

Diagnosis and clinical management of a spontaneous pre-partum uterine rupture in an Angus heifer carrying twins

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Summary

A two year-old, nulliparous Angus heifer was presented because of reduced appetite, bloat and lethargy of one day duration. The heifer was estimated to be 7.5 months pregnant. Physical examination, trans-abdominal ultrasound, blood chemistry analysis, complete blood count and abdominocentesis were performed to identify the possible cause. Based on lack of response to therapy, changes in uterine tone on palpation per rectum, abdominal fluid cytology and trans-abdominal ultrasound, uterine rupture was suspected and an abdominal exploratory laparotomy was performed. An extra-utero, deceased calf was identified along with a second deceased calf partially within the uterus. Exteriorization of the right uterine horn revealed an approximately 40 cm rent extending from the utero-tubal junction to the body of the uterus, which was surgically repaired. Pre- and post-operative medical therapy included intravenous fluids, antibiotics, and anti-inflammatories. Subsequent follow-up revealed that the cow had resumed normal estrous cycles and is being used as an embryo donor.

Keywords: Uterine rupture, twinning, ultrasound, abdominocentesis, cesarean section

Background

Little information is available concerning pre-partum uterine rupture in the bovine. While peri-parturient uterine rupture is common, especially during stage II of labor, pre-partum rupture is rare and usually from an unknown cause.¹ When pre-partum uterine rupture occurs, it is often diagnosed at necropsy, rather than antemortem. When diagnosed early, however, the prognosis for survival can be good.

Case presentation

The patient, a 545 kg, two year-old nulliparous Angus heifer, was purchased three months prior to presentation and according to the current owner had been otherwise healthy until the day prior to admission into the Iowa State University Veterinary Teaching Hospital. The heifer had been restrained in the owner's manual chute for pre-calving scours vaccination and final pregnancy confirmation four days earlier and was currently grazing on alfalfa pasture. No abnormalities with the pregnancy were noted by the referring veterinarian at the time of pregnancy confirmation. The owner first noted the heifer to be severely bloated the day prior to admission (see Figure 1) and at that time passed an orogastric tube to deliver 50 g of poloxalene orally to relieve what was suspected to be frothy bloat. No change was noted in the bloat after poloxalene administration; however, a second attempt at passage of an orogastric tube by the owner yielded expulsion of a large amount of gas and fluid from the rumen. Upon initial physical examination by the referring veterinarian, it was noted that rumen motility was decreased and the abdomen remained distended. Blood chemistry analysis was performed on the farm and blood gas and electrolyte parameters were within normal limits. A jugular catheter was placed and 600 mg (1.1 mg/kg) of flunixin meglumine was administered IV and 6 g (11 mg/kg) of ampicillin trihydrate was given IM prior to being referred to the hospital for suspected vagal indigestion and/or traumatic reticulitis.

Upon examination at the hospital, the heifer was noted to be quiet, alert and responsive with a pear-shaped abdomen and normal temperature, pulse and respiratory rate. Based on skin tent and eye position, she was estimated to be five to seven percent dehydrated. A fluid wave could be elicited upon ballotment of the abdomen, however, no gas or fluid was removed from the rumen following passage of a large orogastric tube. Palpation per rectum revealed a small rumen and a calf palpable within the uterus; a moderate amount of udder development was also noted. A brief trans-abdominal ultrasound examination, using a 3.5 MHz curvilinear probe, revealed a large amount of free fluid within the abdomen and floating objects suggestive of fibrin accumulation and peritonitis. Thirty g of sulfadimethoxine (55

mg/kg) was given IV to address the peritonitis and 40L of normal saline was administered IV to correct dehydration followed by balanced polyionic maintenance fluids at a rate of 50 ml/kg/day. Based on these clinical findings, the differential list included vagal indigestion, traumatic reticulitis and peritonitis of unknown cause.

