

Alternative approach for managing pyometra in mares

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Abstract

Two mares (varying in breed and age) were presented on separate dates after unsuccessful chronic pyometra treatment. Mares were assessed via transrectal ultrasonography; purulent material accumulation in the uterus was confirmed. Vaginal and cervical evaluation revealed cervical adhesion. Blunt debridement allowed access to uterus and uterine lavage treatment. Uterine infection was treated with intrauterine antibiotic infusions, based on culture and sensitivity results. A plastic tube was placed through the cervix and anchored into cervical caudal body using 2 knots of nonabsorbable suture in a horizontal pattern to maintain patency to allow healing. Pyometra was resolved and mares became clinically normal.

Keywords: Mare, pyometra, cervix, patency, plastic tube, hysteroscopy

Background

Pyometra is a condition simply defined as purulent fluid accumulation in the uterus.¹ This pathology in mares, unlike cows, is not associated with persistent corpus luteum nor failure of estrous cyclicity.² Instead, the main cause of equine pyometra is mechanical and due to adhesions, scar tissue, fibrosis, or other factors that prevent normal expulsion of uterine fluid.³ However, persistent cervical closure leading to pyometra due to hormonal abnormality was encountered in a mare with active endometrial cups secreting equine chorionic gonadotropin, without a conceptus.⁴ Although cervical damage contributes substantially to pyometra development, a local endometrial infection predisposes to production of purulent material. Most common pathogens isolated in uterine infections include: *Streptococcus equi* subsp. *Zooepidemicus*, *Escherichia coli*, *Klebsiella Pneumoniae*, *Pseudomonas aeruginosa*, and *Staphylococcus aureus*.⁵

Most mares with pyometra rarely have signs of systemic illness; however, if uterus is extremely distended, colic signs can occur.⁶ For instance, when cervical patency is not affected, purulent vaginal discharges can be observed, especially during estrus, as in other species (e.g. New World camelids and dogs).^{7,8} Mares that develop this pathology tend to have either normal or abnormal reproductive history (e.g. normal foaling, dystocia, intrauterine infusion).⁶ It is also not uncommon for a nonreproductively active mare (e.g. companion horse) to have an undiagnosed pyometra.

Treatment goals should be to establish cervical patency and to cure ongoing infection. For this purpose, several options have been described: uterine lavage, systemic antibiotics, intrauterine infusion with antimicrobials, use of ecobolic agents, gauze packs in the cervix, cervical amputation, cervical wedge resection, cervical stent, cervical stent plus GnRH vaccine and ovariohysterectomy via ventral midline, and standing hand-assisted laparoscopic ovariohysterectomy.^{1,9–14} The best treatment option can vary in each case and relate to practitioner preference; however, a key factor in the treatment of choice and prognosis depends heavily on the degree of cervical damage and lesion location.

Case presentation

Two mares (16-year Quarter Horse [Mare 1], 18-year Tennessee Walking Horse [Mare 2]) were examined after unsuccessful treatment of chronic pyometra. Mare 1 was examined by the primary veterinarian because the mare had malodor vulvar discharge when ridden. Owner acquired the mare a year ago with unknown history. Mare 2 belonged to the teaching herd at the veterinary school, with unknown history of prior foaling. Mares were bright, alert and responsive; physical examinations were within normal limits, with no systemic clinical signs. Transrectal palpation revealed an enlarged uterus with severe thickness of the uterine wall; transrectal ultrasonography revealed hyperechogenic fluid within the entire uterus, consistent with purulent material (Figure 1). Manual vaginal examination confirmed cervical adhesions that fully occluded

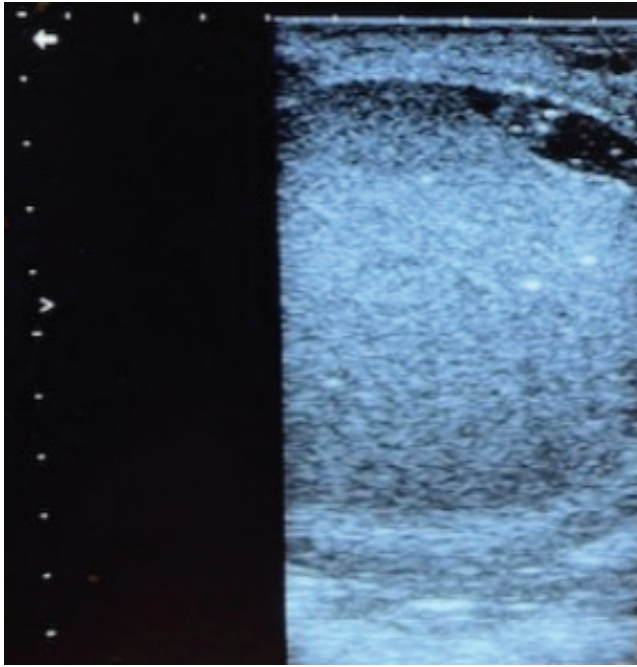


Figure 1. Transrectal ultrasonographic image of uterus of mare with pyometra; note purulent material

