

Case report: Ileo-jejunal entrapment in a uterine mesometrium rent of a non-pregnant mare

Paula A. Schaffer,^a Jennifer M. Sonis,^b Jacobo S. Rodriguez,^c Sushan Han^a

^aDepartment of Microbiology, Immunology and Pathology; ^bDepartment of Clinical Sciences; ^cEquine Reproduction Laboratory; College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO

Summary

A ten-year-old, non-pregnant Arabian mare presented with acute uncontrollable abdominal pain. A diagnosis of small bowel compromise was made on clinical and trans-abdominal ultrasonographic examination. Euthanasia was elected by the owner and the necropsy examination revealed herniation and venous infarction of five meters of distal jejunum and the entire ileum within a 7.5 cm rent in the right mesometrium of the uterus. Small bowel entrapment in a mesometrial rent is rare in domestic animals with few case reports in the literature, but interestingly has been relatively well-characterized in primiparous and multiparous women. Entrapment in a mesometrial rent may be considered as a differential diagnosis for acute small bowel compromise and colic in non-pregnant and pregnant mares.

Keywords: Broad ligament, entrapment, hernia, horse, small intestine

Background

Mesometrial rents have the potential to cause life-threatening small bowel entrapment in both humans and animals. This rare condition is well-documented in humans, but few published reports exist in the veterinary literature, and cases may be under-reported. Mesometrial herniation in women can have a promising surgical prognosis if treated early, and similar success has been historically reported in mares.¹⁻³ In general, herniation and venous infarction of the small intestine is a common cause of acute abdominal pain and euthanasia in horses.^{4,5} Small intestinal hernias in horses most frequently occur in association with spontaneous, congenital, or traumatic rents in the abdominal mesentery, cecocolic fold, diaphragm,⁶ and within natural foramina including the gastroepiploic foramen, the inguinal ring of stallions, and the umbilicus of foals.⁷⁻¹⁰ Small bowel entrapment is rarely documented in rents within the lateral ligaments of the urinary bladder, mesodiverticulum and uterine mesometrium.^{4,8,9,11-13} The pathogenesis of rent formation in these unusual structures has not yet been determined and documentation of additional cases is necessary in order to improve our ability to make early diagnoses and to instigate successful surgical intervention.

Case presentation

A ten-year-old non-pregnant Arabian mare was presented to the Colorado State University Equine Critical Care Service with a four hour-history of acute abdominal pain. On presentation, the mare was tachycardic (70 beats/minute) and had a normal capillary refill time (< 2 seconds). Five liters of bright green watery reflux was obtained upon passing a nasogastric tube. On rectal palpation, loops of small intestine were moderately distended and there was mild gas distension of the large colon. Trans-abdominal ultrasound revealed non-motile, distended small intestine and large amounts of flocculent free abdominal fluid. Fluid obtained by abdominocentesis was serosanguinous with an elevated total protein level of 3.8 g/dL. A strangulating small intestinal lesion was suspected and exploratory laparotomy was recommended. The owner declined surgery and euthanasia was elected due to poor prognosis without surgical intervention.

Outcome

The mare was submitted for postmortem examination. At necropsy the abdominal cavity contained approximately ten L of yellow-tinged serosanguinous and fibrinous fluid. Approximately five meters of small intestine from the level of the distal jejunum to the ileo-cecal junction was herniated through a 7.5 cm diameter rent in the center of the right mesometrium of the uterus just cranial to the uterine artery (Figure 1). The incarcerated small intestine was dilated five cm in diameter. The serosal surface was diffusely mottled dark red and purple, and the wall was thickened one to two cm with transmural

hemorrhage and edema. The intestinal lumen was filled with serosanguinous fluid, clotted blood and mucus, and sloughed necrotic mucosa admixed with finely ground feed material. The associated mesentery had a line of demarcation that sharply delineated incarcerated mesentery from adjacent normal mesentery. Incarcerated mesentery was friable, discolored dark purple, and markedly thickened with hemorrhage and edema which extended from the mesenteric border to the mesenteric root.

