Postpartum septic/toxic metritis in the mare – observation & rationale for treatment
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Introduction
The incidence of infection of the uterus within seven to ten days postpartum (i.e., postpartum metritis; sometimes involving the endometrium, myometrium and perimetrium) in foaling mares is low, but increases when birthing trauma and/or retained placenta occurs. Mares having an apparently normal parturition can also develop postpartum metritis. Sequelae of postpartum metritis, sometimes life-threatening, vary from delay in uterine involution to development of sepsis/toxemia, laminitis, and death. Prompt recognition and treatment of metritis can prevent sequelae from occurring, and will more rapidly restore uterine health to normal with resultant fertile condition.

Keywords: Metritis, postpartum infection, uterus, mare

Occurrence and clinical signs
Septic/toxic metritis may occur with or without dystocia, obvious trauma to the birth canal, or retained placenta, and becomes apparent within one to ten days (most commonly on days 2-4) postpartum. The uterine atony or inertia that is purported to accompany retained placenta has been postulated to be involved in the etiology of septic/toxic metritis. Trauma to the uterus, autolysis of placental remnants, and excessive accumulation of lochia are thought to contribute to rapid growth of bacteria with toxins produced that may be absorbed into the blood stream, particularly when expulsion of contents is delayed or when the normally intact uterine mucosal barrier is damaged.

The pathogenesis of toxic metritis, and particularly the time sequence in development of toxemia, remains hypothetical. Interestingly, infusion of potentially lethal doses of Escherichia coli endotoxin into the uterus of normal foaling pony mares on days 1 and 4 postpartum failed to result in detectable presence of endotoxin within the blood (using the Limulus amoebocyte lysate [LAL] assay for endotoxin detection), and the neutropenia that typically accompanies experimentally-induced endotoxemia did not occur. Evaluation of scanning electron micrographs in that study revealed the endometrial mucosa of both treated and control mares was intact, whereas the uterine mucosal lining of one mare with clinically-apparent septic/toxic metritis that died was markedly disrupted. Apart from the timing of development of septic/toxic metritis and/or laminitis, when the uterus is damaged may be conjectural; however, it is logical to assume a damaged mucosal barrier allows absorption of locally produced toxins. Septic/toxic metritis with neutropenia was found to be more common in mares that retain their placenta, particularly after dystocia. Certainly, disruption of the endometrial mucosal barrier is a risk of dystocia, or disruption could gradually progress after retention of fetal membranes that leads to bacterial overgrowth. When intraperitoneal injections of Escherichia coli endotoxin are given, pronounced neutropenia occurs rapidly (i.e., within 1-2 hours usually), while the pronounced neutropenia with degenerative left shift seen in those mares that develop septic/toxic metritis occurs on days 2-4 postpartum. Thus, perhaps a gradual buildup of endotoxin producing bacteria within the uterine lumen concurrent with progressing damage to the endometrial mucosa allows ever more absorption of endotoxin into tissues and the bloodstream.

If a foaling mare did not have a difficult birth and expelled fetal membranes were not examined for completeness, the first clinical signs in a mare developing septic/toxic metritis may be inappetance, depression, and fever. In some cases, the veterinarian may not be alerted to the potential disorder until he/she is requested to examine a postpartum mare for lameness. Querying the owner about behavior of the mare’s foal may reveal it has been noted to suckle often, yet not be satisfied, due to decreased milk production by the dam. The mare's heart and respiratory rates are often elevated when fever is present. The mare’s mucous membranes may be tacky (owing to dehydration) and, if toxemia exists, the membranes may be discolored with poor perfusion (prolonged capillary refill time). A copious, fetid vulvar discharge is often evident, particularly in those mares affected by trauma and necrosis of the birth
canal. Repeated abdominal straining sometimes occurs when vaginal necrosis or lacerations are present, or if placental remnants are lying in the birth canal. The mare’s feet should always be examined for warmth, presence of increased digital pulses, and pain. If laminitis develops, lameness (particularly of the front feet) can become pronounced. Sinking of the digit(s) and rotation of the third phalanx(ges) may follow, necessitating euthanasia.

