal pain, the results of the physical examination, palpation *per rectum* and abnormal ultrasonographic examination of the right flank.

Surgical Procedure and Surgical Finding:

A 16G catheter was placed into the left jugular vein. The horse was sedated with 0.8 mg/kg of xylazine (X-lazine 10%; L.B.S. Laboratory Ltd.; Bangkok, Thailand) intravenously and anesthesia was induced with 0.1 mg/kg of diazepam (Diazepam injection; GPO; Bangkok, Thailand) and 2.2 mg/kg of ketamine (Ketamine-Hameln; Siegfried Hameln GmbH; Hameln, Germany) intravenously. After induction, the horse was moved into the operation room and placed in the dorsal recumbency position on the operating table. Then, the horse was orotracheally intubated with an endotracheal tube connected to a large animal circle system (Surgivet[®], LDS3000; Gize; Bangkok, Thailand) and the anesthesia during operation was maintained using isoflurane (Attane; Pirama Critical Care Inc.; Bethlehem, PA, USA) combined with oxygen.

After a right paramedian celiotomy (distance about 1 cm from the border of the right abdominal hernial ring), there was no adhesion between any bowel parts with abdominal wall muscle for the incisional hernial portion. Surgical exploration revealed a large colon displacement to the right site of the abdomen. Any attempt to reposition the large colon to its normal anatomical position was impossible. Consequently, an enterotomy at the pelvic flexure was performed to remove the colon content and reduce the large colon size; then, the large colon was easily adjusted to the normal position. The colon contents were normal in color and loose in consistency. Despite further surgical exploration, the distal jejunum segment and body of the cecum still could not be fully examined. Thus, the surgeon used fingers to manually check the EF and found that the jejunocecostomy anastomosis included a jejunal blind stump and the sacculations of the cecum body passed through the EF. During surgical intervention, the surgeon attempted to manually dilate the EF ring and to retract the cecal body and distal jejunum part with one hand, while using the other hand to massage and decompress the enlarged sacculations of the cecal body connected to the enlarged jejunocecostomy anastomosis. The herniation part of the bowels remained in the same position without moving because the

epiploic ring was very tight and the edematous jejunocecostomy anastomosis was stuck. Furthermore, the force for repositioning the entrapped intestine could easily damage the surrounding tissue and major vessels, such as the caudal vena cava and hepatic portal vein (Vasey, 1988). Therefore, euthanasia was carried out as the considered humane option.

After euthanasia, the post mortem gross finding revealed the enlarged edematous of the distal end of the jejunum and the initial body portion of the cecum had passed into the EF in the right-to-left (antegrade) direction as shown in Figure 1. The length of wide slit-like opening was approximately 7 cm that was approximately 14 cm for the circumference of the EF. The serosa characteristic of enlarged edematous jejunocecostomy anastomosis and sacculations of the cecum body showed only some ecchymoses. The untrapped enlarged cecum, fully filled with content, were near the upper right lateral abdominal wall and the caudate lobe of the liver, suggesting that the typhlotomy without surgical field contamination could be performed with difficulty.

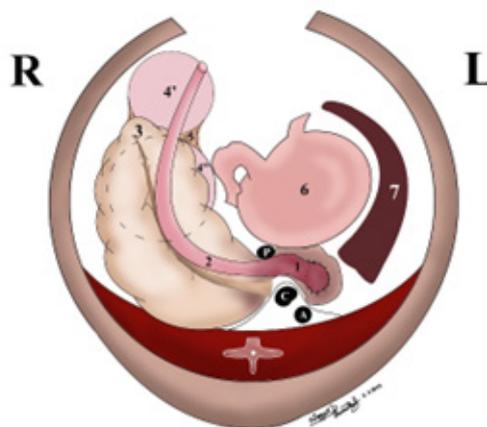


Figure 1 Drawing of a jejunocecostomy anastomosis entrapped in the epiploic foramen. The horse is in the dorsal recumbency position with the rear-view direction. R = right site of horse; L = left site of horse; A = aorta; P = portal vein; C = caudal vena cava; 1 = jejunocecostomy anastomosis; 2 = jejunum; 3 = apex of cecum; 4' = right ventral colon; 4'' = right dorsal colon; 5 = mesocolon; 6 = stomach; 7 = spleen.