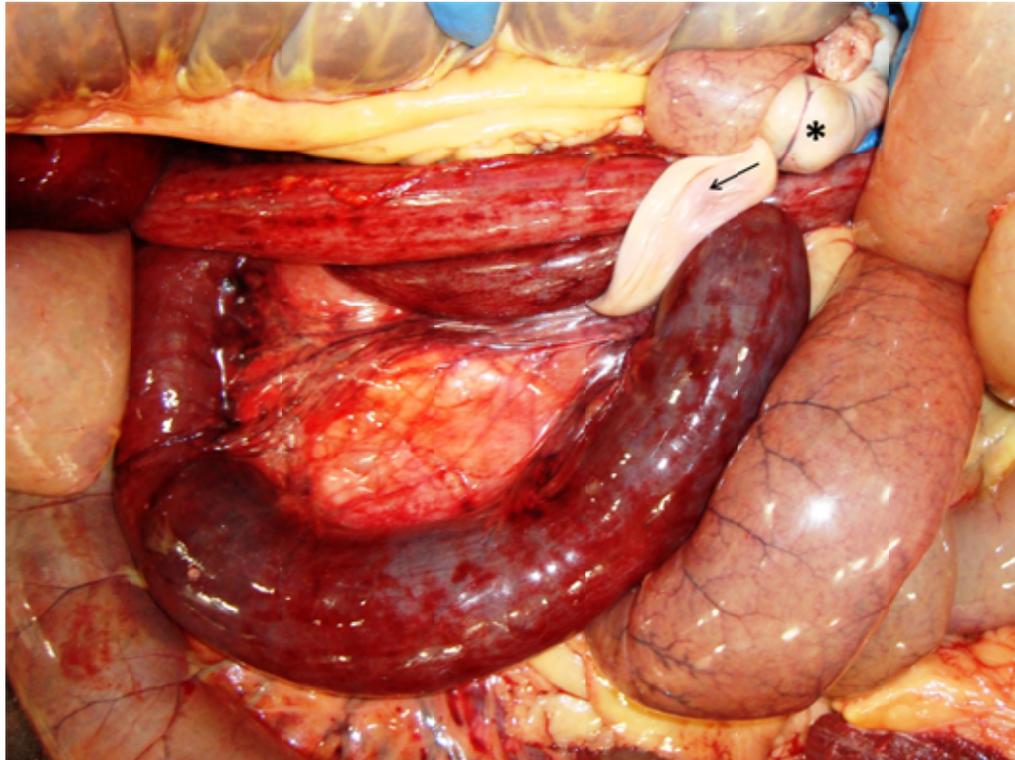


Figure 1. In situ photograph of the post-mortem examination. Five meters of distal jejunum and ileum were herniated and incarcerated within a rent in the right mesometrium of the uterus (arrow). Non-herniated small bowel was light pink, gas distended and sharply demarcated from incarcerated bowel. The right ovary is visible in the upper right quadrant (asterisk).

Evaluation of the right mesometrium (Figure 2) revealed that the rent was smoothly bordered by normal glistening serosal membrane, with no evidence of hemorrhage, inflammation, or fibroplasia, and there were no lesions in the uterus and ovaries. The left mesometrium had a five x three x three cm focal firm fibrous adhesion to the adjacent mesocolon, possibly indicative of prior inflammation or trauma at this site. Additional gross findings included hemorrhagic linear streaks in the cortex of both adrenal glands, severe and diffuse pulmonary congestion with petechial and ecchymotic hemorrhages throughout the mediastinum and on the epicardial surface, all consistent with endotoxemia and suggestive of septicemia and shock.

