Recurrence of renosplenic entrapment after renosplenic space ablation in a seven-year-old stallion

Emily A. Barrell, MS; J. Lacy Kamm, DVM; Dean A. Hendrickson, DVM, DACVS

Case Description—A 7-year-old mixed-breed stallion was admitted because of colic.

Clinical Findings—Entrapment of the left colon in the renosplenic space was diagnosed via rectal palpation and ultrasonographic examination, despite a renosplenic space ablation 6.5 years earlier.

Treatment and Outcome—The renosplenic entrapment was corrected with a combination of phenylephrine administration, rolling, and ballottement of the horse’s abdomen during general anesthesia. The following week, left flank laparoscopic renosplenic space ablation was performed with the horse standing. On examination of the previous surgical site, only 4 bands of fibrous adhesion remained of the original space ablation. The renosplenic space was again closed by suturing the perirenal fascia and renosplenic ligament to the splenic capsule. The horse was discharged from the hospital and recovered at home. No complications or recurrence of entrapment was reported following the procedure.

Clinical Relevance—There have been no previous reports of recurrence of renosplenic entrapment following procedures to permanently ablate the renosplenic space. Recurrence in this patient may be attributed to the horse’s young age at the time of initial surgery or inadequate size or spacing of the sutures through the perirenal fascia and splenic capsule. (J Am Vet Med Assoc 2011;239:504–507)

In October 2002, a 7-month-old (279.5-kg [615.0-lb]) mixed-breed colt was admitted to the Colorado State University Veterinary Teaching Hospital with a history of signs of abdominal pain, which were unresponsive to analgesics. An exploratory laparotomy was performed via a 20-cm ventral midline incision and revealed that the pelvic flexure and dorsal and ventral large colon were in the right dorsal quadrant. Furthermore, the dorsal and ventral large colon were found to be entrapped within the renosplenic space and contained impacted fecal material. The entrapment was reduced, and 3 L of polyionic fluids was introduced into the dorsal colon through an 18-gauge needle to soften the ingesta. The remainder of the exploratory laparotomy findings were unrewarding. The linea alba was closed with No. 3 polyglactin 910 in a simple continuous pattern, and 2-0 polyglyconate was used to close the subcutaneous tissue. Stainless steel staples were used to close the skin incision. Feed was withheld for an additional 48 hours, and potassium penicillin (22,000 U/kg [10,000 U/lb], q 6 h, IV for 1 day) and gentamicin sulfate (6.6 mg/kg [3 mg/lb], IV, once) were administered. Polyionic fluids were administered IV for 48 hours following surgery, and the horse also received ranitidine (5 mg/kg [2.3 mg/lb], q 24 h, PO for 2 days) and omeprazole (2 mg/kg [0.9 mg/lb], PO, q 24 h for 3 days) for ulcer prevention. Flunixin meglumine (0.5 mg/kg [0.23 mg/lb], IV, q 8 h) was administered to control pain and inflammation for an additional 3 days following surgery.

Because of the young age of the horse, the owners and treating clinicians felt that it might be predisposed to recurrent renosplenic entrapment. Therefore, the owners elected to have a renosplenic space ablation performed the following month to permanently prevent recurrence. The weanling was admitted to the Veterinary Teaching Hospital; food was withheld for 12 hours before surgery, and the horse was administered a preoperative dose of flunixin meglumine (1.1 mg/kg [0.5 mg/lb], IV) and procaine penicillin G (20,000 U/kg [9,090.90 U/lb], IM). Restraint during the procedure was accomplished by use of standing stocks, and detomidine hydrochloride (40 µg/kg [18.2 µg/lb] in sterile saline [0.9% NaCl] solution; total volume, 8 mL) was administered for epidural analgesia. Laparoscopy was performed according to the technique described in 2002 by Mariën. The left paralumbar fossa was clipped of hair and aseptically prepped and draped. Each of 2 small portal sites were infiltrated with 10 mL of 2% lidocaine hydrochloride, and a third, larger portal site was infiltrated with 20 mL of 2% lidocaine hydrochloride. A 10-mm portal was created in the 17th intercostal space level with the dorsal aspect of the tuber coxae and served as the laparoscope portal (portal 1). A 25-mm portal was made in the paralumbar fossa midway between the 18th rib and the tuber coxae and was used for a large-bore cannula (portal 2). A third portal approximately 10 mm in size was made 5 cm ventral to the second opening (portal 3). It served as the portal for instrumentation. An electronic insufflator was used to create an abdominal insufflation of 12 mm Hg for the placement of the 2 smaller cannulas and the large-bore cannula. Once the cannulas were placed and the

From the Department of Clinical Sciences, College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO 80523.

Address correspondence to Dr. Hendrickson (Dean.Hendrickson@ColoState.edu).

