

Conception following endoscopic removal of endometrial cysts in a mare

L.M.J. Miller, S.M Ferrer

Veterinary Health Center, College of Veterinary Medicine, Kansas State University, Manhattan, KS

Summary

A 14-year-old appaloosa mare presented for breeding management. She was in diestrus with a history of failure to conceive that breeding season. In addition to poor vulvar conformation, the mare was determined to have a multi-loculated uterine cyst measuring 27 mm x 70 mm in her right uterine horn. A uterine culture yielded growth of *Streptococcus zooepidemicus*. Uterine biopsy was graded IIA, with chronic endometritis being the main finding. At hysteroscopy, approximately seven endometrial cysts were seen in the right uterine horn in close approximation to each other and were ruptured using an endoscopic biopsy tool. Endometritis treatment and breeding management were performed during the next estrus. Uterine lavage and infusion of potassium penicillin was performed daily for five days. Ultrasography was performed daily, and the mare was artificially inseminated on day three of treatment. The mare was determined to be pregnant at 60 days and at nine months of gestation.

Keywords: Endometrial cysts, endometritis, hysteroscopy, pregnancy failure

Background

While endometrial cysts are fairly common in middle-aged to older mares, this case is notable due to the successful treatment of intrauterine cysts and endometritis and conception in the same estrous cycle. It also shows that rupture with an endoscopic biopsy tool is sufficient to clear the uterus enough to succeed in conception in the same cycle.

Case presentation

A 14-year-old appaloosa mare that had been shown as a halter horse was referred to the Kansas State University Veterinary Health Center (KSU-VHC) for failure to conceive and evaluation of an endometrial cyst. Her reproductive history included having had one foal two years prior to presentation and she was artificially inseminated with cooled, fresh semen twice during the current breeding season. Following the first breeding of the season, she was determined to be pregnant at 45 days post-ovulation, but was reported to have subsequently lost her pregnancy and returned to estrus. She was bred a second time by the referring veterinarian, presented to the KSU-VHC 23 days post-ovulation and was found to be not pregnant using transrectal ultrasonography. The referring veterinarian reported a 30 mm endometrial cyst in the right uterine horn that was thought to be affecting conceptus movement. On initial breeding soundness examination at KSU-VHC the mare was determined to have poor vulvar conformation (Figure 1), and upon transrectal ultrasound evaluation the mare was determined to have a very large multi-loculated endometrial cyst measuring 27 mm x 70 mm in her right uterine horn (Figure 2). The endometrial cyst appeared to occupy approximately two thirds of the right uterine horn. The left ovary had a corpus luteum present. There was no edema present in the endometrium nor was there fluid present within the uterine lumen. The cervix measured two fingers wide. The mare was given 2.5 mg dinoprost tromethamine intramuscularly once per day for two days to induce corpus luteum regression and return to estrus for collection of uterine samples. The mare returned to KSU-VHC two days after the final dinoprost tromethamine treatment. A uterine culture and biopsy were performed. *Streptococcus zooepidemicus* was isolated from the uterine culture. The uterine biopsy showed widespread infiltration with neutrophils and lymphocytes, scattered mild periglandular fibrosis, cystic glands and dilated lymphatics. The mare was diagnosed with endometritis and the biopsy was graded as IIA according to Kenney's classification.¹ The owner was given a prognosis for carrying a foal to term of 50-80%.

Treatment

The mare returned 14 days after the previous visit during diestrus for treatment of the endometrial cysts via hysteroscopy. On hysteroscopy, it was noted that there was reddening of the endometrium

