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Recognition and handling of peri-parturient emergencies in mares

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Recognizing emergencies in foaling mares is significantly important in regards to the future health of the horse. The term “emergency” indicates a condition that requires immediate treatment, or may develop into a life-threatening situation for the mare. Most periparturient emergencies usually involve the genitourinary tract; however, many times the gastrointestinal system is involved.

Parturition occurs in a 3-stage process. Stage 1 is the preparatory stage; during this stage, the uterus begins to contract, the cervix dilates, and the foal begins to position itself. This stage last approximately 30 minutes to 4 hours; the end of this stage occurs when the chorioallantoic membrane ruptures; few foals delivered more than 40 minutes after chorioallantoic membrane rupture survive. Stage 2 is the passage of the foal into the birth canal. Normally the front feet will appear first, one slightly in front of other. The muzzle of the foal should be positioned between the 2 front legs. During this stage, violent uterine contractions will be observed. Expulsion of the foal should occur within 20-30 minutes. Stage 3 is expulsion of the placenta. The placenta should be passed within 30 minutes to 3 hours of foaling.

Dystocia

Prolonged foaling during stage 1 or 2 is often associated with dystocia. Foals that are not delivered within 30 to 40 minutes of the onset of stage 2 frequently do not survive. Maternal causes of dystocia include: failure of cervical dilation, small birth/pelvic canal, pelvic deformity (callus formation due to previous pelvic fracture), vaginal or uterine tear with intestinal evagination, uterine torsion, abdominal wall hernia, ruptured pre-pubic tendon, and placentitis. The most common cause of equine dystocia is fetal malposition. Other fetal causes of dystocia include twins, septic fetus, stillbirth, in-utero intestinal evagination, and congenital deformity. Signs of dystocia include excessive straining with no advancement of the foal and failure to progress from stage 1 to stage 2 of foaling. Veterinary intervention should be aimed at delivering a live foal whenever possible, while at the same time preserving the life and fertility of the dam.

There are 4 procedures used to resolve dystocia in the mare: 1) assisted vaginal delivery, in which the mare is conscious and manually assisted in vaginal delivery of an intact foal; 2) controlled vaginal delivery, in which the mare is anesthetized and the clinician is in control of vaginal delivery of an intact foal; 3) fetotomy, in which the dead fetus is reduced to 2 or more parts and removed vaginally in the awake or anesthetized mare; and 4) cesarean section, in which the fetus is removed through a hysterotomy via ventral midline celiotomy.

Assisted and controlled vaginal deliveries require intrauterine manipulation of the foal to correct an uncomplicated malposition. The birth canal must be fully relaxed and well lubricated before applying traction. Excessive use of traction may result in fetal rib, vertebral, or limb fractures or maternal soft tissue trauma. Survival of mares using controlled vaginal delivery is 94%; whereas, survivability of the foal extracted via control-
led vaginal delivery is 32% (Byron et al.). Fifty-eight percent of mares undergoing controlled vaginal delivery were able to deliver a live foal the following year in one study (Byron et al.).

The objective of a fetotomy is to preserve the mare’s life and future fertility when the foal is known to be dead or congenital deformities are detected. This technique is achieved by intrauterine reduction in fetal size to permit safe extraction. Partial dismemberment (2-3 cuts) of the fetus is appropriate; if more dismemberment is anticipated, a cesarean section should be performed. Survival of mares using a fetotomy to resolve dystocia is 56% (Byron et al.).

A cesarean section is indicated when rapid delivery of a live fetus cannot be achieved using forced extraction, or when a partial fetotomy will not be sufficient to facilitate the delivery of the fetus. Survival of mares undergoing cesarean section is 89%; whereas, survivability of the foal extracted via cesarean section delivery is 31% (Byron et al.). Sixty percent of mares undergoing cesarean section were able to deliver a live foal the following year in one study (Byron et al.).

