

Pyometra and cervical wedge resection in a mare

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Summary

A 21-year-old mare evaluated for inappetence and lethargy was diagnosed with pyometra secondary to cervical fibrosis and adhesions. Palliative treatment consisted of uterine evacuation and lavage, however the chronic fibrosis and recurrence of cervical adhesions precluded complete resolution of the condition. A cervical wedge resection was performed to reestablish cervical patency and facilitate uterine drainage. Following surgery, the cervix was manipulated regularly to prevent stenosis and adhesion formation. Eleven weeks after surgery, the mare developed a dilation of the cranial cervical canal and stenosis of the internal cervical os. The stenotic internal cervical os allowed a small amount of malodorous purulent fluid to drain from the mare's uterus but the opening was too small to permit uterine lavage. Ovariohysterectomy was offered as a curative solution for the mare's recurrent pyometra; the owner elected conservative management.

Keywords: Mare, pyometra, cervical wedge resection, ovariohysterectomy

Background

Pyometra is an infrequent diagnosis in the mare and is rarely associated with systemic illness, however mares may become uncomfortable and colicky when the uterus becomes grossly distended. Pyometra occurs secondary to cervical adhesions and fibrosis, but has also been associated with retained endometrial cups¹ or a closed cervix secondary to progesterone from a persistent corpus luteum.² Pyometra may be managed medically with frequent uterine evacuation and lavage or surgically with cervical wedge resection, which reestablishes cervical patency and allows for uterine drainage. Ovariohysterectomy is a surgical option that is infrequently performed given the difficulty in gaining access to the mare's reproductive tract and the risk of complications (ie. peritonitis and hemorrhage) associated with the surgery. This case represents a spectrum of the severity and treatments existing for pyometra in the mare.

Case presentation

A 21-year-old Irish Sport Horse mare was evaluated for inappetence of one day's duration. The mare was dull and lethargic and appeared to have lost weight despite abdominal distension. The mare was ridden daily and had competed two weeks prior to presentation. The mare had never carried a foal to term but had produced multiple offspring via embryo transfer; the last embryo was recovered from the mare in 2013. In 2014 the owner planned to perform embryo transfer one final time, however the mare maintained sterile, mucoid fluid in the uterine lumen despite repeated treatment. In addition, the mare's cervix was difficult to navigate due to its length, tightness and tortuous nature, which may have been exacerbated by repeated cervical manipulation during embryo transfer and likely contributed to the accumulation of mucoid fluid within the uterus. The owner elected to retire the mare from breeding.

On presentation, the mare was quiet, alert and responsive with thin body condition (BCS 4/9) and abdominal distension. The mare's perineal conformation was unremarkable and a vulvoplasty was in place. Palpation per rectum revealed a grossly distended uterus, mimicking the size of a late-gestation pregnancy; echogenic intrauterine fluid was visible via transrectal (Figure 1) and transabdominal ultrasound. The ovaries could not be imaged at this time due to marked uterine distension causing the uterus to expand dorsally above the pelvic brim and into the abdomen. A manual vaginal examination revealed a tightly closed tortuous cervix, with transluminal adhesions.

The mare was administered intravenous detomidine hydrochloride (0.01 mg/kg [0.005 mg/lb], IV), butorphanol tartrate (0.01 mg/kg [0.005 mg/lb], IV), and N-butylscopolammonium bromide (0.1 mg/kg [0.05 mg/lb], IV). Manual cervical dilation was performed to allow passage of a small bore nasogastric tube into the uterine lumen to facilitate the drainage of approximately 115 liters of thick, non-

odorous, purulent material. The uterus was lavaged with ten liters of 0.9% NaCl following uterine evacuation. The mare was administered flunixin meglumine (1 mg/kg [0.5 mg/lb], IV q 24 h), gentamicin (6.6 mg/kg [3 mg/lb], IV q 24 h), penicillin G procaine (20,000 IU/kg [9,091 IU/lb], IM q 12 h), and oxytocin (10 IU/animal, IM q 8 h). The following day the mare was started on a ten day course of sulfamethoxazole/trimethoprim (30 mg/kg [13.6 mg/lb], PO q 12 h) to provide broad spectrum antimicrobial coverage.