the cervical lumen. Fibrotic tissue extended from the body to internal os in Mare 1 and adhesions were in the cervical body in Mare 2; however, neither cervix was distorted.

Treatment

Treatment included uterine lavages with lactated Ringer's solution, ecbolics (20 IU of intramuscular oxytocin every 12 hours) and intrauterine infusions with antibiotics (based on uterine culture [*Streptococcus equi* subsp. *Zooepidemicus*] and sensitivity). Mare 1 had severe pyometra and received systemic oral antibiotics (sulfamethoxazole and trimethoprim tablets, Aurobindo Pharma, East Windsor, NJ, USA) at 30 mg/kg and intrauterine infusions with 50 ml (62 mg/ml) of ticarcillin sodium/potassium clavulanate (compounded formulation, Hagyard Pharmacy, Lexington, KY, USA) for 7 days. Mare 2 received intrauterine infusions with 2 grams of ampicillin (Novaplus, Irving, TX, USA) diluted with 60 ml of lactated Ringer's solution for 5 days.

To allow placement of a foley catheter through the cervix, the fibrotic layer in the cervical internal lumen was opened via blunt debridement using a finger. After catheter placement in the uterus, ~ 4 liters of purulent material was collected from each mare.

After completion of local treatment, hysteroscopy was performed to visualize the degree and specific location of cervical damage. Severe adhesions and fibrotic tissue were observed in the internal os in Mare 1 (Figure 2), whereas in Mare 2, the scar tissue had a more central location in the cervical body.

Cervical surgery (standing position) was performed on separate occasions in these mares to achieve permanent cervical patency. Perineum was aseptically scrubbed with iodine scrub and water; tails were properly wrapped

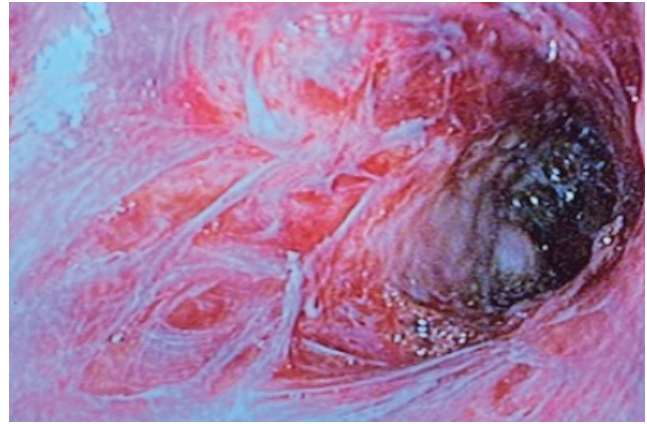


Figure 2. Vaginoscopy image of Mare 1's cervix; note severe adhesions and fibrotic tissue

and held dorsally. An epidural (between first and second coccygeal vertebrae) anesthesia was given using the 'hanging drop technique,' with 60 mg of 2% lidocaine (VetOne, Boise, ID, USA) and 85 mg of xylazine hydrochloride (Bayer, Shawnee Mission, KS, USA). A Finochietto retractor with custom-made blades was placed vaginally to gain free access to cervix. At surgery, mares were sedated with xylazine hydrochloride (1 mg/kg) and butorphanol tartrate (Zoetis, Kalamazoo, MI) at 0.01 mg/kg; maintained with a constant rate infusion of detomidine hydrochloride at 6 µg/kg/hour (Zoetis). Mares received intravenous flunixin meglumine at 1.1 mg/kg (VetOne).

In Mare 1, a cervical wedge resection was made on the dorsal aspect of cervix, along with the placement of a cervical stent with a rigid plastic tube (16 x 2 cm). Due to the deep location of these cervical lesions, a cervical wedge resection was not enough to maintain patency of the cervix. Plastic tube was anchored into the caudal body of the cervix with 2 knots of nonabsorbable polyamide suture No. 2 (Braunamid, B. Braun, Bethlehem, PA, USA), with 1 knot placed on each lateral aspect.