DISCUSSION

Generally, an equine colic surgical patient with a side-to-side jejunocecostomy technique has an increased mortality rate, especially postoperatively during the first 2 months (Proudman, 2002), compared with other kinds of small bowel anastomosis (Findley and Archer, 2014). The reported postoperative complications requiring the repeat celiotomy during hospitalization after the jejunocecostomy were an enlarged small colon or small intestine, jejunal volvulus, colon displacement, diffused serositis, infarcted jejunum (Freeman et al., 2000) and the small intestine wrapped by the small colon and postoperative reflux (Freeman and Schaeffer, 2010). Furthermore, long-term study of the survival rate of horses with surgical colic from hand-sewn or stapled side-to-side jejunocecostomy has shown some postoperative complications, such as serositis, reflux and recurrent colic (Freeman and Schaeffer, 2010). To the authors' knowledge, there has been no report of EFE in surgically examined horses after performing a jejunocecostomy.

At the beginning of the clinical examination in the present case, the rectal palpation could only identify displacement of the large colon that was probably not specific to this case. The FLASH protocol for colic cases is very useful for veterinarians to quickly assess the cause and severity of the affected abdominal organ in the colic horse (Busoni et al., 2011). The ultrasonographic examination following the FLASH protocol with this horse revealed only accumulation of gas in the large colon in the right flank region and also several distended loops of small intestine in the right inguinal area, making the preliminary diagnosis of this colic horse as right dorsal displacement of the large colon or small intestinal strangulation. In most cases, the intestinal bowel of an EFE patient passes from the left part through the EF to lie in the right part of the abdomen above the duodenum (Freeman, 1997). Consequently, the ultrasonographic finding at the duodenal window could not detect the duodenum. Unexpectedly, the sonography images at the duodenal window of this horse suggested that the large colon was filled with gas and the image of the lower right flank region revealed distended loops of the small bowel, suggesting a small intestinal obstruction (Scharner et al., 2002). In this colic horse, the ultrasonographic finding details for the right part of the abdomen differed from previous specific ultrasonographic images of the EFE that usually show a thick wall of the enlarged small intestinal loop in the right cranial abdomen (Scharner et al., 2002; Freeman et al., 2002).

The subsequent findings were that the jejunocecostomy anastomosis included a jejunal blind stump and the sacculations of the cecum body passed through the EF in the right-to-left (antegrade) direction. This herniation direction type was different to the report from Vachon and Fischer (1995) that the bowel herniation at the EF commonly occurs from left to right (retrograde direction).

In the present case, the length of the wide, slit-like opening at the EF of the horse was 7 cm, which was longer than normal, and the circumference was approximately 14 cm, which was approximately the same EF size from the cecal entrapment within the EF in mares (Grzeskowiak et al., 2017). In the EFE of the large colon, the EF is extremely large (15 cm length) allowing for passage in the large colon (Steenhaut et al., 1993; Segura et al., 1999). There has been a report where the mean circumference of an equine EF (assessed at 11.6 ± 2.6 cm) was positively correlated with body weight (van Bergen et al., 2016). Although the etiology for enlargement of the EF ring is inconclusive, atrophy of the right lobe of the liver is proposed to be the cause of the enlargement of the EF (Sisson, 1975), probably the predisposing risk factor for herniation of the intestine.

Crib-biting and wind sucking are the oral stereotypes considered as important risk factors for EFE in horse (Vachon and Fischer, 1995; Archer et al., 2004). Interestingly, the intra-abdominal pressure in cribbing horses during and after cribbing has reportedly increased (Albanese et al., 2013). However, the horse in the current case did not have such cribbing behavior, suggesting that other risk factors may have been involved for EFE in this case.

Large colon displacement is often found in a colic horse, requiring colic surgery (Abutarbush et al., 2005) and abnormal function of a pelvic flexure pacemaker is probably the cause of this disease (Lopes and Pfeiffer, 2000). In the present case, it was probable that the large colon was displaced

to the right part of the abdomen earlier, with large colon displacement probably enforcing the jejunocecostomy anastomosis entering through the EF. However, this movement of the large colon close to the cecum is only speculation because EF of the cecum is very rare (Grzeskowiak et al., 2017).

In addition, the colon displacement as well as colonic volvulus have been considered as causes of increasing intra-abdominal pressure in horses (Canola and Johnson, 2013). In a clinically normal horse, the intra-abdominal pressure (IAP) in the standing position is sub-atmospheric, ranging from -13.3 to 0.0 mm Hg. In contrast the IAP with strangulation of the large colon in a standing colic horse is higher (9.53 mmHg) than normal (de Paula et al., 2020). Therefore, it has been hypothesized that gastro-intestinal disease might influence the greater deviation in the IAP (Scott et al., 2014). In the present case, the abnormal findings from the exploratory celiotomy of the horse were both right dorsal displacement of the large colon and EFE of the jejunum stump connecting with the cecal sacculations. For this reason, the authors speculated that the right dorsal displacement of the large colon may have occurred at an early stage that probably increased the IAP, resulting in the jejunum stump connecting with the cecal sacculations, entrapping in the EF later.

