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Lessons Learned from Dystocia Dilemmas

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Introduction

A difficult birth, which is also referred to as dystocia, is uncommon in the mare, but when it does occur, it represents a true emergency, requiring immediate attention and intervention if a positive outcome is to be obtained. The short, explosive nature of stage II labor in the horse allows little room for error and even small delays can lead to significant problems for the newborn foal and for the dam. The incidence of dystocia in mares ranges from approximately 4% in Thoroughbreds to as high as 10% in some draft breeds and, unlike the cow where fetal/maternal disproportions are common, usually is associated with malposture of the head, neck or limbs.¹,²

Mares of any age and breed can experience dystocias. Recurrent dystocia occurring in separate years in the same mare is uncommon (6 out of 247 dystocia cases in one report).³ Mares with a history of reduced pelvic diameter (e.g., secondary to a pelvic fracture or mass) may be at increased risk.

Terminology

Presentation: Describes which anatomical part of the fetus is leading (closest to the pelvic inlet of the birth canal) AND describes the relation of the spinal axis of the fetus to the spinal axis of the dam.

- Normal = Anterior (cranial)
- Alternative (Abnormal) = Posterior (caudal), Transverse = Anterior (feet towards pelvic canal), Posterior (Spine towards Pelvic canal)

Position: Describes the relationship of the fetal dorsum (in longitudinal presentation) or head (in transverse presentation) to the quadrants of the mare’s pelvis.

- Normal = DorsoSacral
- Abnormal = Dorsopubic

Posture: Describes the disposition of the fetal extremities.

- Normal = head, neck and forelimbs extended
- Abnormal = Flexion of any of the above

On-Farm Identification of Problems

Stage II labor in the mare begins with rupture of the chorioallantois (CA; “breaking water”) and ends with delivery of the foal. Since the normal duration of stage II labor is only 20 – 30
minutes, time is a critical factor in managing equine obstetrical cases. Often a veterinarian is not present at the time of the onset of second stage labor, and on-farm personnel should be familiar with early signs of potential problems. These can include: (1) Failure of any fetal parts, or the amnionic membrane, to appear at the vulvar lips within approximately 5 minutes of rupture of the chorioallantois; (2) no evidence of strong contractions and/or no progression in the delivery process within 10 minutes of rupture of the CA; (3) the foal’s hooves appearing ‘upside down’ (indicating either an anterior, dorso-pubic presentation and position or a caudal presentation); and (4) any abnormal combination of extremities appearing at the vulva (i.e., anything other than 2 front feet and a nose). Any of these signs should prompt an examination of the fetus per vaginam to determine if further intervention is required. Early intervention will improve the likelihood of delivery of a live foal and will enable possible correction of the dystocia before the foal becomes wedged in the birth canal.

**Veterinary Examination of the Mare**

**Brief history:** Includes age and parity of dam, expected foaling date, duration and intensity of labor signs, time since rupture of the CA, previous attempts at manual extraction of the fetus, observation of any fetal movements, attempt to determine relative actual and sentimental value of dam vs. foal must be known and assessed.

A brief physical examination including mucous membrane color, capillary refill time, attitude (exhaustion, recumbency), character of the perineum and any associated vaginal discharge are evaluated.

**Restraint:** Often determined by the preference of the obstetrician, the complexity of the dystocia, and the demeanor of the mare. If the foal is viable, take into account potential effects on the foal.

Stocks should be avoided due to the likelihood that the mare will lie down.

1. Physical restraint: shank, gum chain, twitch.
2. Simple sedation: e.g., detomidine/xylazine (shorter duration) + acepromazine, butorphanol.
3. Tocolytics: e.g. clenbuterol, butylscopolamine bromide
4. Epidural anesthesia: (xylazine/lidocaine) will not eliminate uterine contractions or abdominal press, but will decrease the Ferguson reflex associated with vaginal manipulations. One to 1.25 ml 2% lidocaine per 100 kg body weight OR 35 mg xylazine per 500 kg body weight + 2.6 ml 2% mepivacaine HCl/ 500 kg body weight brought up to 7.0 ml with sterile 0.9% NaCl. The combination optimizes perineal analgesia while reducing the dose of drugs needed and so minimizing the risk of ataxia and hindlimb paresis. Downside: can take up to 30 minutes for full effect of an epidural to be appreciated.

4. General anesthesia: injectable (e.g., xylazine (1 mg/kg IV) followed by ketamine (2 mg/kg IV)) or inhalant.

**Abdominocentesis.** In selected cases of dystocia, some obstetricians recommend performing an abdominocentesis prior to beginning obstetrical work to rule out the possibility of a uterine tear prior to introduction of large volumes of lubricant. It has been reported that elevation of a single
peritoneal fluid value (nucleated cell count, total protein percentage of neutrophils) in postpartum mares may be incidental. However, increases in 2 or more of these values is likely to be clinically significant.6

Veterinary Examination of the Fetus

The First Rule of Obstetrics: Cleanliness

Wrap the mare’s tail, clean the perineum, clean your hands and arms, apply clean lubricant, obstetrical sleeve if desired.

