Management of Uterine and Vaginal Prolapse in the Bovine

Matt D. Miesner, DVM, MS*,
David E. Anderson, DVM, MS

Department of Clinical Sciences, College of Veterinary Medicine, Kansas State University,
1800 Denison Road, Manhattan, KS 66506, USA

Uterine prolapse in cows is a historic topic, well discussed in scientific veterinary literature and texts, argued at legendary proportion between practitioners, and even referenced in western poetry. The condition occurs sporadically, is easily recognized, yet sometimes not so easily repaired. This article discusses replacing, repairing, and removing the uterus, and helpful techniques and potential complications. Occasionally, the veterinarian encounters situations where manual eversion (iatrogenic prolapse) of the uterus is helpful, particularly for efficiently repairing the traumatized uterus in the field. A technique for iatrogenic prolapse also is discussed.

Uterine prolapse

Spontaneous uterine prolapse in cows is an occasionally encountered postparturient complication requiring immediate attention. It almost always happens within 12 to 24 hours after calving. Occasionally, occurrence is delayed until days after calving and complicated by partial cervical involution (closure) creating additive difficulty in replacing the uterus. Cervical involution may necessitate and combination of laparotomy in addition to external reduction [1]. Mid gestation prolapse of the nongravid uterine horn, with successful management and maintaining a viable pregnancy, has been reported [2].

Uterine prolapse occurs sporadically, with dairy cattle seeming to be more frequently represented than beef cattle. Decreased myometrial tone is a logical predisposing mechanism for occurrence, leading to the proposed
risk factors of hypocalcemia and dystocia, causing myometrial fatigue and trauma [3]. Manual extraction of the calf and retained fetal membranes may initiate uterine eversion of the gravid horns followed by complete uterine prolapse after delivery. Uterine prolapse should be regarded as an emergency condition, for one to facilitate replacement, before accumulation of excessive edema, contamination, mucosal trauma, and cervical closure occurs. In addition, client communication to restrict movement should be stressed, decreasing the chance of uterine artery rupture or avulsion from the internal iliac leading to fatal hemorrhage. Without timely intervention, the prognosis for life is grave.

Unlike vaginal prolapse, heritability or additive individual susceptibility with subsequent pregnancies is not apparent with uterine prolapse. Prognosis for survival is dependent on timely intervention, parity, calf viability, and lack of secondary metabolic or musculoskeletal disease. A 1-year study from a large dairy practice in California suggested an incidence of less than 0.1% (200 of 220 K cows), and a 2-week postincident survival of 72.4% [4]. A retrospective questionnaire regarding 90 cases of uterine prolapse, and two matched case control herdmates per farm, over a 3-year period in the United Kingdom found only one cow prolapsed a second time [3]. In the same study, survivability was approximately 80% with the 20% mortality resulting from shock (evisceration); blood loss; refractory downer cow syndrome; and humane euthanasia. Jubb and colleagues [5] suggested a 73.5% (50 of 68) survival rate with only one cow having a history of a previous uterine prolapse, and an 84% (36 of 43) postprolapse conception rate. It should be noted that 43 of the 50 cows were available for conception data. An older study considering primiparous and multiparous beef cows indicated lower pregnancy rates of 33.3% and 66.7%, respectively, after uterine prolapse [6]. A longer calving to conception interval varies between studies, including an additional 10 days [5] to 50 days [3]. Prognosis for life is thought to be positive with timely veterinary intervention, and recognition and treatment of secondary complications. In most instances the decision to treat should be cost effective for the producer.

Replacing the uterus

Prolapse of the uterus is a diagnosis of observation and easily described during telephone consultation (Fig. 1). A large, reddened heavy mass of everted uterus is dramatically visualized, exposing placentomes and possibly attached fetal membranes. Treatment should begin with restraining and evaluating the patient for the presence of metabolic or musculoskeletal disease and treated as indicated. Animal restraint and cleansing of the exposed endometrium, preferably with hypertonic solutions, should be emphasized as priority treatment. Various rope casting restraint methods are described to maintain recumbency and can be applied. In retractable animals chemical restraint may be indicated (see the article by Abrahamsen elsewhere in this
issue). Caudal epidural anesthetics prevent straining and facilitate replacement of the uterus, and at higher volumes provide a method of restraint through posterior muscle paralysis (see the article by Edmondson elsewhere in this issue). Often, the urethra is positioned in the prolapse at an acute angle, such that urination is prevented. Often, by lifting the uterus, the urethra is straightened enough to allow urination, resulting in additional cow comfort and reduced straining. This is also a good time to rule out urinary bladder evisceration through a full-thickness defect in the vaginal or uterine wall. It should also be noted that the bladder, and even intestinal viscera, can be contained within the prolapsed uterus. Bladder retroflexion may persist once the uterus is replaced and result in continued straining by the cow. Ultrasonic evaluation of the pelvic canal for urinary bladder retroflexion should be performed with persistent straining.