Normally, it is conceivable that with normal peristalsis, the ileum could move laterally and push digesta through the ileocecal valve, which can resist a high cecal pressure (van Weyenberg et al., 2006). Conversely, the intense peristaltic wave of the cecum guides the cecal content upwards from the cecum apex to the top, passing through the ceco-colic junction (van Weyenberg et al., 2006). Typically, both the thick ileal wall and ileocecal valve can reduce the pressure from the cecum. In this case, the ileocecal valve was completely bypassed with a side-to-side jejunocecostomy anastomosis. The wall of the jejunum that fixed at the cecum body was thinner than the ileum. Therefore, it is conceivable that pressure from the bowel might have caused herniation through the EF and passed to the omental vestibule, resulting in subsequent entrapment.

CONCLUSIONS

To the authors' knowledge, the entrapment of the jejunal stump from the jejunocecostomy anastomosis portion, including the sacculations of the cecum body in the epiploic foramen, has not previously been reported in the literature. Although diagnosis of the EFE of the jejunal stump connecting with the cecal sacculations portion is challenging before surgery, the jejunocecostomy bowel part may be one of the complications encountered during the long-term survival period of a surgical jejunocecostomy in horses. Therefore, the intestinal herniation from the previous side-to-side jejunocecostomy of the bowels via the EF through the omental bursa should be considered in the differential diagnosis for right dorsal displacement of the large colon and strangulation obstruction from a surgical jejunocecostomy case.

CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this report

REFERENCES

- Abutarbush, S.M., Carmalt, J.L., Shoemaker, R.W., 2005. Causes of gastrointestinal colic in horses in western Canada: 604 cases (1992 to 2002). *Can. Vet. J.* 46, 800-805.
- Albanese, V., Munsterman, A.S., DeGraves, F.J., Hanson, R.R., 2013. Evaluation of intra-abdominal pressure in horses that crib. *Vet. Surg.* 42, 658-662.
- Archer, D.C., Proudman, C.J., Pinchbeck, G., Smith, J.E., French, N.P., Edwards, G.B., 2004. Entrapment of the small intestine in the epiploic foramen in horses: a retrospective analysis of 71 cases recorded between 1991 and 2001. *Vet. Rec.* 155, 793-797.
- Busoni, V., de Busscher, V., Lopez, D., Verwilghen, D., Cassart, D., 2011. Evaluation of a protocol for fast localized abdominal sonography of horses (FLASH) admitted for colic. *Vet. J.* 188, 77-82.
- Canola, P.A., Johnson, P.J., 2013. Intra-abdominal hypertension in horses. *Equine. Vet. Educ.* 25(4), 189-195.
- Constantinescu, G.M., Constantinescu, I.A., 2004. *Clinical dissection guide for large animals*, 2nd edition. Iowa State Press, Ames, Iowa, pp. 60-63.
- De Paula, V.B., Canola, P.A., Rivera, G.G., Bonacin, Y.S., Del Rio, L.A., Canola, J.C., Ferraudo, A.S., 2020. Intra-abdominal pressure screening of horses with colic. *J. Equine. Vet. Sci.* 90, 102998.
- Findley, J., Archer, D., 2014. Management of the surgical equine colic patient following hospital discharge. *In Pract.* 36(5), 229-237.
- Foerner, J., Ringle, M., Junkins, D., Fischer, A., MacHarg, M., Phillips, T., 1993. Transection of the pelvic flexure to reduce incarceration of the large colon through the epiploic foramen in a horse. *J. Am. Vet. Med. Ass.* 203, 1312-1311.
- Freeman, D.E., 1997. Surgery of the small intestine. *Vet Clin North Am Equine Pract.* 13(2), 261-301.
- Freeman, D.E., Hammock, P., Baker, G.J., Goetz, T., Foreman, J.H., Schaeffer, D.J., Richter, R.A., Inoue, O., Magid, J.H., 2000. Short- and long-term survival and prevalence of postoperative ileus after small intestinal surgery in the horse. *Equine. Vet. J.* 32(S32), 42-51.
- Freeman, D.E., Pearn, A.R., 2015. Anatomy of the vestibule of the omental bursa and epiploic foramen in the horse. *Equine. Vet. J.* 47(1), 83-90.
- Freeman, D.E., Schaeffer, D.J., 2005. Short-term survival after surgery for epiploic foramen entrapment compared with other strangulating diseases of the small intestine in horses. *Equine. Vet. J.* 37(4), 292-295.
- Freeman, D.E., Schaeffer, D.J., 2010. Comparison of complications and long-term survival rates following hand-sewn versus stapled side-to-side jejunocecostomy in horses with colic. *J. Am. Vet. Med. Ass.* 297(9), 1060-1067.
- Freeman, S., 2002. Ultrasonography of the equine abdomen: findings in the colic patient. *In Pract.* 24(5), 262-273.
- Grulke, S., Salciccia, A., Arévalo Rodríguez, J.M., Sandersen, C., Caudron, I., Serteyn, D., de la Rebière de Pouyade, G., 2020. Mesh closure of epiploic foramen by ventral laparotomy in 17 horses with entrapment. *Vet. Rec.* 187(6), e43-e43.
- Grzeskowiak, R.M., Barrett, E.J., Rodgerson, D.H., 2017. Cecal entrapment within the epiploic foramen in a mare. *Can. Vet. J.* 58(8), 842-844.
- Hackell, E.S., 2013. Specific causes of colic. In: Southwood, L.L. (Ed.), *Practical guide to equine colic*. John Wiley & Sons, Hoboken, pp. 204-229.
- Livesey, M.A., Little, C.B., Boyd, C., 1991. Fatal hemorrhage associated with incarceration of small intestine by the epiploic foramen in three horses. *Can. Vet. J.* 32, 434-436.
- Lopes, M.A., Pfeiffer, C.J., 2000. Functional morphology of the equine pelvic flexure and its role in disease. a review. *Histol. Histopathol.* 15(3), 983-991.
- Nickel, R., Schummer, A., Seiferle, E., Sack, W.O., 1973. *The viscera of the domestic mammals*. Verlag Paul Parey, Berlin and Hamburg.
- Proudman, C.J., Smith, J.E., Edwards, G.B., French, N.P., 2002. Long-term survival of equine surgical colic cases. Part 1: patterns of mortality and morbidity. *Equine. Vet. J.* 34, 432-437.
- Schambourg, M.A., Nodin, M., Bussy, C., 2021. Epiploic foramen entrapment of the large colon in a 9-month-old Thoroughbred filly. *Equine. Vet. Educ.* 33(4), e83-e85.
- Scharner, D., Rotting, A., Gerlach, K., Rasch, K., Freeman, D.E., 2002. Ultrasonography of the abdomen in the horse with colic. *Clin. Tech. Equine. Pract.* 1(3), 118-124.

