

## **Management of Dystocia in a Belgian Mare**

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On April 20<sup>th</sup>, 2021, a four-year-old Belgian mare presented to Purdue University College of Veterinary Medicine's Large Animal Hospital for dystocia. She reportedly began labor at 7:30 am on April 20<sup>th</sup>, 2021. Per the history of the owner, she had reached full-term in pregnancy with no history of disease or complication. On the farm, the owner attempted to assist delivery, but no progress was made. Because the owner is Amish, transportation needed to be secured, which delayed presentation until 1:00 pm.

Set up prior to presentation is necessary for proper reception of dystocia cases. This allows for the team to work efficiently and without chaos, as well as increases the prognosis for the mare's recovery and the delivery of a live foal. As this case's arrival was delayed due to travel, it was unlikely that the fetus would be alive. However, it is imperative that the veterinary team never assume case outcome, and in the case of dystocia, to always be prepared. Set up for reception of the mare included items for vaginal examination and mutation of the fetus. Equipment for obstetrical cases is stored in a cart on wheels to allow for quick transport (see Figure 1). An area nearby the receiving stall was prepared with equipment for foal resuscitation, which included the emergency crash cart, intubation equipment, suction and intravenous catheterization supplies. Supplies for intravenous catheterization were prepared on another cart, and the anesthesia team readied their drugs and anesthesia machine. The surgery suite was prepared for controlled vaginal delivery as well as cesarean section.

**Figure 1 – OB Cart Equipment**

- Bucket lined with plastic bag
- Pound cotton
- Betadine Solution
- Sterile OB Sleeves
- Sterile lubricating jelly
- Sterile OB Chains
- Sterile OB Handles
- Repulsion rod and OB Snare
- Krey Hook, Iunt Eye Hook
- Gigli Wire and Handles
- Necropsy Knife
- Fetotome

The patient was quiet, alert and responsive upon presentation, although she had muscle fasciculations on her flanks and sweat on her neck, withers and hindquarters. She was tachycardic at 60 beats per minute, eupneic at 28 breaths per minute and afebrile at 101.5 °F. Auscultation revealed no heart murmurs or arrhythmias. She had quieted but present borborygmi in all four quadrants. Her mucus membranes were pink and moist with a normal capillary refill time. She was in excellent condition and weighed 698 kg.

Due to the critical nature of dystocia cases, multiple tasks were performed simultaneously, and a timer was designated to call out every five minutes to ensure that consistent, forward progress was made during the workup. A technician assistant restrained the mare, with the anesthesia team nearby to administer sedation, as needed. None was warranted. A credentialed technician aseptically placed an intravenous catheter in the left jugular vein. Venous blood was drawn from the catheter to perform a hematocrit, total protein, peripheral lactate, venous blood gas and chemistry. Results of the hematocrit was 37%, total plasma protein was 7.5 g/dl and peripheral lactate was 1.0 mmol/l. These values determined she was not dehydrated or hypovolemic. Levels of potassium were at 2.8 mmol/L, sodium at 140 mmol/L and calcium at 1.36 mmol/L, which were within normal limits. Unsurprisingly, potassium and calcium were lower on the range spectrum, which was attributed to the consistent effort of labor. All other values were within normal limits.

Simultaneously, another technician wrapped the tail using rolled gauze, and tied it to the side. Then, the vulva and perineum were cleansed using warm water, pound cotton and betadine solution. Once complete, the internal medicine resident, under the supervision of the attending internist, began the vaginal examination. Donning sterile obstetrical (OB) sleeves and using copious amounts of sterile lubricant, the resident palpated the fetus, revealing a

cranial presentation with a downward deviation of the head and both forelimbs retained. The resident attempted to reposition the fetus, successfully repulsing the fetus, and lifting the head into position. However, no progress was made within 5 minutes to pull the forelimbs dorsally and into position. Therefore, the attending internist determined that any further efforts to delivery the fetus vaginally would be unsuccessful.

The veterinarians discussed further treatment with the owner, citing fetal dam disparity and malpositioning as reasons to progress immediately to a cesarean section. Often, dystocia cases will be anesthetized and attempts to pull the fetus via controlled vaginal delivery. But in this case, the size of the fetus relative to mare was too great to allow for mutation, and any efforts would only add to the time the mare would be anesthetized, increasing her risk for anesthesia related complications and further trauma to her reproductive tract.

