Uterine body fetal reduction in a mare: cranio-cervical dislocation via colpotomy

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Abstract

A 15-year old American Saddle Horse mare, pregnant (~ 60 days) with twins, was referred. Transrectal ultrasonography revealed the presence of 1 fetus in uterine body and the other in right uterine horn. Inconvenient location (uterine body) of the fetus made it difficult to apply established techniques for twin reduction. Cranio-cervical dislocation via colpotomy was performed on the twin located in the uterine body. Heartbeat was not detected at 48 hours postprocedural transrectal ultrasonography. Remaining twin was delivered at term without complications.

Keywords: Mare, colpotomy, cranio-cervical dislocation, twin, body pregnancy

Background

Early (< 30 days) diagnosis of twin pregnancy is of utmost importance for successful reduction. Late diagnosis necessitates the use of more invasive procedures (transvaginal or transcutaneous ultrasound-guided fine needle aspiration).[1] Furthermore, these techniques are not designed for uterine body fetal (> 60 days) reduction. Most twin reduction techniques were optimal for fetuses located unilaterally or bilaterally at the base of uterine horns.[1] For the first time, via colpotomy,[2] manual transuterine cranio-cervical dislocation technique was applied to successfully reduce a uterine body pregnancy.

Case presentation

A 15-year old American Saddle Horse mare was referred for the reduction of a 60-day twin pregnancy. Mare was pasture bred for 5 days and 24 days after the last breeding, presence of twins were detected via transrectal ultrasonography. One embryo (~ 23 - 24 days) was present in the right uterine horn and the other (18 - 19 days) in the caudal uterine body. In the past, mare had multiple ovulations and twin pregnancies and the previous season's twins were both lost as a complication to 'vesicle pinching' technique. Knowing mare's last year outcome, it was decided not to intervene, with the possibility that the twin located in uterine body would resorb or die on its own, since singleton pregnancies established in the caudal uterine body have an extremely low chance of survival (17%).[3] Mare was examined on days 32 and 45 of pregnancy by transrectal ultrasonography. At day 32 examination, normal growth and heartbeats of both twins were observed. At day 45 examination, both twins had normal growth and heart rates. However, uterine body twin had grown into right uterine horn, closer to the other fetus. At day 55 of pregnancy, an attempt was made to interfere with the growth of uterine body twin by applying pressure to the fetus with an ultrasound probe. Mare was then given intravenously 1.1 mg/kg flunixin meglumine (Prevail™, Vet One, Boise, ID) and orally 0.044 mg/kg altrenogest (Regu-Mate™, Merck Animal Health, Summit, NJ). In the days following the procedure, the mare was examined by transrectal ultrasonography and it was apparent that the uterine body twin had grown and it had normal heart rate, hence the mare was referred.

One fetus was located in the caudal uterine body and the other another was at the base of right uterine horn. Although cranio-cervical dislocation (CCD) of fetus can be performed transrectally or intraabdominally,[4] neither approach could be used for a body pregnancy, because of fetal location. A colpotomy approach, typically used for ovariectomy, was performed to facilitate the CCD of a fetus located in the uterine body.

Treatment

Mare was initially sedated with intravenous treatment of 0.5 ml butorphanol (Torbugesic®, Fort Dodge Animal Health a division of Wyeth, New York, NY) and 0.5 ml detomidine (Dormosedan,