Treatment

The mare was presented to the University of Pennsylvania School of Veterinary Medicine, New Bolton Center Hospital for Large Animals for standing cervical wedge resection eight days following initial examination. Immediately prior to surgery, 55 liters of thin orange fluid was drained from the mare's uterus. Following evacuation, the uterus was lavaged with four liters of 0.05% povidone-iodine solution, which can be used in the management of microbial infections to suppress the growth of bacteria without detrimental effects on the uterus. Point of care bloodwork (packed cell volume, total protein, creatinine) was within normal reference ranges. The mare was placed in standing stocks prior to sedation with detomidine hydrochloride (0.01 mg/kg [0.005 mg/lb], IV) and butorphanol tartrate (0.01 mg/kg [0.005 mg/lb], IV). Caudal epidural anesthesia was achieved with the administration of 2% lidocaine (60 mg) and xylazine (60 mg) at the first intercoccygeal space. Adhesions within the cervical canal were broken down (Figure 2) and a full-thickness wedge-shaped defect was created in the cervix from the nine to 12 o'clock position, with the apex pointed cranially.³ The entire *portio vaginalis* was surgically removed. The mare was administered phenylbutazone (4 mg/kg [1.82 mg/lb], IV once) and started on a course of sulfamethoxazole/trimethoprim (30 mg/kg [13.6 mg/lb], PO q 12 h for 10 days) and phenylbutazone (2.2 mg/kg [1 mg/lb], PO q 24 h for 3 days).

The mare was evaluated once daily for three days after surgery. The first assessment revealed a patent cervix that easily admitted two fingers into the external os and one finger into the internal os. The internal cervical os was gently dilated using two fingers and a nystatin-neomycin sulfate-thiostrepton-triamcinolone acetate ointment (Quadritop™ Ointment, Henry Schein Animal Health, Dublin, OH) was applied topically to the cervical openings and canal to prevent adhesion formation. The mare was administered oxytocin (10 IU/animal, IM q 8 h) that day to stimulate uterine contractions and drainage. Prostaglandin (or a synthetic analogue), another commonly used ecbolic, was not selected due to the potential for mare discomfort. The following day, ultrasonographic examination of the mare's reproductive tract per rectum revealed several centimeters of echogenic intrauterine fluid. The mare's uterus was lavaged with four liters of 0.9% NaCl and the initial effluent recovered was watery and pink. The cervix was gently dilated and steroid ointment was applied. Three days after surgery, ultrasonographic examination per rectum of the mare's reproductive tract was repeated. Approximately 2.5 cm of slightly echogenic fluid was present in the uterine body and horns. Multiple medium sized follicles were noted on both ovaries. The cervix was once again dilated and steroid ointment applied. The owner continued to manually dilate the mare's cervix and apply topical steroid ointment to the cervical canal and openings. For the first four weeks, the procedure was performed daily then every other day for two weeks, and compliance was confirmed via frequent communication with the owner.

Six weeks after surgery, the mare's reproductive tract was examined via transrectal ultrasonography. The uterine wall was moderately thickened throughout the uterine body and horns. Approximately 5 cm of echogenic fluid was visible at the uterine bifurcation. Manual cervical examination revealed a patent cervix that permitted two fingers into the external cervical os and one finger into the internal cervical os. The cervical canal was short and straight. The owner was instructed to continue with manual dilation once every three days for the next four weeks.