For Mare 2, cervical resection was not attempted due to adhesions' location. Thus, the plastic tube was placed in the cervix, ensuring proper location in the lumen. The plastic tube was sutured as in the first mare using 2 horizontal mattress patterns, 1 on each side of the cervix body. In this mare, an endoscope was used to ensure correct placement of the tube position and suture (Figure 3). Moreover, a J-shape needle (Figure 4) was used to place the suture blindly into cervix.

Outcome

Mares were confined to stall rest for several days and discharged; both were examined a few weeks later via transrectal ultrasonography to evaluate fluid in the uterus and to monitor the position of the plastic tube (Figure 5). Transvaginal scope was also utilized; plastic tube was still in the correct location and anchored to the caudal body of the cervix.

Mare 1 was presented for a mild purulent vaginal discharge; mare was bright, alert and responsive. Transrectal ultrasonography revealed mild to moderate amount of echogenic fluid (< 3 cm). A sample was submitted for culture that was positive

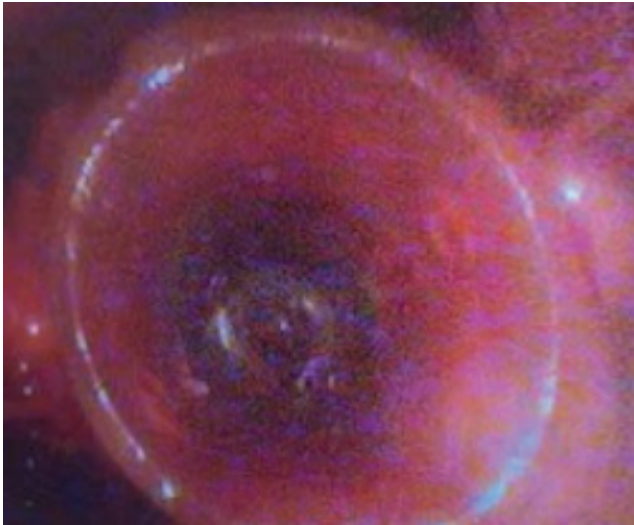


Figure 3. Vaginoscopy image of plastic tube within cervix



Figure 4. J-shape needle

for *Streptococcus equi* subsp. *zooepidemicus*. Mare was treated with uterine lavage and intrauterine infusion with 12×10^6 IU of penicillin G procaine (VetOne) and 1 gram of gentamicin (VetOne) in 4:1 dilution for 5 days. Currently the mare is doing well; has been used for riding lessons and competitions. Mare 2 is currently used as a companion animal; her owner has not noticed any vaginal discharge and/or malodor.

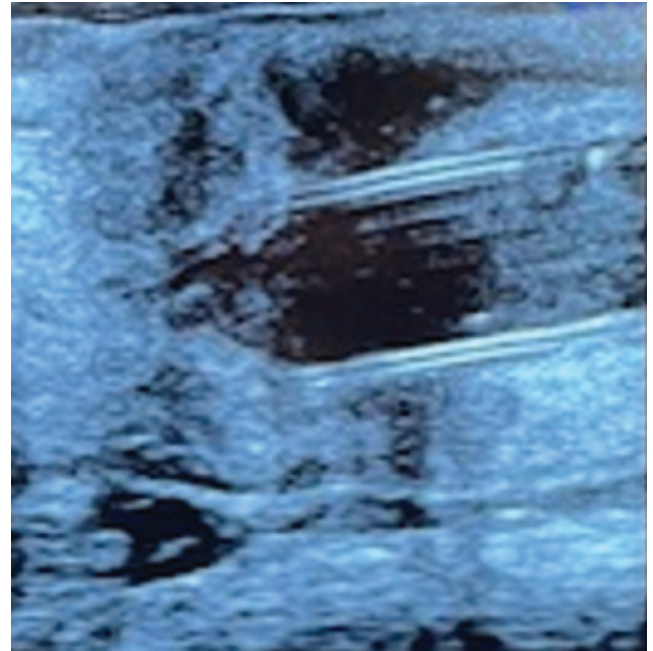


Figure 5. Transrectal ultrasonographic image of cervix; note plastic tube

Discussion

Pyometra in mares has multiple causes; however, disruption of the natural outflow of fluid from the uterus is a key factor.³ In authors' experience, the main cause of chronic pyometra beyond chronic infection has been cervical adhesions preventing natural cervical patency. Diagnosis is best achieved via transrectal ultrasonography to confirm hyperechogenic free fluid within uterus. Although pyometra may not initially affect mare cyclicity, if chronic, this condition could lead to endometrial damage that may disrupt prostaglandin $F_{2\alpha}$ production and ultimately prevent luteolysis.^{3,15}