Kalamazoo, MI). A presurgical dose of 15 ml of ceftiofur (Excede, Zoetis, Kalamazoo, MI) was given intramuscularly in the left pectoral muscle. Vulva was cleaned using a betadine scrub. A caudal epidural was performed using a combination of 3 ml lidocaine (Lidocaine, Vet One, Boise, ID) and 0.8 ml (80 mg) xylazine (Vet One, Boise, ID). Buscopan ([3.5 ml] Boehringer Ingelheim VetMedica, Inc., St. Joseph, MO) was given intravenously for muscle relaxation, and 1 ml detomidine was given intravenously for a longer duration of sedation. Vaginal branch of the internal pudendal artery was palpated,[2] and a lidocaine-soaked gauze was applied cranial and dorsal to the artery[2] for several minutes to provide a topical block at the selected incision site. Next, a short, full-thickness incision was made with a number 10 scalpel blade through the dorsolateral aspect of fornix of vagina, at 9.0 or 10.0 hour position, ~ 2 cm dorsolateral to external cervical os and dorsal and cranial to vaginal artery.[2] Incision was stretched by blunt dissection until a hand could pass through it to grasp the uterus. Twin fetus located in the uterine body was transuterinely identified and its cervical spine was manually dislocated. Subsequently, transrectal ultrasonography was performed; heartbeat was slow and faint after the procedure and completely subsided within the next 2 days. Fetus located in the right uterine horn, was also examined via transrectal ultrasonography immediately after surgery and had normal heartrate. Vaginal wall incision was not closed. Caslick's procedure was performed to prevent pneumovagina and contamination of the vestibule, vagina, and abdomen. After surgery, the patient was treated intravenously with 10 ml flunixin meglumine and orally with 10 ml altrenogest once daily for 4 days. Mare was kept in the hospital for 3 days; it was not allowed to lie down, to decrease the likelihood of evisceration through the incision and mare was evaluated (transrectal ulrasonography) daily until she was discharged.

Outcome

Twin located in the right uterine horn continued to grow through full duration of pregnancy and was born without complications at an estimated 342 days of pregnancy. Fetus that had undergone CCD was not recovered at the time of birth of the surviving twin. In conclusion, colpotomy approach, typically used for ovariectomy, was successfully applied to facilitate the CCD of a fetus located in the caudal most aspect of uterine body. This case provided evidence that a CCD via colpotomy can be successful and is a viable option for safe reduction of a fetus located in the uterine body, a location that is difficult to reach by conventional methods of twin reduction.

Discussion

Twin pregnancies are an important cause of abortion in mares[5] and accounted for 6 - 30% of pregnancy loss.[4] Extensive application of ultrasonography in pregnancy diagnosis and suitable twin reduction methods have reduced pregnancy loss due to twins to 5.4%.[6] Twin pregnancies most commonly result from double ovulations that are either synchronous or asynchronous.[7] Asynchronous ovulations are possibly due to prolonged LH peak.[7] Twin pregnancies resulted in early fetal loss, late term abortions, and birth of small or growth retarded foals and rendered rebreeding difficult.[8] Damage to the reproductive tract of the mare can occur from late term abortions that often resulted in foaling difficulties.[8] A twin foal that is born alive is likely to be smaller than normal as a result of intrauterine growth retardation[8] and have a poor survival rate without immediate critical care.[8] Therefore, a twin pregnancy must be reduced early in pregnancy to avoid late term abortion. Twins are typically located unilaterally or bilaterally in the base of either uterine horn.[1] In rare cases, as in the present case, a uterine body fixation is possible in a twin pregnancy. Uterine body pregnancies and twin pregnancies are undesirable in mares. Uterine body pregnancies in the mare have seldom been reported and often resulted in loss of pregnancy due to inability of placenta to expand.[3] However, fetus located in the cranial aspect of uterine body had a higher likelihood of survival (possible placental expansion within the bifurcation) than fetus located in the caudal aspect.[3]

Although prostaglandins have been used successfully to eliminate twin pregnancies before endometrial cup formation to facilitate mare's return to estrus,[3] other methods were developed to reduce 1 of the twins. Most twin reduction procedures for mares are ideal for unilateral or bilateral twins in the base of the uterine horn(s).[1] Later in pregnancy (> 45 days), it is possible to apply transvaginal

ultrasound-guided method to perform 'fetal stabbing' or yolk sac or allantoic fluid aspiration.[9] However, these methods had very low success rate (0 - 25%).[9] Injection of KCl into fetal heart is another procedure carried out transabdominally for twin reduction,[1,4,10] with good success rate (49%), if performed between 115 -130 days of pregnancy[1] and was used successfully at 200 days of pregnancy.[10] Transvaginal ultrasound-guided fine needle aspiration of allanto-amniotic fluid or injection of KCl into fetal heart was considered for this case. However, inability to properly place the ultrasound probe to effectively perform injection procedure precluded this approach.