JAVMA, Vol. 239, No. 4, August 15, 2011

504 Scientific Reports

Unauthenticated | Downloaded 03/26/24 03:46 PM UTC
exploratory surgery performed, the abdomen was de-
sulfated. The splenic capsule was sutured to the vis-
ceral peritoneum overlaying the left kidney by use of 0
polyglyconate in a continuous pattern. The ablation
site was evaluated prior to closure. The muscle layers
were closed in the large cannula incision with 0 poly-
glyconate in 2 layers of simple continuous sutures. The
skin was closed with 2-0 nylon monofilament suture in
a cruciate pattern for the small portal sites; a continu-
ous pattern was used for the large portal site. Follow-
ing the procedure, the horse was administered flunixin
meglumine (1.1 mg/kg, IV, once). It was discharged,
and the owners were instructed to administer phenyl-
butazone tablets (1.8 mg/kg [0.8 mg/lb], PO) every 12
hours for 5 days with a recommendation to keep the
horse confined in a box stall until suture removal. The
horse was reported to recover well at home.

Nearly 7 years after the renosplenic space ablation,
in October of 2009, the horse was now 7 years of age
with a body weight of 554.5 kg (1,220.0 lb) and was
again referred to the veterinary teaching hospital with
signs of colic including inappetence, decreased defeca-
tion, and attempting to roll. The referring veterinarian
performed rectal palpation of the horse and diagnosed
a renosplenic entrapment of the left colon. The horse
was administered flunixin meglumine (1.1 mg/kg, IV),
buscopan (0.17 mg/kg [0.077 mg/lb], IV), sedatives (xy-
lazine, 0.3 mg/kg [0.14 mg/lb], IV; butorphanol tartate,
0.01 mg/kg [0.005 mg/lb], IV; and acepromazine ma-
late, 0.2 mg/kg [0.09 mg/lb], IV), and ephedrine (20
mg in 60 mL of saline [0.9% NaCl] solution, over 5
minutes IV), but the displacement did not resolve. The
horse was referred to the Veterinary Teaching Hospital
and, upon admission, was sweating and shaking and ap-
peared uncomfortable. Abdominal ultrasound by use of
a 3.75-MHz probe revealed a ventrally deviated spleen
with rounded edges and a lack of visualization of the left
kidney. On rectal palpation, the large colon was identi-
fied as lying dorsolateral to the spleen and the presence
of an impacted right dorsal colon was detected. The left
kidney and renosplenic ligament could not be palpated.
Abdominocentesis was performed, and the sample was
of normal color with total protein concentration < 2 mg/
dl. (reference range, 0.0 to 2.5 g/dL). On the basis of
rectal palpation and ultrasound findings, a diagnosis of
renosplenic entrapment was made. The horse was initial-
ly administered a 5-L bolus of polyionic electrolyte lu-
ids IV followed by 5 mg of phenylephrine (0.009 mg/kg
[0.004 mg/lb]) in 1 L of a polyionic electrolyte solution
via a jugular catheter. It was moved into an induction
stall; the horse was premedicated with xylazine (0.8 mg/
kg [0.36 mg/lb]), and general anesthesia was induced by
use of ketamine (2.2 mg/kg [1 mg/lb]) and diazepam
(0.1 mg/kg [0.05 mg/lb]). General anesthesia was main-
tained with 1 g of ketamine and 500 mg of xylazine in
1 L of 5% guaiifenesin administered IV to effect. Follow-
ing induction of anesthesia, the horse was placed in right
lateral recumbency and hobbles were applied to its hind
limbs. A hoist was used to raise the horse’s hind end off
the ground and position the horse in dorsal recumbency.
The abdomen was then ballotted in an attempt to dis-
locate the left dorsal colon from the renosplenic space.
After ballottement was complete, the horse was rolled

Approximately 2.5 weeks later, the owners elected
to have the abdomen explored laparoscopically and the
renosplenic space ablation repeated as necessary. The
stallion was readmitted to the hospital, and food was
withheld for 24 hours prior to the surgery. A jugular vein
catheter was placed, and the horse was administered
gentamicin (6.6 mg/kg, IV) and procaine penicillin G
(22,000 U/kg, IM) prior to surgery. The horse was placed
in stocks, sedated with 5 mg of detomidine hydrochlor-ide and 5 mg of butorphanol IV, and administered 1-L
of saline solution containing 20 mg of detomidine as a
continuous infusion IV to maintain a desired state of
sedation. Laparoscopy was performed as described by
Farstvedt and Hendrickson and differed from the first
ablation procedure in that portal 3 served as the large
bore cannula site and portals 1 and 2 were used as the
laparoscope and instrument portals. On examination
with the laparoscope, adhesions between the splenic
capsule and the perirenal fascia were observed to be in-
complete. Rather than the sheet of adhesion expected
(Figure 1), all that remained of the fibrous tissue were 4

![Figure 1](image-url) — Necropsy photograph of a horse that had undergone a renosplenic space ablation 3 years previously. Note the complete and smooth fibrous adhesion (large arrow) joining the spleen (asterisk) and perirenal fascia. The renosplenic ligament is denoted by the small arrow.
bands between the splenic capsule and the visceral peritoneum of the kidney (Figure 2). The renosplenic space ablation was repeated by use of size 0 polyglyconate in a simple continuous pattern, incorporating the bands of fibrous tissue from the first surgery into the closure. The skin in all 3 portals was closed with size 0 polyglyconate in a simple continuous pattern, incorporating the bands of adhesion remain.