Histopathology of incarcerated jejunum and ileum confirmed segmental, transmural venous infarction of the gut with ischemic necrosis characteristic of entrapment (Figure 3). The mucosa was extensively sloughed and infiltrated by colonies of mixed bacteria. The submucosa and tunica muscularis were expanded by edema, blood and scattered inflammatory cells. Small intestine orad to the hernia had segmental lymphoplasmacytic enteritis which may have occurred secondary to adjacent small bowel herniation and necrosis. The margins of the mesometrial rent lacked inflammation, hemorrhage, or fibrosis and consisted of normal fibrovascular mesometrial stroma covered by smooth serosa with mild mesothelial reactivity. Lack of inflammation or fibrosis is consistent with a congenitally formed rent though a traumatic rent occurring several years in advance with termination of fibrosis and remodeling

was also considered. The zona glomerulosa of the adrenal cortex was extensively disrupted by hemorrhage and coagulative necrosis, consistent with endotoxic shock (Waterhouse-Friderichsen syndrome).

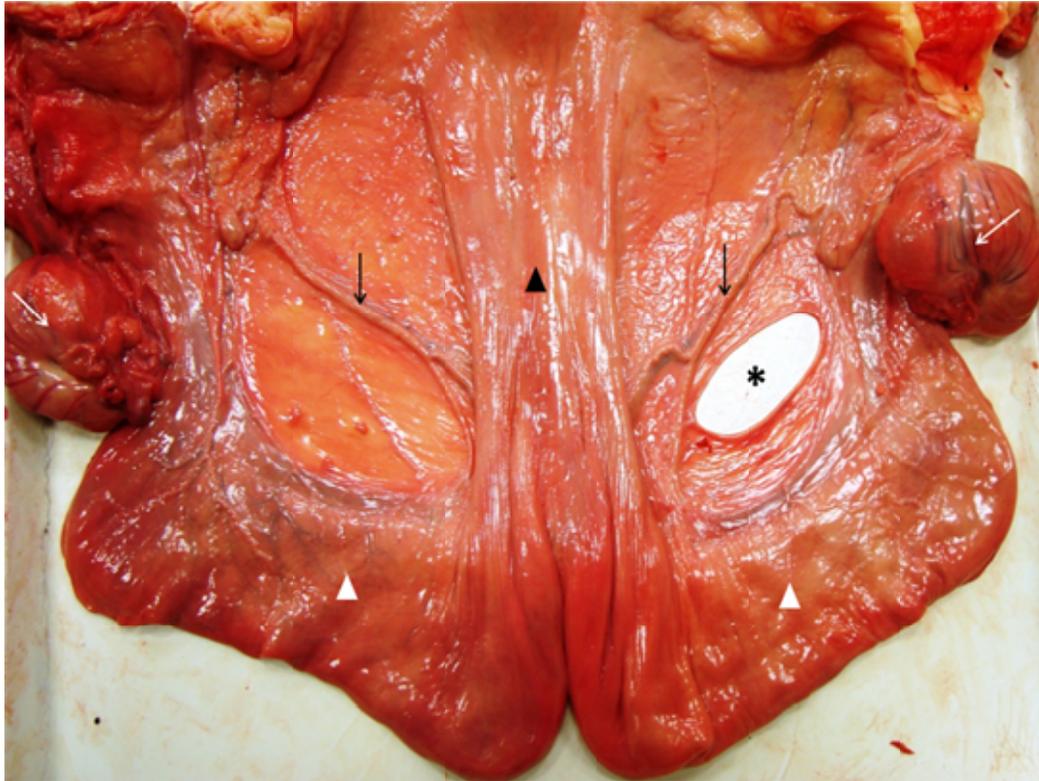


Figure 2. Dorsal view of the uterus. A 7.5 cm rent was present in the right mesometrium (asterisk). The margins of the rent were smooth with no hemorrhage or fibrosis. The uterine body (arrowhead), uterine horns (open arrows) and uterine arteries (arrows) were grossly normal.