(Figure 3), likely to be an area of endometritis. Furthermore, approximately seven endometrial cysts were found in the right uterine horn in very close proximity to one another (Figure 4). Following rupture of the cysts using an endoscopic biopsy tool, transrectal ultrasonography was performed. There was a corpus luteum present on the right ovary, a moderate amount of fluid present within the uterine lumen, and no remaining cysts were detected. A uterine lavage was performed using 3 L of 0.9% sodium chloride solution to remove the fluid and debris remaining following cyst removal. The mare was treated with 2.5 mg dinoprost tromethamine intramuscularly once per day for two days to induce corpus luteum regression and return to estrus. The mare returned three days after the final dinoprost tromethamine treatment for treatment of endometritis and breeding management. On presentation transrectal ultrasonography was performed. The left ovary had a follicle measuring 31 mm x 30 mm, uterine edema grade 3, the cervix was measured two fingers wide, and there was a moderate amount of free fluid within the uterus. A uterine lavage was performed with 4 L of 0.9% saline, followed by infusion of 2,000,000 units of potassium penicillin into the uterus for two days. On day three of treatment, the mare had a 34 mm follicle on the left ovary, moderate endometrial edema, and the cervix measured two fingers wide. At that time, she was artificially inseminated with cooled semen containing 1×10^9 morphologically normal progressively motile spermatozoa. The mare received 2500 IU human chorionic gonadotropin intravenously at the time of insemination. Six hours following insemination, transrectal ultrasonographic examination revealed severe endometrial edema and fluid accumulation in the uterus indicating post-breeding endometritis. The uterus was lavaged with 1 L of 13% DMSO and 0.3% povidone iodine solution in sterile saline, followed by 2 L of sterile saline. Penicillin (2,000,000 IU) was infused into the uterus after the lavage. At this time, the mare's cervix was still very tightly closed, so 200 μ g of misoprostol was placed within the cervical lumen to relax the cervix and aid in clearance of the uterine fluid. Intrauterine infusions with penicillin continued for two more days for a total of five days of antibiotic treatment. Oxytocin (20 IU) was given intramuscularly six hours after treatment and every two hours thereafter for six treatments. Ovulation was detected with transrectal ultrasonography approximately 36 hours after insemination. The day following ovulation, a uterine infusion of 1 gram of ampicillin was administered and Caslick's vulvoplasty was performed.

Outcome

The mare was determined to be pregnant at approximately 90 days post-ovulation. Pregnancy was uneventful. However, at approximately 9.5 months of gestation the mare presented at the KSU-VHC with signs of colic. Colon displacement was diagnosed, and surgery was performed. Unfortunately, the mare had an adverse event while recovering from anesthesia and was euthanized.

Discussion

In the case described here, the mare presented with multiple inciting causes of infertility. The most obvious on initial external examination was the poor vulvar conformation. Her vulvar lips folded in along the sides as well as at the dorsal commissure with the rectum (Figure 1). In addition, her vulva was also tilted cranially above the pelvic rim allowing contamination of the vestibule and vagina with feces. This poor conformation made this mare prone to pneumovagina and ascending endometritis.^{2,3}

Another possible cause of subfertility was presence of endometrial cysts. It is estimated that 55% of subfertile mares over the age of ten have endometrial cysts, which has an economic impact on the breeding industry in the form of additional breeding cycles, barren seasons, and misdiagnosis of pregnancy.^{4,6}

Endometrial cysts can be an indicator of underlying fibrosis and/or decreased myometrial contractility. The cysts tend to occur at the base of the uterine horns near the uterine body,⁷ which can interfere with implantation of the embryo. Cysts can negatively affect pregnancy in many ways such as blocking conceptus movement, altering histotroph production, and causing insufficient endometrial contact with the conceptus,^{7,8} all of which contribute to embryonic death.⁹ Cysts have been shown to reduce uterine vascular perfusion with a positive association between cyst area and disturbed uterine hemodynamics.⁶

Cysts can mimic signs of early pregnancy on ultrasonographic examination, so it is suggested that a recent accurate map of any uterine cysts is prepared prior to breeding to decrease the probability of misdiagnosis of pregnancy.

Categorization of cysts is by size and location within uterine tissue. The three types are glandular, lymphatic, and transmural.^{10,11} Lymphatic cysts or lymphatic lacunae are greater than 1 cm in diameter and can be up to 20 cm.¹¹ These cysts are dilated areas of lymphatic tissue caused by uterine fibrosis and decreased myometrial contractility or may be caused by poor drainage due to gravity in a large pendulous uterus.⁵ Mares with lymphatic cysts typically, but not always, have poor uterine biopsy scores.¹² Both glandular and lymphatic cysts are luminal, so their presence can affect conceptus migration and placentation since microcotyledons cannot be formed on the endometrium or the allantochorion in apposition to the cystic regions. Both glandular and lymphatic cysts require numerous or very large cysts to compromise fertility and because of the typically larger size of lymphatic cysts, they are more commonly associated with fertility problems. Histologically cysts are lined by columnar epithelium and lamina propria. They may contain normal or atrophied endometrial glands and within the cyst wall there is an inner lining of cuboidal cells and hyaline.⁴

A decision to treat uterine cysts should be based on the size, number and location of the cysts, and is typically reserved for mares in which they have a negative effect on fertility. A uterine biopsy is recommended prior to treatment of cysts to determine the prognosis for return to fertility after treatment. Although mares are not typically treated and bred in the same estrous cycle, recovery from treatment is short, so a mare can be treated during the breeding season and returned to service that same year.