Upon owner consent, the patient was prepared for a cesarean section surgery. Her abdomen was clipped from the xiphoid process to mammary glands and to each flank prior to induction to reduce the amount of time under general anesthesia. Pre-operative medications of 22,000 IU/kg potassium penicillin (15,356,000 IU), 6.6 mg/kg gentamicin (4,606.8 mg) and 1.1 mg/kg flunixin meglumine (767.8 mg) were delivered intravenously. The anesthesia team sedated the patient with 400 mg xylazine and 20 mg butorphanol intravenously. They rinsed her mouth, and induced anesthesia with 5% guaifenesin to effect, 1700 mg ketamine and 35 mg midazolam intravenously. Hoof covers and hobbles were placed, and the patient was positioned in dorsal recumbency on the surgery table. She was maintained on isoflurane using positive pressure ventilation and received isotonic fluids (Plasmalyte®) at a steady bolus of 180 ml/hr. Her abdomen was aseptically prepared for surgery using a two-phase scrub technique with 4% chlorohexidine and 70% isopropyl alcohol. The surgeons had already performed a surgical scrub, donned their gowns and gloves, and were setting up the surgical instrument table.

A 45 cm incision was made along the ventral midline of the abdomen using a #10 scalpel blade to incise through the skin and subcutaneous tissue. Blunt Mayo scissors transected the linea alba. The uterus was located. Using the hocks of the fetus, the surgeons exteriorized the uterus from the abdomen. They placed two stay sutures in the uterus using #1 PDS, one proximal to a hock of the fetus and the other distal to the hoof. Steady traction was applied to the stay sutures using Kelly forceps. Using a #10 scalpel blade, an incision was made through the uterus parallel to the plantar aspect of the right pelvic limb. The right pelvic limb was retracted from the uterus, followed by the left pelvic limb. OB chains were placed the fetlock of both pelvic limbs, with a half-hitch below the fetlocks. Gradual manual traction was applied to the chains in a vertical direction by the circulating surgical team while the surgeons increased the uterine incision to create more space as needed. A stud colt was declared dead upon delivery, weighed 73 kg and had a significant congenital defect of a wry nose. Wood chips were also discovered in the uterus and attributed to contamination from attempted mutation by the owner at the farm.

The uterus was assessed for damage, and hemostatic forceps and a switch stitch was applied to the distal end of the uterine incision to control hemorrhage. The surgeons quickly separated the placenta from uterus at the margins of the incision. The endometrium and myometrium were sutured together circumferentially around the uterine incision using size 0 Monocryl in a simple continuous pattern. The uterine incision was closed using #1 PDS in a lambert pattern, which was then oversewn with #1 PDS in a cushioning pattern. The stay sutures were removed, and a copious lavage of Lactated Ringers® rinsed the uterus, surrounding viscera and body cavity. Suction was used to aid in clearing the abdomen of the lavage. The linea alba was closed with #3 Vicryl in a combination of far-near-near-far and inverted cruciate suture patterns. A rinse of Lactated Ringers® and gentamicin was poured over the linea prior to the closure of the subcutaneous layer. The subcutaneous layer and skin were closed in two layers using 2-0 Monocryl in a simple continuous pattern.

A stent bandage was placed over the incision using gauze pads and sterile towels secured with #1 Supramid in a cruciate pattern. The patient was hoisted from the surgery table and positioned on thick pads in the recovery stall. She stood with a little difficulty and received a recovery score of 1.5. Once in her stall, intravenous fluids (Plasmalyte®) were delivered at maintenance fluids (60 ml/kg/day) overnight. She received oxytocin (20 units) intravenously every four hours. Potassium penicillin (22,000 IU/kg) QID, gentamicin (6.6 mg/kg) SID and flunixin meglumine (1.1 mg/kg) were delivered intravenously. Once she was fully alert, she was given free choice water and a mash of Equine Senior®, and slowly returned to a diet of free choice grass hay. Her colostrum was collected and frozen in PULAH's colostrum bank. Overnight, she was quiet and alert.