Examination of the uterus per rectum and by transrectal/transabdominal ultrasound commonly reveals an enlarged atonic uterus containing an excessive amount of variably echogenic fluid. Aseptic manual examination of the birth canal is recommended to determine if any accompanying swelling, hemorrhage or necrotic tissue are present in the birth canal, which would confirm birthing trauma. Manual examination of the uterine lumen should be performed to detect the presence of placental remnant(s), including a retained tip of the placenta that previously occupied a uterine horn.

Additional diagnostic tests

A complete blood count is useful for confirming if sepsis or toxemia has developed, as neutropenia with a degenerative left shift is commonly found. Neutrophils sometimes are found to be ‘toxic’, evidenced by hypersegmented nuclei and cytoplasmic vacuolation. In one study involving foaling mares referred to a hospital for dystocia, neutropenia was most pronounced 3-4 days postpartum. Absolute neutropenia (ie, often < 1500 neutrophils/µL) has been described as a common finding in mares with septic/toxic metritis. While the relationship between bacterial endotoxemia and onset of laminitis is currently questioned, signs of endotoxemia have been linked to significant risk of laminitis developing.

Swabbing the uterine lining and retained lochia for bacterial culture has been recommended to identify the organism(s) present, and to guide selection of antimicrobial(s) used in treatment of infection. Bacteria typically isolated from the uterus of mares with metritis after correction of dystocia include aerophilic and microaerophilic or anaerobic organisms – such as Escherichia coli (a potent endotoxin-producer) and Streptococcus spp., and sometimes Bacteroides fragilis and Clostridium spp.

When foot soreness develops, radiographs should be procured and evaluated for sinking or rotation of the digit. When sinking of the digit is suspected due to ‘ledging’ being evident at the coronary band, contrast material can be infused into the vasculature to evaluate the circulatory status of the foot. Once vascular disruption has occurred, the prognosis for survival is grave.

Treatment

Various treatments for postpartum metritis in mares have been advocated. Systemic administration of broad spectrum antibiotics is indicated to control infection. Antibiotics selected should be effective against both gram positive and gram negative bacteria. Administration of gentamycin (6.6 mg/kg, q24h, iv) and penicillin (22,000-44,000 units/kg Na’ or K’ penicillin, q6h, iv or im; or 22,000 units/kg procaine penicillin q12h, im) can be used for this purpose. If endotoxemia is considered a significant risk, administration of polymixin-B (1,000–6,000 units/kg q6-8h, slowly iv) may be added to the systemic antimicrobial regimen. Pentoxiphylline (7.5-10 mg/kg, q 8-12 h po or iv) may provide added benefit to improve malleability of erythrocytes and thus potentially improve circulation to vasculature of the foot. For additional protection against endotoxemia, and for anti-inflammatory effects flunixin meglumine (0.25 mg/kg, q8h, iv) may administered. Specific treatment of the genital tract includes oxytocin therapy (10-20 IU oxytocin q6h, im), stimulating uterine contractions (lasting 20-50 minutes) that aid in expulsion of uterine contents. Uterine lavage can be performed to remove debris and bacteria from the uterus, thereby reducing contamination and creating a less favorable environment for bacterial growth. Uterine lavage prior to antimicrobial treatment will also remove purulent material and cellular debris that bind to and inactivate many antibiotics. However, whether there is additional benefit to administration of local antibiotics by uterine infusion is controversial. There may be some benefit to controlled exercise if foot soreness is not present, but exercise is considered contraindicated if foot soreness is present.
For uterine lavage in postpartum mares, the author prefers to utilize a large bore tube (eg, stomach tube). After disinfection of the perineal and vulvar areas, a sterilized or disinfected nasogastric tube is passed into the uterus. The hand must be cupped around the end of the tube to prevent the uterus and any remaining placenta from being siphoned into its end. Gentle lavage with warm (40°C to 42°C), sterile, physiologic saline (administered via a sterile or disinfected stomach pump) in three- to six-liter amounts can be performed until the effluent is relatively clear. If necessary, uterine lavage can be repeated on successive days until uterine infection is controlled.

Acute laminitis is a medical emergency, and treatment should commence as soon as possible. Many therapeutic regimens have been recommended for the treatment of laminitis. Current equine medicine textbooks should be consulted for discussion of various treatments that may be indicated. Certainly, padding of the foot (frog), administration of anti-inflammatory/analgesic medications, and restriction of movement are indicated as part of the treatment regimen.

References