The treatment in this mare consisted of rupture of the cysts using hysteroscopy and a uterine biopsy tool. Other treatment options are to ablate the cysts using laser photoablation or loop electrocautery. Neodymium/yttrium (Nd:YAG) laser irradiation is used in photoablation.⁴ Loop electrocautery has the advantages of reduced equipment costs and reduced thermal trauma to the endometrium compared to photoablation.¹³ The advantages to using hysteroscopy and a uterine biopsy tool alone include minimal equipment needed and absence of thermal trauma to the endometrium. Although the recurrence of cysts using this method is unknown, the cysts are likely to recur as a result of continuing fibrosis within the endometrium. While this treatment was successful in this case, there is not enough evidence to determine if this is a suitable treatment option for all mares or how it would compare with other treatment options.

In addition to poor vulvar conformation and endometrial cysts, this mare also had bacterial endometritis (Figure 3). It is unknown if the endometritis was secondary to her poor vulvar conformation or to overbreeding in previous estrous cycles. Although it would have been preferable to treat the bacterial endometritis during the first estrus following hysteroscopy and wait until the following estrus to breed the mare, it was quite late in the breeding season and the owner elected not to wait. Nevertheless, concurrent treatment of endometritis and insemination was successful.

Learning points

- A mare can be successfully treated for endometrial cysts and endometritis and be successfully bred during the same estrous cycle.
- It is important to evaluate an endometrial biopsy to determine the prognosis for an individual animal. Large endometrial cysts are not always associated with fibrosis and poor prognosis for pregnancy.
- Lymphatic endometrial cysts can be treated by rupturing the cysts with biopsy instruments via endoscopy, followed by successful pregnancy in one cycle.

References

1. Kenney RM: Cyclic and pathologic changes of the mare endometrium as detected by biopsy, with a note on early embryonic death. *J Am Vet Med Assoc* 1978;172:241-262.
2. Hemberg E, Lundeheim N, Einarsson S: Retrospective study on vulvar conformation in relation to endometrial cytology and fertility in thoroughbred mares. *J Vet Med A Physiol Pathol Clin Med* 2005;52:474-477.
3. Heilkenbrinker T, Schubert TS, Oetjen J, et al: Consequences of a surgical correction of an insufficient closure of the vulva on

- genital flora and conception rate in mares. *Dtsch Tierarztl Wochenschr* 1995;102:183-187.
4. Blikslager AT, Tate LPJ, Weinstock D: Effects of neodymium:yttrium aluminum garnet laser irradiation on endometrium and on endometrial cysts in six mares. *Vet Surg* 1993;22:351-356.
 5. Bracher V, Mathias S, Allen WR: Videoendoscopic evaluation of the mare's uterus: II. Findings in subfertile mares. *Equine Vet J* 1992;24:279-284.
 6. Ferreira JC, Gastal EL, Ginther OJ: Uterine blood flow and perfusion in mares with uterine cysts: effect of the size of the cystic area and age. *Reproduction*. 2008;135:541-550.
 7. Tannus RJ, Thun R: Influence of endometrial cysts on conception rate of mares. *Zentralbl Veterinarmed A* 1995;42:275-283.
 8. McDowell KJ, Sharp DC, Grubaugh W, et al: Restricted conceptus mobility results in failure of pregnancy maintenance in mares. *Biol Reprod* 1988;39:340-348.
 9. Yang Y-J, Cho G-J: Factors concerning early embryonic death in thoroughbred mares in South Korea. *J Vet Med Sci* 2007;69:787-792.
 10. Rambags BPB, Stout TAE: Transcervical endoscope-guided emptying of a transmural uterine cyst in a mare. *Vet Rec* 2005;156:679-682.
 11. Wilson DL: Diagnostic and therapeutic hysteroscopy for endometrial cysts in mares. *Vet Med* 1985;80:59-63.
 12. Adams GP, Kastelic JP, Bergfelt DR, et al: Effect of uterine inflammation and ultrasonically-detected uterine pathology on fertility in the mare. *J Reprod Fertil Suppl* 1987;35:445-454.
 13. Bartmann CP, Stief B, Schoon HA: Thermal injury and wound healing of the endometrium subsequent to minimally invasive transendoscopic use of Nd:YAG-laser and electrosurgery in horses. *Dtsch Tierarztl Wochenschr* 2003;110:271-280.