Discussion

The pathogenesis of mesometrial rent formation in the mare has not been determined. Defects may be secondary to pelvic trauma such as may be associated with dystocia, previous abdominal surgery, or from various causes of abdominal inflammation (i.e. perforating or necrotizing enteritis, colitis, metritis, cystitis and peritonitis) which may result in tears in the ligament and subsequent healing with permanent rent formation. Hemorrhage from uterine or ovarian vessels is a well-documented complication in post-parturient mares.^{14,15} Hematomas can form in the mesometrium due to rupture of the middle uterine artery at mid-gestation or parturition. Improper healing may result in focal necrosis of the mesometrium, possibly resulting in rent formation.¹⁵ Abdominal rents in general may also be a spontaneous congenital anomaly.^{1,2,15}

The ten-year-old non-pregnant mare in this case report had no previous history of colic. The mare had been bred by live cover as a three- and four-year old, and successfully produced a foal from each pregnancy with unassisted parturition and no history of dystocia or post-partum complications. Despite this unremarkable health history, it is possible that the mare may have had subclinical pelvic trauma or hemorrhage of the mesometrium during pregnancy and parturition, which may have resulted in a mesometrial defect and permanent rent formation in the right mesometrium. Indeed, the gross adhesion of the left mesometrium and mesocolon suggests a prior history of at least focal pelvic serositis, though the relation of this lesion to the mesometrial rent and prior pregnancies is purely speculative. As the rent lacked inflammation and fibrosis, a congenital defect is also considered likely in this case.

Two case reports of mares with small intestinal herniation in a mesometrial rent are in the literature published in 1972 and 1980. In the 1972 report, a three-year-old pony mare presented for acute colitis of 36 hours duration. The mare had severe abdominal pain on rectal palpation and underwent exploratory standing laparotomy.² At surgery, the entire jejunum and most of the ileum had herniated through what was presumed to be a congenital defect in the left mesometrium, though no reference was made to the mare's prior breeding history and the rent could not be grossly visualized. The herniated intestine appeared viable and no resection was required. Ablation of the left broad ligament was performed. The mare recovered after surgery and was subsequently used for breeding without complication. In the 1980 report, a four-year-old Belgian mare in the eighth month of gestation presented with acute colic of six hours duration.³ A ventral midline celiotomy was performed and five meters of jejunum were herniated in a rent in the right mesometrium. Similar to the first case, the herniated intestine was successfully reduced and resection and anastomosis was not necessary. The mesometrial defect was not closed or ablated in this case, and gross features of the rent were not provided. The mare recovered from colic surgery and delivered a normal foal three months later.

