Diagnosis and Surgical Treatment of Uterine Lacerations in Mares (33 Cases) (21-Nov-2003)

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Abstract
With prompt surgical treatment, the prognosis for survival in mares with uterine lacerations is good (80%). Uterine lacerations were most common in the tip of the uterine horns. Most of these lacerations were not palpable pre-surgically. Thus, history, clinical exam, and abdominocentesis are critical in determining the need for exploratory laparotomy. Severe abnormalities in hemodynamic values and a history of obstetrical manipulations for dystocia are associated with postsurgical mortality.

1. Introduction
Uterine tears, ruptures, or lacerations are an infrequent but serious post-partum complication. In a report of post-partum deaths in 98 mares, uterine lacerations accounted for 6.1% of all deaths and 11% of all deaths directly related to the reproductive system. A uterine laceration was the third leading cause of death behind ruptured uterine artery (41%) and cecal perforation (19%) [1]. Uterine lacerations can occur during fetal manipulation of dystocias and spontaneously during parturition for unknown reasons [2-4]. Uterine ruptures have also been reported pre-partum and have been associated with hydramnios [5] and uterine torsion [6,7]. Diagnosis of uterine lacerations is based on history, clinical signs, rectal palpation, and/or transvaginal uterine exam [2]. Abdominocentesis is valuable in determining degree of peritonitis and is predictive of post-partum mares with or developing a clinical abnormality [8]. Ancillary diagnostics such as laparoscopy may also be useful [9]. The prognosis for survival in mares with uterine rupture is not well documented but is reported to be better with prompt diagnosis and treatment [2,10]. In the largest study reported (n = 18), only 39% of the mares survived [2]. However, this was a multi-center study with varying medical and surgical management. Several cases (n = 6) were not referred for treatment until at least 3 days post-partum.

The purpose of this study is to summarize the clinical details on a large number (n = 33) of uterine laceration cases that were referred to a surgical referral facility for treatment. Specific objectives were to examine anamnesis, clinical, and laboratory abnormalities in an attempt to determine key prognostic indicators for survival. We hypothesized that uterine lacerations are more prevalent in the tip of the uterine horns than in the uterine body and that they occur more commonly in the tip of the right uterine horn than in the left.

2. Materials and Methods
The medical records of 33 mares with a uterine laceration that were managed surgically at Rood and Riddle Equine Hospital between 1988 and 2000 were reviewed. Cases were selected for review based on a computerized query, with uterine tear/rupture as a key word in the diagnosis. Exclusion criteria included mares whose records were not supportive of a uterine laceration that was confirmed by either surgical report, necropsy, or daily records. Signalment, method of diagnosis, location of laceration, clinical signs, surgical approach, duration post-partum, survival, and laboratory values were tabulated. Survival was determined as discharge from the hospital, presence of breeding records post-date of laceration [a] (Thoroughbreds only), and absence of hospital record of death or euthanasia for 1 yr after treatment of the uterine laceration.

Ventral Midline Surgical Procedure - Horses were anesthetized, placed in dorsal recumbency, and prepped aseptically for a ventral midline celiotomy. For better uterine body exposure, midline was shaved and prepped to the level of the mammary glands. A ventral midline incision was made centered on the umbilicus extending approximately 10 cm cranial and 10 cm caudal. Lacerations in the uterine horn were exteriorized for repair. Lacerations in the uterine body were isolated as well as...
possible with laparotomy sponges. Lacerations were debrided as necessary; if present, fetal membranes were separated from the laceration site, and any excessive bleeding was controlled with ligatures. The defect was closed in simple continuous fashion and oversewn with an inverting pattern using #1 polygalactin 910. The abdomen was lavaged with 20 - 40 l of warm sterile saline and closed in standard fashion. An abdominal drain was placed before closure in most cases. Either a 10-mm flat silicon drain or a 32-French chest drain was sutured in a puncture created 4 - 5 cm cranial to the incision.

Post-Operative Care - Intravenous broad spectrum antimicrobials, typically potassium penicillin (22,000 IU/kg, IV, q 6 h) and gentamicin (6.6 mg/kg, IV, q 24 h) were continued post-operatively for a minimum of 48 h or until normal complete blood count (CBC), absence of a fever for 24 h, clean peritoneal lavage, and absence of clinical signs of peritonitis were obtained. Peritoneal lavage was done once or twice daily through a drain placed intra-operatively, with 5 - 10 l of warm lactated ringers solution (LRS) fed by gravity. Lavage was continued until relatively clear fluid was obtained. Mares that failed to improve clinically during the first 24 - 48 h generally had metronidazole (15 mg/kg, PO, q 12 h) added to their antimicrobial regimen. Uterine lavage was started 12 - 24 h post-surgically and continued once or twice daily depending on the character of the effluent.