- Scott, V.H., Williams, J.M., Mudge, M.C., Hurcombe, S.D., 2014. Effect of body position on intra-abdominal pressures and abdominal perfusion pressures measured at three sites in horses anesthetized with short-term total intravenous anesthesia. *Am. J. Vet. Res.* 75(3), 301-308.
- Segura, D., Garzon, N., Nomen, C., Prades, M., Valls, S., 1999. Entrapment of large colon through the epiploic foramen in a horse. *Equine Vet. Educ.* 11(5), 227-228.
- Steenhaut, M., Vandenreijt, I., van Roy, M., 1993. Incarceration of the large colon through the epiploic foramen in a horse. *Equine. Vet. J.* 25(6), 550-551.
- Sisson, S., 1975. Equine digestive system. In: Getty, R., (Ed.), *Sisson and grossman's the anatomy of the domestic animals*, (5th edition). WB. Saunders, Philadelphia, pp. 479, 493-497.
- Turner, T.A., Adams, S.B., White, N.A., 1984. Small intestinal incarceration through the epiploic foramen of the horse. *J. Am. Vet. Med. Assoc.* 184(6), 731-734.
- Vachon, A.M., Fischer, A.T., 1995. Small intestinal herniation through the epiploic foramen: 53 cases (1987-1993). *Equine. Vet. J.* 27(5), 373-380.
- Van Bergen, T., Haspelslagh, M., Wiemer, P., Swagemakers, M., van Loon, G., Martens, A., 2019. Surgical treatment of epiploic foramen entrapment in 142 horses (2008-2016). *Vet. Surg.* 48(3), 291-298.
- Van Bergen, T., Wiemer, P., Martens, A., 2021. Equine colic associated with small intestinal epiploic foramen entrapment. *Vet. J.* 269, 105608.
- Van Bergen, T., Wiemer, P., Schauvliege, S., Paulussen, E., Ugahary, F., Martens, A., 2016. Laparoscopic evaluation of the epiploic foramen after celiotomy for epiploic foramen entrapment in the horse. *Vet. Surg.* 45, 596-601.
- Van Weyenberg, S., Sakes, J., Janssens, G.P.J., 2006. Passage rate of digesta through the equine gastrointestinal tract: a review. *Livest. Sci.* 99(1), 3-12.
- Vasey, J.R., 1988. Incarceration of the small intestine by the epiploic foramen in fifteen horses. *Can. Vet. J.* 29(4), 348-382.

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