Nine weeks after surgery, the owner noted a malodorous white-yellow vulvar discharge. The mare was examined the following week by transrectal palpation and ultrasonography. The mare's uterine body and uterine horns were distended with moderately echogenic fluid (greater than 10 cm). Manual cervical examination revealed a straight cervical canal that could easily admit two fingers. A double guarded culture swab was passed through the cervix in an effort to obtain a sample of uterine fluid for

bacterial culture and sensitivity. Following passage of the swab, no purulent material was evident on the swab or gloved hand. Careful cervical palpation revealed a large dilation, approximately 5 to 6 cm in length, cranial to the cervical canal. The exact location of the dilation was difficult to ascertain. Two scenarios were possible: the circumferential dilation was in the cranial cervical canal and developed secondary to repeated stretching of the internal cervical os and cranial cervical canal, or the dilation was a fibrous adhesion in the caudal uterine body created by repeat trauma to the internal cervical os. The former seemed to be the most plausible, however endoscopy was recommended to characterize the exact location of the dilation.

Eleven weeks after surgery, the mare presented to the University of Pennsylvania School of Veterinary Medicine, New Bolton Center Hospital for Large Animals for endoscopic evaluation. She was bright, alert and responsive and vital parameters were within normal limits. The mare was placed in standing stocks and administered detomidine hydrochloride (0.01 mg/kg [0.005 mg/lb], IV), butorphanol tartrate (0.01 mg/kg [0.005 mg/lb], IV), N-butyloscopolammonium bromide (0.1 mg/kg [0.05 mg/lb], IV) and flunixin meglumine (1 mg/kg [0.45 mg/lb], IV). Transrectal ultrasonographic evaluation of the mare's reproductive tract revealed greater than 10 cm of echogenic fluid within the uterine body and horns. Air was visualized in the vagina, caudal uterine body and cervical canal, indicating some degree of cervical patency. The mare's vulvoplasty had been previously opened but she maintained adequate apposition of vulvar lips. Manual examination of the cervix confirmed the presence of a large, circumferential dilation cranial to the cervical canal. No obvious opening was palpable along the cranial borders of the dilation. A small amount of purulent malodorous fluid was present in the dilation and a sample was obtained for aerobic culture and sensitivity.

Examination of the caudal reproductive tract was performed using a flexible videoendoscope (GIF-Q160 Gastroscope, CLV-180 light source, CV-180 image processor, Olympus, Center Valley, PA). A circumferential dilation was visualized cranial to the cervical canal. The tissue lining the dilation was pink and smooth and a small opening (3-4 mm in diameter) was visualized in the cranial wall of the dilation. Purulent fluid was visualized emanating from the opening. The opening appeared to be most consistent with a stenotic internal cervical os, but was too small to permit advancement of the endoscope into the uterus. It was not possible to advance a small gauge catheter through the biopsy channel of the endoscope given the tortuous nature of the canal cranial to the opening.

Because uterine lavage was no longer feasible, the owner was advised of the options of conservative treatment with systemic antibiotics for a finite period of time (to combat the production of purulent fluid within the uterus) or standing hand-assisted laparoscopic ovariohysterectomy. Systemic antibiotic treatment, rather than intrauterine therapy, was proposed as a means to establish better uterine distribution given the presence of purulent fluid within the uterus. Ovariohysterectomy was proposed as a curative, surgical option recognizing the risk of surgical complications and the large financial commitment.

Aerobic culture of the purulent uterine fluid yielded a light growth of *Actinobacillus rossii*, a gram negative coccobacillus species with in vitro sensitivity to the following antimicrobials: chloramphenicol, doxycycline, ciprofloxacin, ticarcillin and amikacin. The owner declined both surgical and antimicrobial therapy.

Outcome

The mare continues to drain approximately 240 ml (one cup) of malodorous, purulent fluid from the vulva each day with no signs of systemic illness. The owner is hesitant to pursue further treatment at this time given that the mare's uterus is draining consistently. The mare's reproductive tract is examined once monthly by transrectal and transabdominal ultrasonography to ensure the uterus does not become markedly distended. Currently the mare continues to be ridden daily with plans for competition in the near future. At the time of writing, the mare remains comfortable with markedly reduced uterine distension and continued vulvar drainage from the uterus.

