How to Repair Cervical Tears Using a Trendelenburg Type Positioning

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Cervical tears can be easily and efficiently repaired by placing mares in a Trendelenburg type position. This technique can be used successfully for large tears involving the ventral aspect of the cervix and mares not amenable to standing surgical repair. Authors’ address: Hagyard Equine Medical Institute, 4250 Iron Works Pike, Lexington, Kentucky 40511; e-mail: lears01@gmail.com (O’Leary). © 2009 AAEP.

1. Introduction
Cervical tears can be a potential cause of infertility in mares. Late-term abortion or a difficult dystocia has been associated with the development of cervical tears. The inability of the cervix to close properly will potentially result in a chronic uterine infection.1,2 Surgical repair of large cervical lacerations is needed to restore the future fertility of a mare. In most cases, cervical lacerations are repaired with the mare standing in stocks using epidural anesthesia. The cervix is retracted caudally, and the cervical repair is performed using two- to three-layer closures after the cervical defect has been debrided. Tears that involve the ventral aspect of the cervix are generally more difficult to repair because of lack of visibility of this area. In these cases, the cervix has to be retracted and rotated to allow visualization and accurate closure. In some cases, the temperament of the mare or a small vestibule (limiting visualization) makes standing surgical repair difficult. If the cervical repair is not successful, the mare will continue to be infertile.

Secure closure of full-thickness lacerations of the caudal uterus or cranial vagina can be achieved by positioning the mare into a Trendelenburg position. The hind quarters of the mare are elevated using a hoist system. These tears could be easily and efficiently repaired in this position. Based on the ability to easily visualize the cranial vagina, we felt that difficult cervical tears could also be potentially repaired in a more secure manner using this method. Therefore, the ability to accurately achieve secure closure of difficult lacerations would help restore the fertility of these mares. We describe our technique of repairing cervical tears using Trendelenburg positioning.

2. Materials and Methods
Five Thoroughbred mares were admitted to the Hagyard Equine Medical Institute for evaluation and surgical repair of a cervical laceration. Before surgery, the size and location of the tear were evaluated. If the decision was made to repair the defect under anesthesia, the surgical induction room was prepared. The surgical supplies and surgical head
light were brought to the induction room area to help minimize anesthesia time. The mares were sedated using xylazine hydrochloride (1.1 mg/kg, IV) and induced into anesthesia using ketamine hydrochloride (2.2 mg/kg, IV) and diazepam (0.05 mg/kg, IV). The mares were maintained under anesthesia using isoflurane and oxygen. Monitoring equipment included the use of a pulse oximeter. The mares are positioned in dorsal recumbency with the hind limbs secured to the hoist. The perineal area is aseptically prepared while the mare is in dorsal recumbency. The cranial vagina is gently prepped using a dilute iodine solution. Once the perineal region is prepared and the surgical supplies are prepared, the mare’s hind end is elevated to ~30–45°.

Using sterile lube on both hands, a stay suture was digitally placed through the normal margin of the cervix just adjacent to the tear/defect. A second stay suture was placed through the normal margin of the cervix on the opposite margin of the cervical defect. Once the stay sutures were accurately placed, the cervix was retracted into the vestibule.

The edges of the cervical defect were debrided 1–2 cm beyond the original laceration to separate the intact internal and external mucosa and expose the normal fibromuscular edge of the cervix. The cervix was repaired in either a two-layer or three-layer closure using 1 polyglycolic acid in a simple continuous Lembert pattern for each layer. The defect in the cervix was closed to allow an ~1- to 2-cm-diameter opening at the caudal cervical os. Once the final layer was completed, the mare’s hind end was lowered. The mares were positioned in lateral recumbency on a recovery mat and monitored during recovery. Post-operatively, mares were treated with broad-spectrum antibiotics and non-steroidal anti-inflammatory agents. Recommendations were also made to digital apply nystatin, neomycin sulfate, thiostrepton, triamcinolone acetonide ointment® to the cervix every couple days for 10–14 days to ensure the cervical os remained patent.

3. Results
Review of mares medical records admitted to the Hagyard Equine Medical Institute from January 2009 to March 2009 showed that five mares (five Thoroughbreds) had cervical tears repaired under general anesthesia using Trendelenburg type positioning. The location of the cervical laceration was in the 5–7 o’clock position in four mares and the 3 o’clock position in one mare. In two mares, the cervical tear extended almost the entire length of the cervix. In the remaining three mares, the tear extended 50–75% of the length of the cervix. In all mares, this technique allowed for the cervix to be more caudally retracted, improving visualization of the tear. Because of the better visualization, the cervical defects were efficiently repaired (surgical time ranged from 20 to 30 min from the time stay sutures were placed and the defect was closed completely). All mares recovered from anesthesia without problems. Post-operatively, the repairs were judged to be satisfactory for breeding, and at the time this report was submitted, none of the cervical repairs required further surgical repair.

4. Discussion
The Trendelenburg position was originally described for gynecological and abdominal surgery in humans, allowing for better access to the pelvic organs as gravity pulls the intestines away from the pelvis.

It is important that the mares are in diestrus when surgical repair is attempted; for the two mares that were not and had poor cervical tone, altrenogest® was prescribed at 0.044 mg/kg, PO, q 24 h, for 2 wk before surgery. Diestrus allows for better vi-
ualization and manipulation of the margins of the laceration.\textsuperscript{3}

Challenging factors of repairing lacerations of the cervix in the standing mare include limited access, visibility, depth of the surgical field,\textsuperscript{4} variable responses to standard sedation and epidural dosages, and being confined to within stocks. These factors can all affect instrument manipulation and suture placement.

Positioning of these mares in dorsal recumbency with their hindlimbs elevated was found to be especially beneficial for large lacerations and for those in a ventral position with respect to speed of procedure and overall cosmetic appearance. Confounding factors of placing older multiparous mares in dorsal recumbency under general anesthesia include the general anesthetic risk itself, MC III cortical bone fractures on recovery,\textsuperscript{5} and positional myopathies.\textsuperscript{6} We did not encounter any of these confounding factors. Mares noted to have reduced respiratory rates and for those cases that the procedure took $>20$ min were placed on a ventilator. All mares were placed on recovery mats and hand recovered, thereby minimizing the risk of post-anesthetic myopathies and ataxic recoveries.\textsuperscript{7}

This technique allowed us to attempt repair on significantly sized lacerations of the cervix, of which some had previously failed to heal by a standing approach and led to chronic infertility. Although we feel a sufficient cosmetic appearance was achieved in all of these cases, and none of them have returned to the hospital for repeat surgery, we are aware that the potential benefits of this surgical technique cannot be fully assessed until we evaluate the percentage of in-foal mares later this year.

Although positioning of the mare in dorsal recumbency under general anesthesia has been published,\textsuperscript{2,4} we are unaware of placing the mare in a Trendelenburg type position being previously described. This technique allows for greater visualization, accessibility, and speed of procedure compared with previous techniques described for repair of cervical lacerations.

References and Footnotes


\textsuperscript{2}Panolog Ointment, Fort Dodge Animal Health, Fort Dodge, IA 50501.
\textsuperscript{5}Regumate Solution 0.22\%, Intervet/Schering-Plough Animal Health, 29160 Intervet Lane, PO Box 318, Middlesbore, DE 19966-0318.