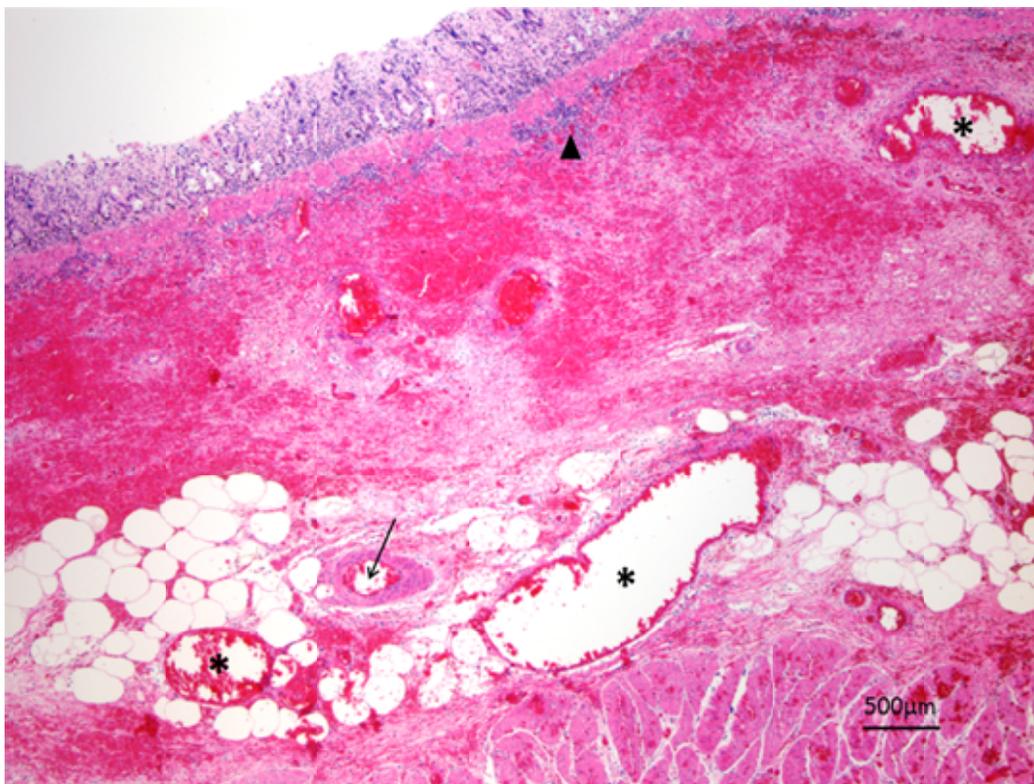


Figure 3. Photomicrograph of incarcerated jejunum. There was transmurular venous infarction, hemorrhage, and ischemic necrosis of the intestinal wall. The mucosa was sloughed with moderate inflammation (arrowhead) and extensive hemorrhage and edema of the submucosa, and marked venous dilation (asterisks) and congestion of arterioles (arrow). H&E, Bar 500 μ m.

To the authors' knowledge, no comparable reports are available regarding this condition in other large animal species or in companion animals. Interestingly, small bowel herniation in a mesometrial rent is rare, but well-described in women, in which it accounts for < 0.1% of all causes of intestinal obstruction and 4-7% of all internal hernias.¹⁶⁻²² In women mesometrial rents are associated with multiparity or a history of uterine surgery, salpingitis, or endometriosis, though congenital rents are also thought to occur.¹⁷ Diagnosis of bowel herniation in a mesometrial rent is based on clinical signs and computerized tomography scan, and surgical correction can be performed by laparoscopic reduction of herniated intestine, surgical resection and anastomosis if necessary, and ablation of the mesometrial defect to

prevent recurrence. Ablation is achieved either by suturing the defect closed or by surgically incising the mesometrium to connect the defect with the lateral mesometrial fold. In humans, mesometrium defects are classified into three types based on location in reference to the round ligament.²³

Small intestinal herniation in a mesometrial rent should be considered as a differential diagnosis in maiden mares and mares that have previously foaled or are currently pregnant which present with signs of acute abdominal pain and small bowel entrapment. The time elapsed between presentation of initial signs and surgical intervention, as well as extent of small bowel incarceration likely determine the outcome, though at least some surgical cases had long-term favorable outcomes.^{2,3}

Learning points

- Herniation of intestine through rents in the mesometrium is an important differential for acute colic in maiden mares and mares that have previously foaled or are currently pregnant.
- Mesometrial rents may occur congenitally in the mare, and post-parturient trauma or abdominal inflammation may also be a risk factor, as is often the case in women.
- Meticulous examination of the mesometrium should be considered in post-parturient mares to identify possible mesometrial lesions that could result in future rent formation.
- Intestinal herniation through a mesometrial rent should be a differential diagnosis for a mare presenting with acute colic even if the previous reproductive history is unremarkable.