Discussion

Pyometra in the mare is seldom accompanied by systemic clinical signs^{2,4,5} and mares with transluminal cervical adhesions and concurrent pyometra are often clinically stable for years until the uterus becomes severely distended. If the cervix is closed due to fibrosis and/or adhesions, vulvar discharge will not be visualized. Pyometra commonly results from cervical incompetence secondary to parturition, attempts to resolve dystocia, or repeated cervical manipulation during intrauterine treatments or embryo transfer. Transluminal cervical adhesions interfere with normal uterine clearance mechanisms^{2,3,5} leading to accumulation of fluid within the uterus and ultimately pyometra. The most common organism associated with pyometra in the mare is *Streptococcus equi* ssp. *zooepidemicus*; *Escherichia coli*, *Actinomyces* sp., *Pasteurella* sp., *Pseudomonas* sp., *Propionibacterium* sp., and *Candida rugosa* have been reported as well.^{2,4} Equine pyometra is typically managed with uterine lavage and ecbolics such as oxytocin or synthetic prostaglandin analogues, with appropriate antimicrobial therapy helping to facilitate treatment.^{2,4} Surgical treatment is considered when severe cervical adhesions or fibrosis prevents adequate drainage.

Cervical wedge resection³ is one treatment option for mares with pyometra secondary to cervical adhesions and fibrosis. In a report involving six mares with cervical defects and chronic pyometra, a full-thickness wedge-shaped defect was created in the dorsolateral aspect of the cervix to create a permanent opening to the uterus. In that report, the wedge was approximately 3-4 cm wide at its base and narrowed to a 2-3 cm diameter lumen near the internal cervical os. Post-operative care consisted of daily treatment with topical steroids and antibiotics for two weeks, then once weekly treatment for the following two weeks. Resolution of pyometra was achieved in five of six mares. The one mare that did not resolve the pyometra and required periodic lavage was presumed to have poor drainage subsequent to ventral displacement of the uterus secondary to a large accumulation of uterine fluid.

Ovariohysterectomy is a treatment option for refractory cases of pyometra in which uterine lavage is ineffective or impossible due to cervical or serosal adhesions or the dependent, ventral location of the uterus. Ovariohysterectomy in the mare is an infrequently performed procedure.⁶ Surgical access to the uterus with the mare under general anesthesia in dorsal recumbency is difficult, and ovariohysterectomy with this approach has resulted in more postoperative complications than more recent laparoscopic assisted approaches.^{7,8} Laparoscopic standing transection of the dorsal uterine attachments followed by general anesthesia and resection of the uterus at the caudal body was successful without any significant complications in three mares.⁶ Surgical approaches with the mare standing and the use of improved laparoscopic techniques make this approach a more viable option with decreased risks.

In the present case, uterine lavage was difficult given the tight, tortuous nature of the mare's cervix and the cervical adhesions. The owner elected cervical wedge resection as a treatment for the mare's pyometra, allowing the mare to maintain quality of life and athletic aspirations without the complications and costs associated with ovariohysterectomy. The large volume of uterine fluid at presentation may have had a negative influence on the outcome by decreasing the mare's ability to actively expel uterine fluids after the wedge resection was performed. That is, the cranioventral distension of the uterus may have contributed to decreased uterine clearance even after the establishment of cervical patency. In cases of a ventrally-angled, pendulous uterus, uteropexy has been reported as a technique to facilitate drainage and improve pregnancy rates, but has not been reported as a treatment for advanced pyometra and was not pursued in this mare.⁹

Learning points

- Pyometra in the mare is rarely associated with systemic illness.
- Cervical wedge resection is a surgical option for pyometra for cases in which uterine evacuation and lavage is insufficient.
- Ovariohysterectomy is an infrequently performed procedure in the mare but if successful, is a curative option for refractory cases of pyometra.

- Significant cervical remodeling may occur following cervical wedge resection, and repeated evaluation is recommended following surgery.

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Figure 1. Transrectal ultrasound image of the uterus illustrating echogenic material within the caudal uterine body. Marks are at intervals of 5 mm.