The following morning, the patient had not passed the placenta despite administration of oxytocin, and was mildly febrile at 101.9°F. She also had a moderate amount of nasal discharge. A complete blood count and chemistry panel was submitted. An overwhelming neutropenia was discovered, with white blood cells at 4.2 K/L. This was consistent with the presence of retained fetal membranes. The placenta should normally pass within 3 hours post-partum, and retention of fetal membranes can cause metritis, a serious infection of the uterus. Complications from metritis include sepsis and laminitis.

A uterine lavage using the Burns Technique was performed. The Burns Technique requires an intact placenta, as the clinicians infused a large volume of balanced saline directly into the allantoic cavity of the placenta. This re-expands the allantoic space, removing the tightly held attachments of the placenta with minimal trauma or damage to the uterus. Consistent, gentle lavage using this technique resulted in the placenta being passed. Assessment of the fetal membranes found that the placenta had been fully passed with no tears or missing portions. A second uterine lavage was performed in the late afternoon. The collected effluent was dark brown consistent with autolyzed blood.

To continue contracture of the uterus, oxytocin (20 units) was given every four hours intravenously. In addition to continued intravenous potassium penicillin and gentamicin administration, metronidazole (15 mg/kg) TID was started orally. Oxytocin acts on the smooth muscles of the uterus to produce contractions, aiding in the clearing and involution of the uterus. It is typically delivered intramuscularly, but due to the placenta having been retained and the level of contamination, intravenous use was indicated. Potassium penicillin and gentamicin, when used in conjunction, act as a broad-spectrum antibiotic pair. The addition of metronidazole was to target gram-negative and positive anaerobic bacteria that might typically be present in the cases of metritis. Flunixin meglumine is a nonsteroidal anti-inflammatory drug that reduces inflammation and thereby pain, as well as reduces the effects of endotoxins released into systemic circulation.

Ultrasound examination of her thorax did not reveal any abnormalities but continued monitoring for progressive respiratory illness was warranted. Her stent bandage was removed and replaced with a belly band consisting of Elasticon® tape and sterile gauze sponges. The belly band was replaced every other day until its final removal. The patient was reportedly uncomfortable and mildly colicky overnight. This was consistent with the pain of uterine involution. On the morning of April 23<sup>rd</sup>, she was quiet and responsive. Her physical exam and PCV/TP values were within normal limits. A rectal examination revealed a small amount of fluid within the uterus and good uterine tone was appreciated. Another uterine lavage was performed, yielding clear fluid. The attending internist determined no further lavages were warranted, discontinued the use of oxytocin and instructed the team to monitor for changes in mentation, fever or increased and foul discharge.

Throughout the rest of the patient's hospitalization, the neutropenia resolved, and she developed no further complications with her surgical incision, uterus or lungs. She was taken on short walks to graze. Five days post-operatively, flunixin meglumine, intravenous antibiotics and metronidazole were discontinued, and the intravenous

catheter was pulled. Oral trimethoprim sulfamethoxazole (34 mg/kg) was started for every twelve hours for ten days. Plaques of edema developed on either side of her incision after the belly band was permanently removed, which was expected but monitored carefully. A repeat ultrasound examination of the incision, uterus and thorax found no concerns, although the patient did have intermittent coughing and nasal discharge.

On April 26<sup>th</sup>, the patient was discharged to the owner. As the cause of the intermittent fevers and cough were not identified, the owner was instructed to monitor carefully for post-operative complications associated with a cesarean section. It was recommended that he have his herd tested for equine influenza or equine rhinopneumonitis (EHV-1), which he had declined at the time of the mare's hospitalization. Exercise restrictions were in place for four months, with a slow return to activity. Rebreeding of the patient should be avoided for 60 days to allow the uterus to fully heal. As of October, we had not received word of the mare's status, but expected a full recovery.

By the proficient actions of the veterinary team, dystocia in mares can be managed with success. Equine hospitals that receive mare dystocias should have standard operative procedures in place, with all members of the team aware of the hospital's best practices. The technician team should have items organized for receiving of mares and resuscitation of foals in place and easily accessible. All tasks should be assigned to members of the receiving team in advance of reception, and everyone should report directly to the attending veterinarian to avoid confusion in orders. Every dystocia case differs in its required needs, and often client wishes will dictate the ultimate path to treatments. No matter the situation, the team must be flexible and prepared to provide the best outcome for their patient.