Discussion

The diagnosis of renosplenic entrapment is often made solely on the basis of combined findings on rectal palpation and abdominal ultrasound. Although rectal palpation is a somewhat nonspecific diagnostic tool and confirmation of renosplenic entrapment could have been made via laparoscopy or exploratory laparotomy, the authors were confident that entrapment was the most likely cause of the initial recurrent episode of colic in this patient. Renosplenic entrapments have been reported to comprise between 2.3% and 6% of cases of colic in horses, and the incidence of recurrence has been found to be between 3.2% and 21%. Survival rates after left dorsal displacement of the colon are reported to be as high as 93%, but for horses with a history of recurrence, the cost of repeated correction, the lost training time, and the potential for complications following surgery can be considerable obstacles for many owners. Thus, surgical intervention may be a viable option for management of patients with recurrence. Several techniques exist to permanently prevent renosplenic entrapment, including colopexy, colon resection, and ablation of the renosplenic space. These can be accomplished either laparoscopically through the left flank in standing animals (with or without hand assistance) or through a celiotomy with the horse in right lateral recumbency under general anesthesia. Each technique presents its own unique advantages and disadvantages, but all serve to create permanent ablation of the renosplenic space, preventing recurrence. To our knowledge, this is the first documented instance of renosplenic entrapment following surgery to obliterate the renosplenic space.

It is suspected that the shape and depth of the renosplenic space vary among horses, with deep clefts predisposing some to recurrent entrapments and narrow shelves reducing this likelihood. Additionally, it has been reported that the morphology of the renosplenic space may change as an animal ages. The horse in the present report was 7 months old at the time of the initial ablation surgery, and it is of note that renosplenic ablations are not commonly performed on animals of such a young age. In this case, the treating clinicians thought that renosplenic entrapment at such a young age might have indicated a predisposition to future entrapments and thus elected, with the owner’s consent, to perform the ablation on the weanling. It is unknown whether the young age of this colt may have contributed to the failure of the ablation. Previous studies have only included horses ≥3 years of age. It is possible that as this colt continued to grow, the ablation became stretched or the shape of the renosplenic space changed naturally with growth, either of which may have created space for potential entrapment. Further research may be warranted to determine whether suture closure of the renosplenic space should be postponed in young, growing horses.

Previous reports detailing necessary size requirements and spacing for suture bites through the splenic capsule and perirenal fascia are limited. Mariën et al suggested bite sizes of at least 1.5 cm narrowly spaced 1 to 2 cm apart to reduce tension across the suture line and prevent tearing of the splenic capsule. In the patient in the present report, it is possible that the bite sizes used in the initial procedure in 2002 were too small in depth, spaced too far apart, or a combination of both, resulting in failure of most of the suture line over time.

Recently, Epstein and Parente described the laparoscopic placement of a nonabsorbable mesh to oblit-

Unauthenticated | Downloaded 03/26/24 03:46 PM UTC
erate the renosplenic space, an alternative to the previously described suture closure. 1,2,9 The authors postulated that advantages may include less requirement for surgical expertise and less potential for tearing of the splenic capsule under tension of the sutures. In that study, 8 5 horses underwent 2 laparoscopic procedures: the first to place the mesh and the second, 4 weeks later, to determine healing and evaluate the renosplenic space. All horses were subsequently euthanatized, and measurements of the implants and renosplenic space were taken at necropsy. It was found that although the procedure subjectively took a longer amount of time to complete than would a traditional laparoscopic suture closure method, closure of the renosplenic space with fibrous tissue was complete in all 5 horses. Problems encountered 8 included difficulty introducing larger-sized pieces of mesh for horses with large spaces, and in 1 horse, a mesenteric adhesion to the mesh was noted. Although the finding of an adhesion is disconcerting, few animals that have undergone laparoscopic renosplenic space ablation have had documented reevaluation,4,8,9 making it possible that adhesions have gone undetected with traditional suture closure methods. Polypropylene mesh may serve as a larger scaffold for fibrous tissue and offers more complete coverage of the renosplenic space than the traditional suture closure method. It may be more useful in younger animals, as larger pieces of mesh could be used to offset potential growth of the animal and widening of the space.

Until now, laparoscopic renosplenic space ablation was thought to be 1 method of permanently preventing entrapment of the large colon. However, the horse in this report has shown that this procedure may not always provide a lasting solution. Laparoscopic ablation is an efficient, minimally invasive procedure with decreased risk during anesthesia to the patient, reduced cost to the owner, and quick recovery times, compared with celiotomy performed in dorsal recumbency. However, placing sutures more closely together or use of a mesh may be necessary to prevent gapping and inadequate renosplenic space ablation in a young horse.

References


b. Vicryl, Ethicon Inc, Somerville, NJ.
c. Maxon, Ethicon Inc, Somerville, NJ.
e. Dermalon, Ethicon Inc, Somerville, NJ.