The following day, further diagnostic tests were performed including a complete blood count (CBC) and abdominocentesis. The CBC revealed a low plasma protein (5.4gm/dl) and elevated fibrinogen (600mg/dl; plasma protein:fibrinogen ratio of 9 suggestive of an inflammatory process. Interpretation of the abdominal fluid cytology and cell count showed a transudative process (protein of 0.1 gm/dl) with mild neutrophilic inflammation and a mild pathologic hemorrhage with phagocytized red blood cells. The abdominal fluid was orange in color and had a thick consistency. Following the abdominocentesis, palpation per rectum and trans-abdominal ultrasound were repeated. A fetal heartbeat could not be identified via trans-abdominal ultrasound and within the free abdominal fluid in the lower right abdomen a region suspected to be free-floating placenta with cotyledons was now visible (see Figure 2). Upon palpation per rectum, thickened myometrial ridges near the body of the uterus could be identified and a calf was no longer palpable. A tentative diagnosis of uterine rupture was made and 40L of a balanced polyionic solution was administered prevent hypovolemic shock due to anticipated fluid loss during surgery.

Treatment

Following local anesthesia (inverted L) with 2% lidocaine, a right paralumbar flank approach was used to open the abdomen. Entry into the abdomen allowed approximately 50L of fluid to be drained from the incision and free floating placenta was observed (Figure 3). Exploration of the abdomen revealed a free floating calf and completely detached placenta within the abdominal cavity. The body wall incision was extended to accommodate removal of the calf which was deceased. Further examination revealed a large rent in the right horn of the uterus. Within the rent, a second deceased calf was found and was subsequently extracted from the abdomen along with its placenta (Figure 4). The age of the fetuses was estimated to be approximately 7.5 months based on physical characteristics and previous estimations.

Further evaluation of the uterus confirmed a long dorsolateral rent measuring 40cm and extending from the tip of the right uterine horn to near the uterine bifurcation (Figure 5). The rent was cleaned of remaining placental tissue and two layers of modified Utrecht pattern, using 2 polyglactin 910 was used to close the uterus. Six liters of normal saline was used to lavage the uterine closure as well as the abdominal cavity, and a sterile orogastric tube placed on the floor of the abdomen was used to syphon a majority of the fluid from the abdomen. Exploration of the remainder of the abdomen revealed no other abnormalities. The abdominal musculature and peritoneum were then closed using 2 polyglactin 910 in a simple continuous pattern in two layers. The skin was closed with 3 polymerized caprolactam using a Ford's interlocking pattern. Balanced polyionic IV fluids were continued at 50 ml/kg/day as well as antibiotic and anti-inflammatory treatments of 1.1 mg/kg of flunixin meglumine IV BID, 11 mg/kg of ampicillin trihydrate IM BID, and 27.5 mg/kg of sulfadimethoxine IV BID. The fetuses and placenta were submitted for necropsy with no fetal abnormalities found.

Outcome

Recovery was uneventful; the heifer was dismissed two days following surgery and was maintained on 22,000 IU/kg penicillin G IM BID and 1 mg/kg of meloxicam PO every other day for one week following discharge. Uterine involution was monitored periodically by the referring veterinarian and mild adhesions to the pelvic floor and thickening of the right uterine horn were noted that have improved over time. The heifer was noted to resume normal estrous cycles and is enrolled as an embryo donor.

Discussion

Spontaneous pre-partum uterine rupture is a relatively rare event in cattle.¹ In this case uterine rupture was not high on the initial list of differential diagnoses, but it was suggested by further diagnostic tests. The lack of resolution of abdominal distention indicated that problems could exist beyond the gastro-intestinal system. Reports of uterine rupture in single calf pregnancies have been predominant in the literature.^{1,2} Thirty-seven of the reported 39 uterine ruptures were reported in cows carrying a single fetus.¹⁻⁵ Two of the 39 cases involved twin fetuses.^{6,7} Of the 39 cases of spontaneous uterine rupture, 27 occurred in nulliparous females three years of age or less.^{1,3,5,7} The remaining 12 animals that were older than three years ranged from four to eight years of age.^{1,3,5,7} As in the present case, a nutritional or gastrointestinal problem was the primary complaint in ten of the 39 reported cases.^{1,2,3,5} The remaining 29 cases were presented with abnormalities associated with the second stage of labor and/or dystocia.^{1,4,6,7}