Possibility of applying CCD technique was contemplated in this case. Depending on the stage of pregnancy, it has been used either transrectally or intraabdominally via standing flank incision.[4] Transrectal approach was feasible between days 55 and 90 of pregnancy when the fetus can still be reached and identified. An intraabdominal approach was possible between days 58 and 110 of pregnancy after the development of fetal bones and muscles.[4] Transrectal and intraabdominal CCD were successful in 63 and 63.10% of cases respectively.[4] These routes of performing CCD were not considered in this case due to inability to firmly grasp the fetus transrectally and increased risk of peritonitis due to distance required to reach the uterine body through laparotomy.

Colpotomy approach has been used to successfully for ovariectomies as a safer, more rapid alternative to other methods of open and laparoscopic ovariectomy.[11] Colpotomy was performed in a standing animal, under sedation, in a shorter time, requiring least instrumentation and ideal for cosmetic reasons.[10] Primary disadvantages to this approach is that the surgeon is operating blindly and a surgeon with a small arm diameter is required when operating on mares with a narrow pelvis, ponies, and mules.[2,11] There is also the risk of evisceration and peritonitis.[12] In this case, CCD technique was used in twin reduction due to its high success rate for pregnancies of 60 days and colpotomy approach was successfully applied, given the difficulty in reaching uterine body by other methods. Colpotomy has been mentioned[13] as a potential approach for twin reduction using CCD technique and we successfully carried out these principles.

Learning points

- Colpotomy is an alternative approach to reach uterine body.
- Colpotomy approach can be successfully used to reduce a twin in the uterine body by cranio-cervical dislocation of the fetus.
- Cranio-cervical dislocation via colpotomy approach is ideal to reduce a 60-day old twin located in the uterine body.

References

1. Macpherson ML, Reimer JM: Twin reduction in the mare: current options. Anim Reprod Sci 2000;60-61:233-244.
2. Prado TM, Schumacher J: How to perform ovariectomy through a colpotomy. Equine Vet Educ 2017;31:209-213.
3. Jobert ML, LeBlanc MM, Pierce SW: Pregnancy loss in equine uterine body pregnancies. Equine Vet Educ 2005;17:161-165.
4. Wolfsdorf KE, Rodgerson D, Holder R, et al: Success rate of post-fixation twin reduction using cranio-cervical dislocation. Proc Am Assoc Equine Pract 2009;55:257-261.
5. Miller A, Woods GL: Diagnosis and correction of twin pregnancy in the mare. Vet Clin North Am Equine Pract 1988;4:215-220.
6. Laugier C, Foucher N, Sevin C, et al: A 24-year retrospective study of equine abortion in Normandy (France). J Equine Vet Sci 2011;31:116-123.
7. Davies Morel MCG, Newcombe JR, Reynolds N: Asynchronous ovulation in mares: seasonal variations in frequency. Vet Rec 2015;176:310-313.
8. McKinnon AO: Twin Reduction Techniques. In: Samper JC, Pycock JF, McKinnon AO: editors. Current Therapy in Equine Reproduction. 1st edition, Philadelphia; Saunders: 2007. p. 357-373.
9. Journée SL, de Ruijter-Villani M, Hendriks WK, et al: Efficacy of transvaginal ultrasound-guided twin reduction in the mare by embryonic or fetal stabbing compared with yolk sac or allantoic fluid aspiration. Theriogenology 2013;80:346-349.
10. Bass L, Wilkins J: Birth of a live foal after transabdominal ultrasound-guided cardiac injection of a 200-day equine twin fetus. J Equine Vet Sci 2014;34:549-555.

11. Tate LP Jr, Fogle CA, Bailey CS, et al: Laparoscopic-assisted colpotomy for ovariectomy in the mare. Vet Surg 2012;41:625-628.
12. Smith SE, Devine DV: Hand-assisted laparoscopic ovariectomy and colpotomy in standing mares. Vet Surg 2013;42:586-590.
13. Sitters S, Wolfsdorf K: Twin Reduction: Cranio-Cervical Dislocation. In: Dascanio JJ, McCue PM: editors. Equine Reproductive Procedures. 1st edition, Hoboken; John Wiley & Sons: 2014. p. 222-225.