Topically applying osmotic agents, such as salts or sugar, has proved effective to begin reducing and preventing the edema that rapidly accumulates within the prolapsed tissue. It is also recognized that these products can amplify endometrial trauma [7]. Manual massage during replacement, using ointment with lubrication and emollient properties, is an effective alternative [8]. Attempt to keep the uterus elevated off the ground while cleaning to prevent ongoing contamination. Laundry baskets, kennel grates, and a plethora of fenestrated supportive or containment devices have been used to replace uterine prolapse reduction. The author prefers a ceramic-coated adjustable cooking grill grate (20 in × 30 in) when assistance is unavailable, which is easily supported between the cranial thighs and hip of the practitioner and the caudal thighs of the sternal recumbent or standing cow, allowing both hands to be used to work. Evaluate the surface of the exposed endometrium for tearing and perforations and repair at this time if possible. Alternatively, if repair is not possible as in the case of severe necrosis or circumferential lacerations, amputation of the uterus should be considered.

Fig. 1. Photograph of a prolapsed uterus that occurred shortly after assisted vaginal delivery in a heifer.
(see later). Protecting the exposed uterus from further trauma and environmental contamination should be performed by wrapping the uterus in plastic or dampened cloth under compression. Confining the uterus in a wrapped plastic or porous fabric bag aids in control of the uterus during replacement and prevents handling-induced trauma to the friable mucosa. If a compression wrap is applied, do so in a manner that allows sequential removal of portions of the wrap as the uterus is replaced from the base (near vagina) to the apex of the prolapse. Additionally, to reduce handling trauma and keep hands warm during cold weather, mittens can be worn while kneading and massaging the uterus during replacement (Fig. 2). Begin reducing the prolapse at the base and continue to the apex. Evaluate for complete reduction and passively infuse warm fluid into the uterus to completely reduce the inverted uterine horns. Failure to achieve complete reduction of the prolapse can result in continued straining and uterine necrosis. Remove excess infused fluid by siphoning it out of the uterus after infusion. Administer oxytocin (20–40 IU, intramuscularly) to enhance uterine involution [9].

Full-thickness lacerations should be repaired when visualized. It is often suggested that repair can be forgone if lacerations are less than 2 to 3 in and dorsal (most common), because the defect closes sufficiently with oxytocin therapy and uterine involution [9]. The statement is often implied when tears are noted post-live-calf extraction and without uterine prolapse or complications. The authors strongly encourage client communication about the risks associated with not repairing uterine lacerations when diagnosed. For detailed techniques on repair of lacerations without a prolapse, the reader is directed to other sources [9,10]. With a prolapsed uterus, repair is easy to perform with a simple continuous pattern of #2 or #3 catgut suture. With wide, radiating areas of devitalized or traumatized tissue from the free edges of the laceration, vertical mattress sutures should aid in minimal tension apposition and result in an inverting pattern of the uterus when

![Fig. 2. Cooking mittens worn to protect the uterine mucosa from iatrogenic trauma during reduction of the prolapse.](image)
replaced. Repair should be performed whenever possible, because post-partum metritis caused by gross contamination and additional trauma has occurred.

Positioning of the cow can facilitate replacement. A very efficient means of positioning is with the cow in sternal recumbency and “frog legged” (stifles down, pelvic limbs stretch out behind the cow). This position can put the cow at risk for coxofemoral luxation. When available in the field, hip lifters can also help support the tuber coxae or even allow some ventral support of the quadriceps draped over a bale of straw. When replacing the prolapse in the standing animal, a support device (see previously) should be used. It is best to allow the cow to stand as soon as possible. Application vaginal retention sutures (see vaginal prolapse section) are at the discretion of the individual, but often are not necessary. Vaginal retention sutures may stimulate additional straining by the cow.