In previously reported cases survival of the fetus is greatly impacted by the timing of intervention relative to the occurrence of the rupture and age of the fetus at time of delivery.¹ Both fetuses were delivered dead in this case and it was estimated that rupture and subsequent death occurred greater than 48 hours prior to admission. Previously published cases showed 30 of the 41 calves were dead at the time of delivery. Of the 11 calves born alive, seven were singles and four were from twin pregnancies.¹⁻⁷ Survival of the dam was greatly impacted if the rupture occurred pre-partum and was not associated with concurrent dystocia. A major factor in outcome of the present case was that the cervix was completely closed at time of presentation and aided in maintaining a sterile abdominal environment, thus allowing time for intervention and subsequent normal healing following cesarean section. Review of the literature showed that 13 of the 39 cows (33%) presented for uterine rupture died following treatment.¹⁻⁷ All 13 dams that died had predisposing factors including uterine torsion, oversized fetus, and fetal malformations associated with dystocia that led to further debilitation and subsequent death or euthanasia.

Diagnostic evaluation of this patient revealed numerous abnormal findings that were helpful in diagnosis and subsequent treatment for spontaneous uterine rupture. Trans-abdominal ultrasound with a 3.5 MHz convex probe revealed large amounts of fluid within the abdomen along with a region suspected of being free-floating placenta with cotyledons and attached placental chorioallantois. Analysis of the abdominocentesis revealed a mild neutrophilic inflammation along with a mild pathologic hemorrhage. The existence of phagocytosed red blood cells within free abdominal fluid without evidence of gastrointestinal tract contents was suggestive of trauma or rupture of a non-gastrointestinal organ within the abdominal cavity. An additional significant finding was the protein level of the abdominal fluid which was 0.1 gm/dl (normal range 0.1-2.5 gm/dL) which is consistent with a transudative process associated with a large volume of fluid.⁸ Abnormal thickening of uterus near the cervix was noted which also suggested of uterine pathology.

Early diagnosis and initiation of therapy in the case of uterine rupture is critical for survival of the dam and the fetus. Due to the sterile environment of the abdomen, corrective surgery, removal of the fetuses and placenta and supportive care allowed a good prognosis for recovery and a guarded prognosis for future reproductive usage in this animal. It is unknown what caused the uterine rupture to occur, however, the history of bloat and removal of large amounts of gas and fluid from the rumen on-farm prior to referral is suggestive of a digestive problem leading to increased intra-abdominal pressure. Carriage of twin fetuses in a single uterine horn may have also played a role, along with a recent history of being worked through a chute. As the fetuses and placenta were found to be normal at necropsy, the likelihood that the dam was experiencing hydrops prior to rupture of the uterus is low but could not be completely ruled out. It is also important to note that this event was not associated with parturition at the time of rupture.

Learning points

- While not a common occurrence, spontaneous pre-partum uterine rupture should be considered as a differential diagnosis during the third trimester of pregnancy in animals presented with vague clinical signs referable to the abdomen.
- Abdominal ultrasonography and abdominocentesis can be useful diagnostic aides in addition to palpation per rectum in determining if abdominal exploratory surgery is warranted to confirm rupture of the uterus.
- If diagnosed early, the prognosis for life can be good and return to reproductive soundness is possible.

References

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Figure 1: Image of the heifer taken by the owner prior to intervention.