3. Results
The primary presenting complaints were depression and mild colic. Exceptions were: concurrent large colon volvulus (n = 1), evisceration of the small colon (n = 2), and large colon (n = 1). Previous obstetrical manipulations for dystocia was reported in 10 of 33 cases. The median for time from parturition to diagnosis was 35 h (range, 12 - 72 h). Most mares presented with tachycardia and leukopenia and were afebrile. Abdominocentesis (n = 29) revealed 48% (14 of 29) of mares with white blood count (WBC) 100,000 cells/µl or greater (range, 28,500 - 157,200 cells/µl).
In 3 case records, the exact site of the laceration was not noted. All of the uterine body lacerations (n = 8) could be diagnosed by palpation per rectum or per vaginum, whereas only 3 of 22 horn lacerations could be diagnosed by palpation. All cases were repaired surgically either by a ventral midline and/or transcervical approach. There were significantly more lacerations in the uterine horn (n = 22, 73%) than body (n = 8, 27%). In the uterine horn lacerations, there were significantly more tears in the right horn (73%) than in the left (27%). Overall, 80% of the mares survived. Non-survivors were most likely to die or be euthanized in recovery (71%), reportedly because of severe septic (n = 4) or hypovolemic shock (n = 1). Other complications (29%) included severe adhesions (n = 1) and laminitis (n = 1).

4. Discussion
Characteristically, uterine rupture has been described to most commonly occur in the dorsal uterine body [11-13] and commonly results from fetal manipulation during dystocia [2,11]. However, in this case series, uterine ruptures (73%) were significantly more common in the uterine horn (P = 0.016). Only 33% of horn lacerations had a history of fetal manipulation for dystocia, but this was not significantly different from 50% found in the body lacerations (P = 0.231). The clinical presentation of uterine laceration is predictable. Most mares, with exception of those with acute hemorrhage and intestinal evisceration, present between 26 and 42 h (95% CI) post-partum with clinical signs of peritonitis. The absence of fever in some of the mares in this study is thought to be largely attributed to treatment with flunixin meglumine before referral. Sixty-three percent (19 of 30) of the time, hematology revealed leukopenia. Leukopenia was likely caused by peritonitis subsequent to uterine laceration. However, mares with dystocia and fetal manipulation have been shown to have marked leukopenia 3 days post-partum, persisting until 5 days post-partum [14]. Trans-rectal and trans-cervical palpation of the uterus were not diagnostic of a uterine laceration in many of the uterine horn lacerations (19 of 22). Conversely, all of the uterine body lacerations were palpable. Abdominocentesis in this study was invariably serosanguineous in character and revealed peritonitis. Therefore, most of the uterine horn lacerations were taken to surgery based on clinical signs, history, and abdominocentesis findings. Abdominocentesis was therefore crucial in determining whether or not exploratory surgery was performed. Elevations in two or more peritoneal fluid values has been suggested as a clinical guideline in post-partum mares for presence of a potentially life threatening lesion (total nucleated cell count > 15,000 cells/µl, total protein > 3.0 g/dl, and/or differential count greater than 80% neutrophils) [8]. All mares in this study met this criteria. Evaluation of other laboratory variables did not reveal any unique prognostic indicators. Non-survivors had a significantly increased packed cell volume and heart rate and more severe leukopenia. In most cases, these values were consistent with and were interpreted as clinical manifestations of severe septic shock from septic peritonitis. Because selection criteria for cases was based on the final diagnosis, we were not able to determine what percentage of post-partum mares operated with suspicion of uterine lacerations (not confirmed by palpation) had a different lesion resulting in peritonitis. However, it is the opinion of the author who performed the majority of these surgeries (R.E.) that very few mares have different lesions when a uterine laceration is suspected (not confirmed) preoperatively.
Recurrence of uterine lacerations was not observed in any of the mares treated for uterine lacerations at our hospital. In humans, previous cesarean section (uterine scar) is the most important predisposing factor for the occurrence of uterine rupture [15].
5. Conclusion
In our study, uterine rupture was most common in the right uterine horn and usually not associated with dystocia or assisted delivery. When treated surgically, the prognosis for uterine laceration in the uterine horn and dorsal body is good (75% and 81% survival, respectively). Mares that show marked hemodynamic abnormalities and have a history of obstetrical manipulations are likely at greater risk for post-operative mortality. A good clinical history, physical exam, and abdominocentesis are necessary for prompt diagnosis and surgical intervention. Post-partum mares with depression, fever, and/or colic should have an abdominocentesis performed as part of the initial exam/workup. Using the aforementioned guidelines published by Frazier et al., [8] and clinical findings, a decision for referral/abdominal exploratory can be made.

Footnotes
[a] www.equineline.com

References

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