**Amputation of the prolapsed uterus**

Occasionally, extensive calving or environmental trauma has occurred, necessitating a complete ovariohysterectomy to salvage the cow for slaughter. Another indication may be when significant delay in treatment has occurred allowing time to cervical involution a preventing reduction of the prolapsed uterus. When deciding on amputation, it is important to remember that the uterine broad ligaments and reproductive tract vasculature are contained within the prolapse and abdominal viscera and urinary bladder may also be enclosed. The near uterine wall should be incised carefully and the inner prolapse evaluated for contained viscera and vasculature. Viscera should be repelled into the abdomen. Visualize and ligate large uterine arteries and veins with large (#3) moistened and doubled catgut suture or umbilical tape.

Differing techniques for removing the uterus have been described [9,11]. The surgeon may elect to ligate each entire half of the uterus with two complete hemicircumferential or transfixing sutures using umbilical tape, amputate the uterus distal to the sutures, and replace stump into the pelvic canal [9]. A second technique is to place a series of overlapping interrupted crushing sutures with catgut for hemostasis of the cut surface, followed by a continuous appositional suture pattern to close the lumen [11]. The latter technique is more time consuming but provides more accurate hemostasis and reconstruction. Another described technique is to ligate circumferentially the prolapsed uterus tightly near the vulva with either surgical tubing or broad suture (umbilical tape) and allow the uterus to slough distal to the suture. The uterus should slough within a week to 10 days [11].

**Iatrogenic uterine prolapse**

Forced extraction of calves and dystocia can result in uterine tears for various reasons [9]. Laparotomy exposure and “blind” one-handed suturing
techniques through vaginal access are described elsewhere [9,10]. One technique for attempting repair of uterine rupture is by manually exteriorizing the uterus to gain visual access of the traumatized area [8–10]. The cervix must be adequately relaxed for the procedure to be successful, and is limited to within the first few hours (maximum <12 hours) after calving. The cow should be adequately restrained, surgical instruments and suture material ready, and a uterine support device (see previously) or clean plastic drape to support the uterus. The repair should be performed as quickly as possible to prevent accumulation of excessive edema. Most uterine tears are dorsal and just cranial to the cervix, and complete uterine prolapse may not be necessary.

β2-Adrenergic agonist drugs (betamimetics) have historically been used in veterinary medicine to relax the uterus (tocolysis) for procedures, such as facilitating fetal manipulation during assisted vaginal delivery and providing more complete exteriorization of the uterus during cesarean section [12]. Examples of these drugs are clenbuterol, isoxsuprine, ritodrine, and epinephrine. Of these pharmaceuticals, only epinephrine and possibly ritodrine are permitted for use in food-producing animals in North America. A Canadian study indicated successful tocolysis with ritodrine [13]. The author is unaware of the availability, cost, or legal recommendations with the use of ritodrine in the United States. Personal experience and communication are limited to the use of epinephrine for tocolysis. Epinephrine does have inherent side effects associated with betamimetics, such as altering blood pressure, increasing heart rate, myocardial work, and inducing irreversible fatal cardiac arrhythmia. Use as a tocolytic should be weighed on a case-by-case basis and other options considered.

A bolus intravenous administration with 10 mL of 1:1000 epinephrine diluted in 50 mL of sterile saline has also been successful without adverse effects in the authors’ experience. A uterine caruncle, fold of endometrium, or placenta is grasped and steady traction applied to evert the uterus. The surgeon should be patient and not overzealous with traction. As progress is made, the surgeon can advance their grip cranial toward the apex of the uterine horn until the uterus is exteriorized. Difficulty in this procedure arises when the weight of the uterus prevents exposure; also, it is more successfully done before caudal epidural anesthesia allowing the cow to aid expulsion through abdominal press. The defect is then repaired and uterus replaced as within the abdomen.