Figure 1. Vulvar conformation on presentation.

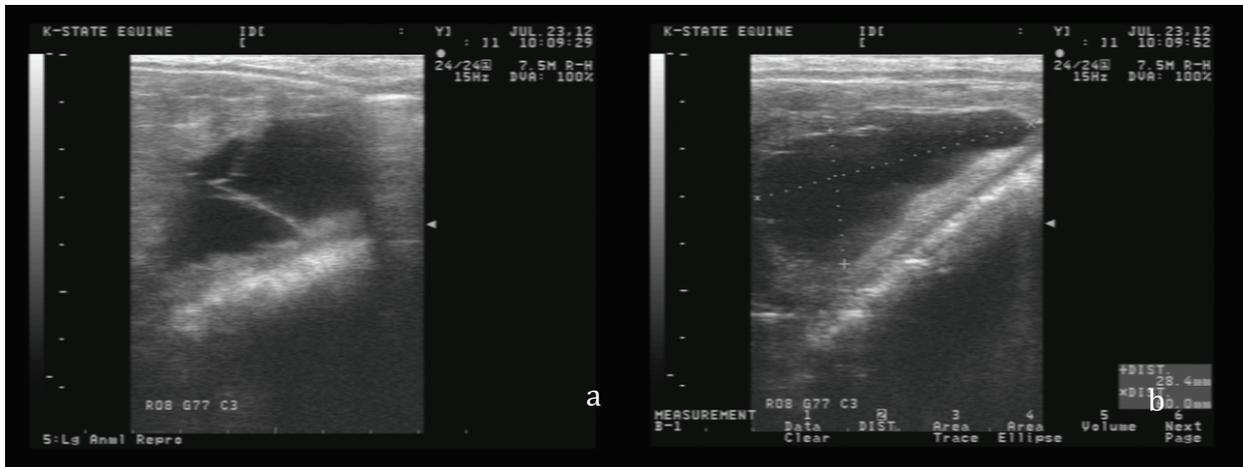


Figure 2. Large, multiloculated intrauterine cyst in the right horn. The cyst appeared to involve two-thirds of the uterine horn. Shown in cross-section (a) and length-wise (b).



Figure 3. Inflamed area of the endometrium as seen on hysteroscopy, likely an area of endometritis.

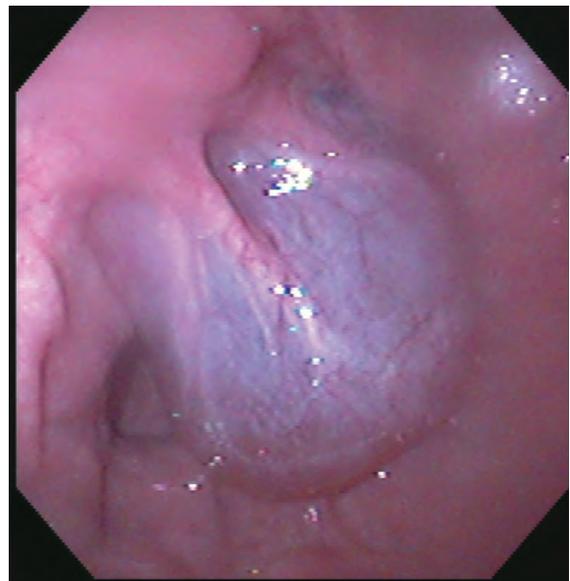


Figure 4. Uterine cysts as seen on hysteroscopy.

(Editor's Note: The photographs in this manuscript appear in color in the online version of Clinical Theriogenology.)