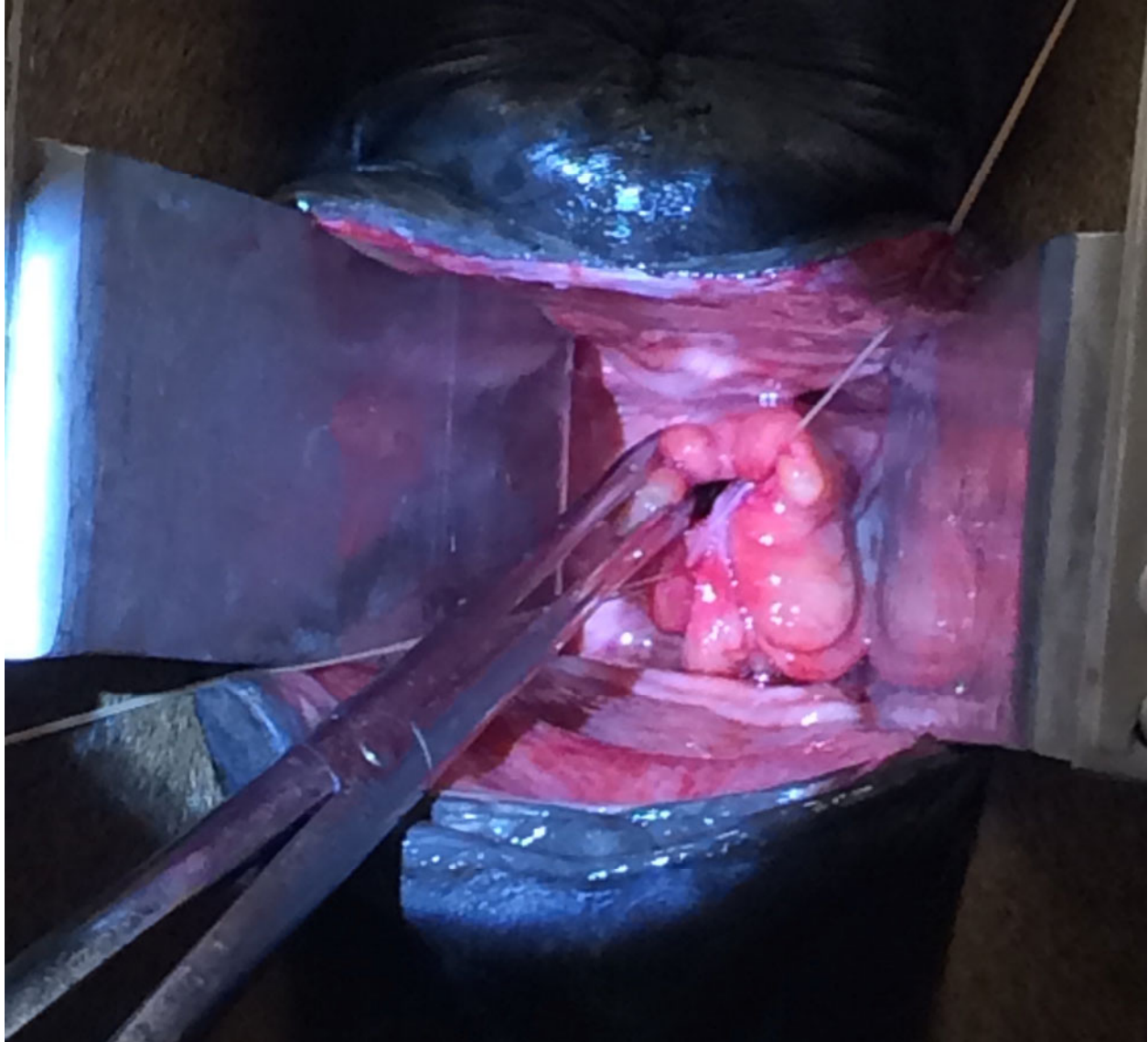


Figure 2. Transluminal cervical adhesions prior to cervical wedge resection.

(Editor’s Note: Photographs in this manuscript are available in color in the online edition of Clinical Theriogenology.)