References

1. Arnold CE, Payne M, Thompson JA, et al: Periparturient hemorrhage in mares: 73 cases (1998-2005). *J Am Vet Med Assoc* 2008;232:1345-1351.
2. Lamothe P, Giguere G, Marcoux M: Hernia of the broad ligament of the uterus in a mare. *Mod Vet Pract* 1972;53:49.
3. Becht JL, McIlwraith CW: Jejunal displacement through the mesometrium in a pregnant mare. *J Am Vet Med Assoc* 1980;177:436.
4. Tennant B, Wheat, JD, Meagher, DM: Observations on the causes and incidence of acute intestinal obstruction in the horse. *Proc Annu conv Am Assoc Equine Pract* 1975. p. 426-438.
5. Wheat JD: Causes of colic and types requiring surgical intervention. *J S Afr Vet Med Assoc* 1975;46:95-98.
6. Santschi EM, Juzwiak JS, Moll HD, et al: Diaphragmatic hernia repair in three young horses. *Vet Surg* 1997;26:242-245.
7. Archer DC, Proudman CJ, Pinchbeck G, et al: Entrapment of the small intestine in the epiploic foramen in horses: a retrospective analysis of 71 cases recorded between 1991 and 2001. *Vet Rec* 2004;155:793-797.
8. Gayle JM, Blikslager AT, Bowman KF: Mesenteric rents as a source of small intestinal strangulation in horses: 15 cases (1990-1997). *J Am Vet Med Assoc* 2000;216:1446-1449.
9. Gayle JM, Macharg MA, Smallwood JE: Strangulating obstruction caused by intestinal herniation through the proximal aspect of the cecocolic fold in 9 horses. *Vet Surg* 2001;30:40-43.
10. Voermans M, Butler CM, van der Velden MA, et al: Incarcerated umbilical hernia in the horse: a case with a review of the literature. *Tijdschr Diergeneesk* 2004;129:142-149.
11. Freeman DE, Koch DB, Boles CL: Mesodiverticular bands as a cause of small intestinal strangulation and volvulus in the horse. *J Am Vet Med Assoc* 1979;175:1089-1094.
12. Hawkins JF, Schumacher JS, McClure SR, et al: Small intestinal incarceration through the lateral ligament of the urinary bladder in a horse. *J Am Vet Med Assoc* 1993;202:89-90.
13. Jenei TM, Garcia-Lopez JM, Provost PJ, et al: Surgical management of small intestinal incarceration through the gastrosplenic ligament: 14 cases (1994-2006). *J Am Vet Med Assoc* 2007;231:1221-1224.
14. LeBlanc MM: Common peripartum problems in the mare. *Equine Vet Sci* 2008;28:709-715.
15. Ueno T, Nambo Y, Tajima Y, et al: Pathology of lethal peripartum broad ligament haematoma in 31 Thoroughbred mares. *Equine Vet J* 2010;42:529-533.
16. Fafet P, Souiri M, Ould Said H, et al: Internal hernia of the small intestine through a breach of the broad ligament, apropos of a case. Review of the literature. *J Chir (Paris)* 1995;132:314-317.
17. Guillem P, Cordonnier C, Bounoua F, et al: Small bowel incarceration in a broad ligament defect. *Surg Endosc* 2003;17:161-162.
18. Haku T, Daidouji K, Kawamura H, et al: Internal herniation through a defect of the broad ligament of the uterus. *Abdom Imaging* 2004;29:161-163.
19. Hiraiwa K, Morozumi K, Miyazaki H, et al: Strangulated hernia through a defect of the broad ligament and mobile cecum: a case report. *World J Gastroenterol* 2006;12:1479-1480.
20. Ishihara H, Terahara M, Kigawa J, et al: Strangulated herniation through a defect of the broad ligament of the uterus. *Gynecol Obstet Invest* 1993;35:187-189.

21. Natalini G, Trancanelli V, Gerli P, et al: Internal hernia through an orifice of the broad ligament of the uterus. *Minerva Chir* 1980;35:1359-1362.
22. Nozoe T, Anai H: Incarceration of small bowel herniation through a defect of the broad ligament of the uterus: report of a case. *Surg Today* 2002;32:834-835.
23. Cilley R, Poterack K, Lemmer J, et al: Defects of the broad ligament of the uterus. *Am J Gastroenterol* 1986;81:389-391.