**Uterine Prolapse**

Uterine prolapse is an uncommon complication of equine parturition. It is generally considered more common after dystocia or retained placenta. Prolapse may occur hours to days after foaling. Diagnosis is based on the presence of the prolapsed uterus hanging from the vagina as a soft mass with a red, corrugated surface. Mild-to-moderate symptoms of restlessness, pain, anxiety, elevated heart rate and respiratory rate are observed. Concurrent complicating factors such as internal hemorrhage, incarceration of intestines, and shock will result in a poor prognosis and possible rapid death. Initial treatment includes keeping the mare quiet, wrapping the tail, and elevating the uterus to the level of the vulva using a sheet or a flat board. The mare should be heavily sedated while the veterinarian kneads the uterus up and into the vagina, taking care not to perforate the uterus. An epidural may be necessary alleviate the mare from straining. Once the uterus is replaced, the uterus can be filled with sterile fluid and drained or the mare should be walked down a steep slope to ensure uterine horn intussusception does not occur. The mare should be closely monitored for the next 48-72 hours for signs of endotoxemia, laminitis, uterine tear, hemorrhagic shock, and death. The mare’s subsequent fertility will depend on the degree of endometrial damage incurred during the prolapse and recovery period, but the prognosis for fertility has been reported to be good. Recurrence rates for uterine prolapse are unknown, but they are generally considered low.

**Retained Placenta**

The term *retained placenta* is defined as failure of passage of part, or all of the chorioallantoic membrane within 3 hours post-delivery. The incidence of retained placenta occurs in less than 10% of foalings. The area most likely to be persistently adhered is the near the tip of the non-gravid uterine horn. If not managed appropriately, placental retention can become a life-threatening situation. The rapidly decaying placenta within the uterus provides an ideal environment for bacterial proliferation. The sequela to bacterial proliferation results in the development of toxic metritis, septicemia, endotoxemia, and laminitis. The most common presenting sign is the protrusion of the placenta through the
vulvar lips; however, if a portion of the placenta has been torn, “tags” of placenta may be present within the uterus. Postpartum mares with a vaginal discharge, fever, decreased appetite, depression, or laminitic lameness should be suspected of having a retained placental remnant. Treatment of retained placenta consists of serial oxytocin treatments, broad-spectrum antibiotics, anti-inflammatories, and uterine lavage. Manual extraction of the placenta is controversial; potential complications of overzealous manual removal include hemorrhage, intussusception of uterine horns, endotoxemia, delayed uterine involution, and intrauterine adhesions.

Premature Placental Separation (Red Bag Delivery)

Premature placental separation has been associated with placentitis, systemic illness, and fetal death in utero. It is an especially likely complication of induced parturition. The separated chorioallantoic membrane appears at the vulvar lips as a glistening red velvet structure. The disruption of placental circulation rapidly leads to fetal hypoxia and death. The chorioallantoic membrane should be incised immediately and the fetus delivered. The foal should promptly be evaluated and referred to an intensive care unit if possible.

Uterine Tear (Rupture)

Uterine tears can occur in any portion of the uterus. Uterine tears in the uterine body are generally associated with dystocia, although they can occur in this location with normal parturition. A possible consequence of uterine body tears is laceration of the uterine artery, uterine branch of the ovarian artery, or the vaginal artery resulting in hemorrhagic shock or death. Occasionally, gastrointestinal evisceration can occur through the uterine body tear. Often, uterine body tears can be detected during digital uterine examination immediately after extraction of the fetus.

Tears not associated with dystocia more commonly occur toward the tip of the gravid horn. The right horn is more commonly tore than the left uterine horn. These are probably associated with fetal movements during stages 1 and 2 of labor. Uterine horn tears can be difficult to digitally palpate and are often not detected until the mare becomes lethargic, depressed, anorectic, febrile, and/or exhibiting signs of abdominal pain as septic peritonitis develops. The interval from occurrence of the tear to diagnosis and treatment or surgical repair of the uterine tear directly impacts the outcome. Diagnosis is based on history (post-partum mare), clinical signs, digital palpation of a tear within the uterus, increased abdominal fluid observed on ultrasonography, abdominal fluid leukocytosis, and abdominal fluid hyperproteinemia. Surgical repair of the uterine tear through a ventral midline is often the treatment of choice yielding a 76% survivability rate (Javiscas et al.).