Pyometra pathophysiology depends on the species. For example, in cows this condition is mainly observed during postpartum, because complete uterine clearance did not occur before the first ovulation.¹ Cows that have had dystocia, retained fetal membranes, metabolic diseases, or others, could be predisposed to metritis, followed by endometritis resulting in pyometra. In cows, a persistent corpus luteum will lead to anestrus and continued progesterone secretion, favoring uterine diseases.¹⁶ Furthermore, in cows there is bacterial synergism, with some having greater penetration in the endometrium and others favoring bacterial invasion.¹⁷ Additionally, pyometra can lead to salpingitis, thus affecting cow's fertility resulting in economic losses.¹⁷

In dogs and pigs, in addition to the hormonal component, the diseases can be enhanced by cystic endometrial hyperplasia complex, where the secretion from the endometrium in addition to progesterone action will favor pyometra development.¹ It is important to note that among progesterone effects, there are 3 that should be highlighted: cervical closure, uterine quiescence and promoting release of histotroph from the endometrium.

In mares, the best treatment option depends on the main cause and veterinarian preference. However, if the main cause

is cervical adhesion, then the degree and location of lesions have a crucial role in determining treatment. Although if the principal cause is different, in reference to hormonal influence, the underlying cause must be addressed if possible. There are also other factors to be considered (e.g. client budget, mare age and owners' reproductive goal for the mare).

Immediate recovery can be achieved in some cases through uterine lavage and antibiotic therapy; however, the risk of relapse is high.¹¹ Regardless, uterine infection should always be treated. Cervical wedge resection serves as a potential therapy in many cases, but may not be suitable for more inward adhesions in the internal os, due to inability to achieve full resection. Attempting wedge resection has the potential risk of penetrating into the peritoneal cavity if excessive tissue is removed from the dorsal aspect of the cervix. If this occurs and purulent or infected contents enter into the cavity, there is a high risk for peritonitis.¹⁰ Cervical amputation can be another alternative if the main problem of the cervix is in the body and/or caudal os. With this technique the mare may be used as an embryo donor if the cervix is still competent.⁹ Nevertheless, the latter technique may have a risk of penetration into the peritoneal cavity.

Other more invasive approaches (e.g. ovariohysterectomy) may be necessary; surgical approach can be either via ventral midline celiotomy¹³ or via laparoscopy.¹⁴ The ventral midline approach can be combined with laparoscopy.¹⁸ The most common postoperative problems reported have been inappetence for 24-48 hours, mild colic, ileus and the potential risk of peritonitis. It is imperative to drain the uterine content (to reduce the chances of peritoneal contamination) before surgery. However, in certain cases, the uterus has to be exteriorized to drain uterine content.¹⁹ Ovaries can be spared to preserve the ability to obtain oocytes. In ovariohysterectomized mares, oocytes can be recovered once from excised ovaries. Conservative treatment that we adopted (improving patency of the cervix and treating uterine infections) may be useful to have repeated oocyte collection via transvaginal aspiration.

Cervical stents appear to be a good option for improving patency of the cervix. Use of a flexible hose material was successful in several cases except for 1 (displacement and loss).¹¹ For this reason, the tube should fit tight enough and it should be sutured to ensure permanent placement. In addition to cervical stent, a GnRH vaccine can be used to prevent cyclicity.¹²

As observed in cases of stent placement, regular follow up is recommended because obstruction of the plastic tube from encroaching tissue or viscous fluid is still possible. Continuing monitoring is also important in mares with just wedge resection, to ensure cervical patency.²⁰ It is also crucial to regularly evaluate plastic tube patency and flush intraluminal fluid and tissue accumulation if necessary. We do recommend placing a plastic tube with a diameter of at least 2-3 cm to minimize the risk of occlusion.

Learning points

- Mares used as companion animals can have an undiagnosed pyometra
- Cervical patency is crucial for long-term pyometra treatment
- Placement of a plastic tube through the cervix is a feasible option to improve fluid outflow from the uterus

- Uterine infection should be treated, regardless of any other treatment choice

Authors' contribution statement and agreement

EP, AH, and TP prepared the original draft, and manuscript content; EC, LB, DP, TD, CS, PP, and LS were involved in clinical case management. Authors reviewed and approved final version of the manuscript.

Conflict of interest

None to report.

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