Vaginal prolapse

Risk factors, description, and occurrence of vaginal prolapse have been reviewed [14–16]. Vaginal and uterine prolapse are common problems in cattle, occasional problems in sheep, but more rarely seen in goats. When
vaginal prolapse is seen in goats, these occur more frequently in dairy breeds. Acute vaginal prolapse may be seen prepartum or postpartum. Animals suffering prepartum vaginal prolapse should be selected for culling after weaning the current offspring. Dietary factors implicated in vaginal prolapse include poor quality forage; hypocalcemia; high estrogenic-content foodstuffs, such as legumes and soybean meal; and overcrowding. Estrogen is a potent inhibitor of bone calcium resorption and elevated levels could plausibly, although not scientifically proved, increase the risk of uterine prolapse [7,14]. Individual animal risk factors include obesity, chronic coughing, chronic straining to urinate or defecate, and excessively short tail docking in sheep. Vaginal prolapse may be described using a grade scale of I to IV (Fig. 3) (Table 1) [15]. In this grading scale, vaginal prolapse severity and extent of damage is used to assess treatment options.

**Acute vaginal prolapse**

A plethora of techniques have been described for treatment of acute vaginal prolapse including Buhners suture, boot lace sutures, paravaginal stents, Caslik’s suture, rope slings or harnesses in sheep, and indwelling vaginal retainers in sheep. Indwelling retainers and rope slings are purported to have the advantage that kids and lambs may be able to birth around or through the device. Dystocia is a concern, however, whenever these devices are left in place. Ideally, rope slings or retainers should be removed within a few days of expected parturition. Alternatively, parturition may be induced to allow a shorter interval for close observation or for elective

![Fig. 3. Grade III vaginal (dorsal oval mass) prolapse with urinary bladder eversion (ventral mass).](image-url)
cesarean section. In small ruminants, suture techniques have a higher risk of tearing through the perineal tissues. When necessary, the authors have chosen to use 6- to 12-mm diameter rubber stents to place under mattress sutures. The authors place three to five vertical or horizontal mattress sutures over a stent that is positioned perpendicular (for vertical mattress) or parallel (for horizontal mattress) to the vulva. All of these techniques are used to maintain position of the vagina cranial to the vulva and ideally within the vaginal vault. Vaginal vault retention requires replacement of the function of the vestibular sphincter muscles. The sutures must be placed along the hair-nonhaired margin of the vulva such that the depth of the suture mimics the effect of the vestibular sphincter muscle. Placement of the sutures too superficially results in insufficient support of the vaginal tissues and persistent or recurrent straining. Persistent straining and recurrent prolapse result in tearing of the vulva (Fig. 4).

Buhner sutures should be placed using a Buhner needle inserted 1-cm incision made approximately at the level of the ischium (4-cm width proximal

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Relevance</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Intermittent prolapse of vagina; most commonly when lying down.</td>
<td>Likely to progress to Grade II if not treated.</td>
<td>Temporary retaining suture; cull after calving or perform permanent fixation technique if embryo flush cow.</td>
</tr>
<tr>
<td>II</td>
<td>Continuous prolapse of vagina ± urinary bladder retroflexed.</td>
<td>Urinary bladder involvement (common) can obstruct urination or cause persistent straining.</td>
<td>Temporary retaining suture; cull after calving or perform permanent fixation technique if embryo flush cow.</td>
</tr>
<tr>
<td>III</td>
<td>Continuous prolapse of vagina, urinary bladder, and cervix (external os visible).</td>
<td>Can cause compromise to urine outflow and ureters. Should be treated quickly to prevent life-threatening injury.</td>
<td>Perform permanent fixation technique if embryo flush cow. Induce parturition or perform elective C-section if commercial cow.</td>
</tr>
<tr>
<td>IV</td>
<td>Grade II or III with trauma, infection, or necrosis of vaginal wall. a. Subacute such that replacement into vaginal vault is possible. b. Chronic with fibrosis such that the vagina cannot be replaced.</td>
<td>Grade IVa repair laceration, debride wounds, treat infection, and replace into vaginal vault. Grade IVb Requires elective C-section or vaginal resection.</td>
<td>Perform permanent fixation technique if embryo flush cow. Induce parturition or perform elective C-section if commercial cow.</td>
</tr>
</tbody>
</table>

to the ventral comisure of the vulva) and exiting a 1-cm incision made on midline of the perineum 4-cm dorsal to the dorsal comisure of the vulva. The needle is inserted first, then quarter inch (6.4 mm) width umbilical tape is inserted in the end of the needle and the suture is pulled back through as the needle is removed. The procedure is repeated on the contralateral side with the needle exiting the same proximal midline perineal incision.