Uterine Torsion

The cause(s) of uterine torsion in mares is not well defined. Clinical signs are centered around persistent generalized abdominal discomfort. Diagnosis is confirmed by rectal palpation. The broad ligament on the side of the uterine torsion is often more caudal and identified as a tight vertical band, whereas the opposite broad ligament is pulled horizontally across the top of the uterus before coursing ventrally; the two broad ligaments meet where they pass under the uterus. Location of the ovaries may also help in identification of the broad ligaments. Transabdominal ultrasonography should be perform-
ed to assess fetal viability. There are many published methods of uterine torsion correction. If the cervix is dilated (in term mares) sufficiently to allow insertion of an arm, it may be possible to grab the foal ventrolaterally and rock the uterus and foal back and forth until enough momentum has been achieved to correct the uterine torsion. A second method includes placing the mare under general anesthesia and rolling the mare towards the side of the uterine torsion while someone stands on a plank of wood placed against the flank. A third method includes correction of the uterine torsion via 1 or 2 flank incisions while standing. The torsion is corrected by placing a forearm under the uterus to rock the fetus and uterus back and forth while gaining enough momentum to derotate the torsion. The fourth method includes ventral midline celiotomy which provides: 1) the ability to correct the torsion; 2) assess the status of the uterus; and 3) to evaluate the abdomen for any other complications. If a cesarean section is necessary, it can be performed at that time. Often the prognosis is good; however, this depends upon the degree of vascular compromise.

**Uterine Horn Intussusception**

Injudicious traction on a retained fetal membrane remnant may invert the tip of the uterine horn and progress to complete uterine prolapse. Compromised circulation and pressure on nerve endings may produce signs of abdominal discomfort. Palpation per rectum should include exploration of the tips of both horns. The affected horn will be shorter than normal and extremely thickened. Manual reduction by pressure from within the uterine lumen may be possible. Infusion of several liters of sterile fluid should complete the extension of the affected horn. Oxytocin should be administered while fluid is drained from the uterus. Resolution of the problem may be confirmed by palpation per rectum. If conservative management fails to resolve the uterine horn intussusception, then surgical intervention may be required. If the tip of the affected uterine horn is necrotic, then a partial ovariohysterectomy may be required.

**Urinary Bladder Rupture**

Occasionally, the bladder may rupture as a consequence of increased intra-abdominal pressure in the foaling mare or to direct trauma during parturition. Clinical signs are delayed until the effects of electrolyte imbalances are evident. Affected mares become depressed and inappetent, with failure to void urine. Clinical examination reveals tachycardia, tachypnea, and signs of abdominal discomfort. Hyperkalemia, hyponatremia, and hypochloremia are often present along with an elevated BUN and creatinine. Abdominocentesis reveals elevated creatinine levels. A standing vaginal approach in which the urinary bladder is everted and repaired through an incision made along the vaginal floor allows excellent observation and repair of urinary bladder tears in mares.

**Urinary Bladder Eversion**

Urinary bladder eversion results from severe straining during parturition. The diameter of the mare’s urethra is such that the bladder may become everted into the vagina and protrudes through the vulvar lips; urine may be seen dripping. Following epidural, the edematous mucosal surface should be cleaned, any bladder tears repaired, and the bladder gently massaged (using sterile lubricant) back through the urethra. Occasionally, a loop of intestine may be forced into the everted bladder making it difficult to replace the bladder; this can be verified ultrasonographically. These cases may require ventral midline
c celiotomy to assess intestinal viability. If it is difficult to replace the everted bladder and ultrasonography indicates no intestines are present within the bladder, the urethral sphincter should be incised to replace the bladder; the incision should then be closed once the bladder is replaced. A Foley catheter should be inserted to lavage the bladder lumen and to ensure complete repositioning. Broad-spectrum antibiotics, anti-inflammatories, and tetanus should be administered.

**Rectovaginal Fistulas and Third-Degree Perineal Lacerations**

Third degree perineal lacerations generally occur during unassisted foaling when the fetal hoof catches on the vaginal roof at the vestibulovaginal junction. Forceful straining by the mare drives the hoof through the rectovaginal shelf such that the fetal hoof penetrates the rectal lumen. If the fetus is viable, it may remove the affected limb itself and delivery will proceed unimpeded; a rectovaginal fistula results. If the limb remains within the rectum as the foal is delivered, the fetus causes the trapped limb to tear out the perineal body and anal sphincter; a third degree perineal laceration results. In both circumstances, the mare is treated with broad-spectrum antibiotics, anti-inflammatories, tetanus, gruel diets, green grass, and mineral oil. Reconstructive surgical repair of the rectovaginal fistula or third-degree perineal laceration is performed 4-6 weeks after the initial injury.