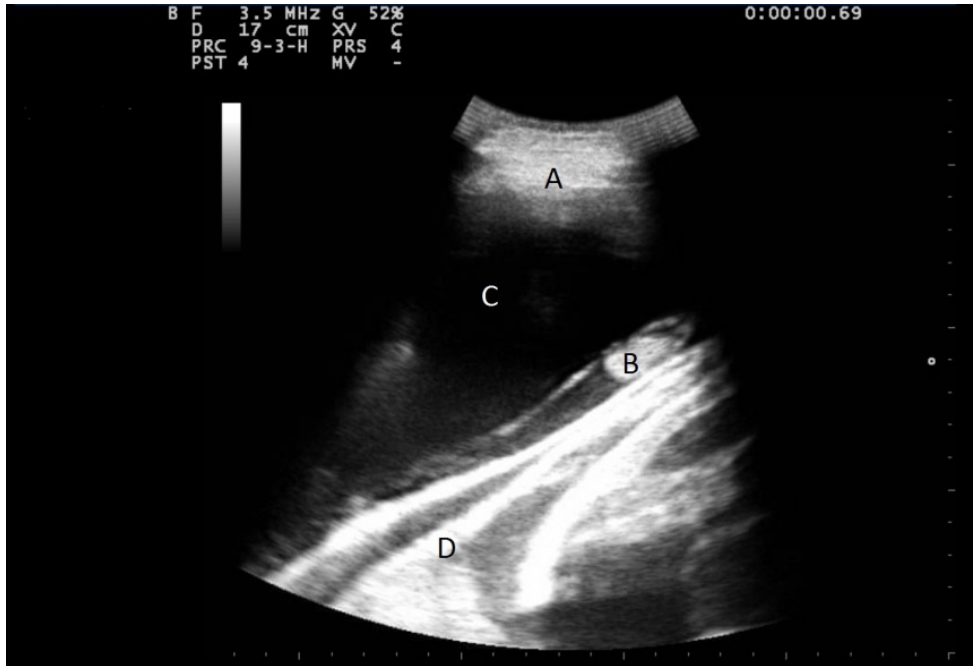


Figure 2: Abdominal ultrasound image taken in the lower right midsection of the abdomen (A = body wall; B = suspected cotyledon; C = free fluid in abdomen; D = suspected free-floating placenta).

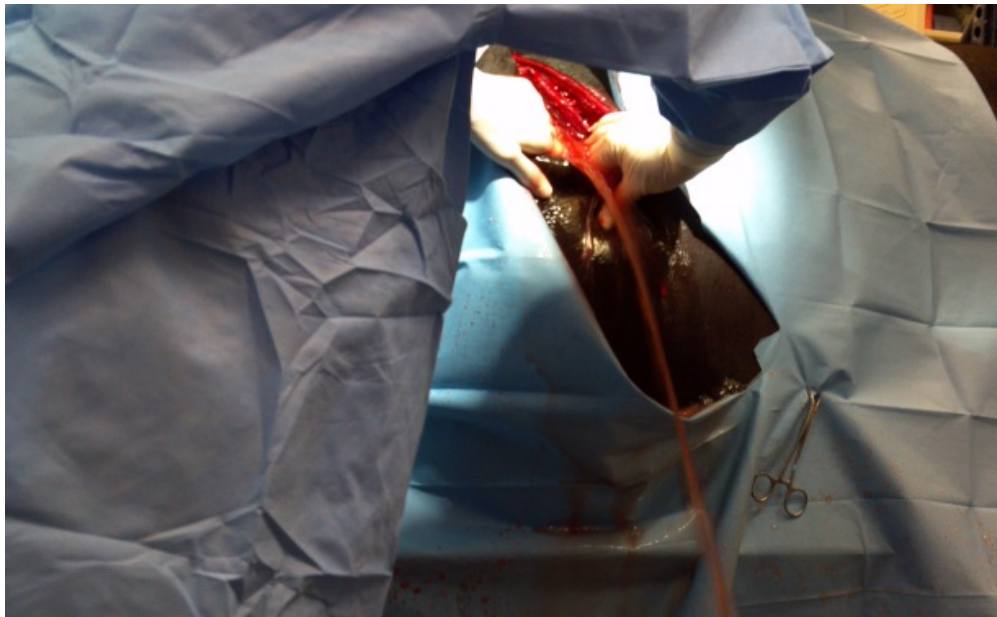


Figure 3: Free abdominal fluid draining from abdomen immediately upon entry into the peritoneal cavity during exploratory surgery.



Figure 4: Both calves and placentas after removal from abdomen.



Figure 5: Image of rent in uterus after removal of calves.

(Editor's note: The photographs in this manuscript are available in color in the online edition of Clinical Theriogenology.)