**Chronic vaginal prolapse**

Although Buhner’s suture and other methods of fixation give temporary relief from vaginal prolapse, chronic vaginal prolapse requires more invasive techniques to stabilize the vagina. The Johnson button and Minchev suture techniques are appropriate for vaginal prolapse associated with excessive redundancy of the dorsal vaginal wall. These techniques are traumatic and may result in tearing of the vagina into the abdomen because of chronic straining after surgery or may cause damage to the sciatic nerve or internal pudendal artery if these structures are not avoided. In these techniques an indwelling needle (Johnson button) or umbilical tape suture (Minchev) are placed from the dorsolateral vaginal wall through the sacrotuberous ligament, gluteal musculature, and skin. In the case of the Johnson button, large, flat disks are attached to each end to secure the device. With the Minchev suture, rolls of gauze sponges are attached to each end to secure the device. These are left in place for 2 to 6 weeks to allow for extensive fibrous adhesions to form, which serve as anchors for the vaginal shelf.

Cervicopexy is appropriate for vaginal prolapse associated with excessive redundancy of the ventral vaginal wall. Cervicopexy can be performed transvaginally or by flank laparotomy. Flank laparotomy offers the best approach for anatomic and permanent fixation because the cervix can be more accurately anchored without interference with the bladder, the suture can be
placed without compromise of the cervical lumen, and the suture is permanently placed with little risk of infection. Cows having chronic vaginal prolapse are often obese, however, and excessive abdominal fat increases the difficulty of this procedure dramatically. Transvaginal cervicopexy offers the easiest and least invasive surgical approach and is amenable to field conditions. Two sutures of #3 vetafil are placed through the external os of the cervix (being careful not to penetrate the lumen of the cervix) and are anchored to the prepubic tendon (being careful not to entrap the bladder, urethra, or intestines). Disadvantages of cervicopexy include increased risk of entrapment of the urethra, increased risk of sepsis of the abdomen or cervix, increased risk of compromise of the lumen of the cervix, and suboptimal anatomic positioning. An indwelling urethral catheter placed during the procedure helps localize the urethra and avoid urethral entrapment.

Vaginoplasty and vaginal resection are effective in the elimination of vaginal prolapse and may be used for either dorsal or ventral wall prolapse, but this procedure prevents the animal from being used in natural service or going through normal parturition. This technique is done with the animal standing with epidural anesthesia. A triangular segment of the dorsal lateral vaginal wall is resected on both sides with the triangles based on dorsal midline. Then, the sides are sutured closed together. The vaginal wall resection should only leave enough room for embryo flushing equipment to be passed through the vagina. Vaginal resection can be performed in chronic vaginal prolapse were vaginal redundancy is circumferential such that a complete segment of the vagina can be removed. Vaginal resection is performed much like rectal amputation. A vaginal speculum is placed into the lumen of the prolapsed vagina and then cross-fixation pins are placed through the vaginal prolapse and tube to stabilize the segment for surgery. The injured portion of the vaginal prolapse is resected and an end-to-end anastomosis performed using #1 or #2 polyglycolic acid in interrupted suture pattern. Complications of vaginal resection include stricture, dehiscence, hemorrhage, abscess, and reoccurrence of prolapse.

After surgery, the animal should be rested for 30 days before insemination or breeding activity is resumed. The authors only recommend treatment of chronic vaginal prolapse when there is a history of chronic hormonal manipulation. Other vaginal prolapses have a high concern for heritability and these animals should be culled. If the animal is to be made a pet, ovariohysterectomy is recommended. Complications of surgical treatments for vaginal prolapse include reoccurrence; dehiscence; hemorrhage; abscess; damage to vital structures (urethra, sciatic nerve, pudendal artery); and peritonitis.

Summary

Uterine prolapse is a commonly encountered postcalving complication, but has an infrequent incidence of occurrence in cattle populations. The condition is easily recognized and treatment success begins with prompt
cow restraint and management before replacement. Care should be taken to replace the uterus gently and completely. Individual case survival should be considered good and conception rates favorable with prompt veterinary intervention and minimal complications. Occasionally, surgical intervention for laceration repair or complete amputation of the uterus may be indicated.

Vaginal prolapse can be acute or chronic and occur either prepartum or postpartum. Each case should be evaluated individually and graded based on duration and complications. Animals suffering prepartum vaginal prolapse should be selected for culling after weaning the current offspring. There are many reasons for vaginal prolapse other than heritability, which should be considered when confronted with the condition. Long-term prognosis for vaginal prolapse is limited because of culling.

References