**Colic**

It is common for mares to colic immediately after to about 2 months after foaling. Post partum mares appear to be at an increased risk of development of a large colon torsion. This condition presents as a violent colic with obvious abdominal distension. Early surgical intervention is necessary to increase the survival rate. Compression of the small colon, rectum, or cecum between the uterus and pelvis during delivery may result in bruising of abdominal viscera and ultimately necrosis of the affected section of small colon, with subsequent development of signs of impaction or peritonitis. Surgical resection of the affected area is often necessary; however, the affected region of the small colon is often times too far within the abdominal cavity to warrant a resection and anastomosis. Occasionally a mesenteric or broad ligament rent will be formed due to the foal placing its foot through the mesentery or ligament without damaging the uterus. A loop of small intestine will become incarcerated within this rent resulting in revitalization of the intestine. Surgical resection and anastomosis is required to correct this abnormality. Early surgical intervention is imperative to increase the prognosis. Rupture of the gastrointestinal tract is usually associated with a ruptured stomach or cecum. Septic shock is apparent, and humane euthanasia is indicated. Diaphragmatic hernia is a rare cause of colic; however, during the abdominal thrust phase of delivery, a tear in the diaphragm can occur. Small intestine usually becomes entrapped within the thoracic cavity resulting in devitalization of the entrapped portion of bowel. Surgical intervention is required in attempts to correct the abnormality. A resection and anastomosis is required and closure of the diaphragm should be performed.

**Periparturient Hemorrhage (Broad Ligament Hematoma)**

Hemorrhage from the middle uterine, utero-ovarian, or external iliac arteries is a significant cause of periparturient colic symptoms and death in older multiparous broodmares (up to
40% of postpartum deaths). This complication may occur before, during, or after parturition; most commonly within the first 24 hours postpartum. Hemorrhage is equally associated with dystocia and problem-free deliveries. Clinical signs include abdominal pain, sweating, weakness, elevated heart rate, elevated respiratory rate, ataxia, pale mucous membranes, and hemorrhagic shock. The course of clinical signs progress rapidly; many mares suffering from uterine hemorrhage are simply found dead. Veterinarians should differentiate this condition from postpartum colic. Diagnostic tools include transabdominal ultrasound, +/- rectal exam, complete blood count, and abdominocentesis. Treatment should be aimed at treating the hemorrhagic shock. Mares should be confined to a dark, quiet stall with minimal disturbance. Mild sedation may used if necessary to ensure the mare remains quiet. Medical therapy should include anti-inflammatories, antibiotics, and IV fluid therapy. Optional medical therapy includes the use of blood transfusions, aminocaproic acid, pentoxyfilline, oxytocin, and naloxone. There is no proven surgical treatment available; an exploratory celiotomy is contraindicated. Laparoscopic vessel ligation may have merit in early-recognized cases. In the acute phase, the prognosis for life is guarded. In those mares that survive, owners should be advised that repeat bleeding episodes might occur in future parturitions.

Rectal Prolapse

Prolonged straining during dystocia can lead to variable amounts of rectal mucosa being forced out through the anal sphincter. The tissue then becomes subject to trauma, contamination and vascular compromise. If not promptly corrected, pressure from the anal sphincter causes venous congestion and swelling. In a type 1 rectal prolapse, only the rectal mucosa and submucosa project through the anus. Type 2 rectal prolapse involves all or part of the rectal ampulla. Types 1 and 2 rectal prolapses respond to reduction and treatment of the primary problem. The mucosal edema and irritation can be reduced by topical application of glycerin, sugar, magnesium sulfate, and/or lidocaine jelly; epidural anesthesia may also be required to reduce the prolapse. No feed should be offered for 24-48 hours, then begin to offer gruel diets and/or fresh green grass. Mineral oil should be administered via nasogastric intubation.

With a type 3 prolapse, a variable amount of small colon intussuscepts through the rectum. In a type 4 prolapse, the peritoneal rectum and a variable amount of small colon form an intussusception through the anus. Type 3 rectal prolapses can possibly be manually reduced; however, serial abdominocentesis should be performed to assess intestinal wall integrity. Laparoscopy can also performed to directly visualize the small colon. If manual reduction cannot be achieved, then a submucosal resection, a resection and anastamosis, or euthanasia should be considered.

Type 4 rectal prolapse can possibly be manually reduced; however, serial abdominocentesis should be performed to assess intestinal wall integrity. Signs of colic attributable to small colon impaction are often seen if a type 4 rectal prolapse is manually reduced. This type of rectal prolapse results in necrosis of the prolapsed small colon because of mesenteric avulsion and vascular tearing. Prolapses involving at least 20 cm of small colon result in avascular necrosis of the small colon and septic peritonitis. Prognosis of type 4 rectal prolapse yields a guarded prognosis despite surgical management. Mares with a type 4 rectal prolapse often warrant euthanasia.
References