Viability of the Fetus

Viability of the fetus will affect all subsequent decisions. Voluntary movement, withdrawal reflex, corneal reflex, suckle reflex, anal reflex (caudal presentation), pulses, heartbeat, capnograph. It can be easy to say the fetus is alive. It can be very difficult to definitively determine if the fetus is dead.

Diagnosis

It is essential that an accurate diagnosis of the dystocia be made. In spite of the pressure and chaos, you should take the time to identify presentation, position, and posture. Determine if a second fetus is present. Identify obvious lesions, lacerations or pelvic abnormalities in the mare. Assess degree of cervical relaxation and condition of uterus. Attempt to determine if fetal abnormalities are present (contracted tendons, hydrocephalus, etc.)

Treatment Options

Treatment options often depend on viability and value of the fetus. There are basically three options: vaginal delivery, fetotomy or Caesarean section. The ‘best choice’ will depend on the situation at hand, the experience of the obstetrician, and the proximity of a referral hospital.

Keep Track of Time

If a vaginal delivery is attempted, it is recommended that time be monitored by someone other than the obstetrician. If no progress is made in a given time period (e.g., 15 minutes), then an alternative approach should be considered. Prolonged vaginal manipulations are contraindicated if future fertility of the mare and viability of the foal are important. If the obstetrician is properly trained and equipment is available, remember that a simple one or two cut fetotomy on a dead fetus is often sufficient to resolve a difficult dystocia. A common mistake is to use fetotomy as a last resort, only after extensive vaginal manipulations have failed. At this point, extensive soft tissue trauma often has already occurred, the birth canal is dry, and the uterus is tightly contracted around a fetus wedged within the pelvis, making fetotomy much more difficult.4

Vaginal Deliveries and Fetal Manipulations (Mutations)
The Second Rule of Obstetrics: Lubrication

1. Lubricate
   a. Introduction of large volumes of clean, preferably warm lubricant, usually with a stomach pump will greatly facilitate all vaginal manipulations, will reduce potential trauma to the mare’s reproductive tract, will facilitate forced extraction, and may even help induce some degree of uterine relaxation.
   b. Polyethylene polymer powder (PEP) should be avoided if a uterine rupture is possible or if Caesarean section may be needed. Peritoneal contamination with as little as 2 g of pure PEP powder (1 liter of 1% (w/v) PEP solution) can be toxic to the mare, causing severe peritonitis and death. Carboxymethylcellulose/propylene glycol formulations are now preferred.
   c. Repel. Pushing the fetus cranially out of the pelvic canal into the abdominal cavity and uterus. Should always be the first mutation when it can be safely performed. Caution: uterine rupture
   d. Tocolytics can help
   e. Clenbuterol. Slow IV administration of 0.17 - .35 mg/ 454 kg body weight. Oral administration has been attempted with less dramatic effects. N-butylscopolammonium bromide; 140 mg IV for a 500 kg mare).
   f. Large volumes of warm lubricant infused into the uterus.

2. Mutation. Manipulation of the fetus to return it to normal presentation, position and posture.
   a. Mutation of the extremities: distal joint medially, proximal joint laterally
   b. Rotation: easiest to do in concert with traction
   c. Version: Rotation of the fetus on its transverse axis into an anterior or posterior presentation. Difficult to do on a term fetus. Caesarean section may be preferable

3. Forced Extraction. Obstetrical chains may provide a better grip and will spread the force over a larger surface area when properly applied. Apply with one loop above and one half hitch below the fetlock, and with the eye of the chain on the dorsal aspect of the limbs.
   a. A head snare can be applied to maintain the neck in an extended position.
   b. Mandibular snares should be used only to direct the head of a live foal. Excessive traction on a mandibular snare can result in fracture.
   c. Assisted vaginal delivery should be performed in concert with the mare’s abdominal straining.

The Third Rule of Obstetrics: Compassion

If the foal is not delivered with the traction applied by two strong men, reassess the situation – don’t just pull harder. Commonly overlooked problems include the following: elbow lock, fetal oversize (rare), dog-sitting (one or both hindlimbs flexed at the hip).

4. Obstetrical tips.
   a. Manually assist ventilation in a foal in anterior presentation.
   b. Work on a standing mare.
   c. Flip a mare in lateral.
   d. Take advantage of gravity

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i. Position the mare’s head downhill
ii. Hoisting of an anesthetized mare provides the obstetrician with an amazing advantage. Delivery of a foal per vagina following elevation of the mare’s hindquarters is referred to as a Controlled Vaginal Delivery (CVD).

5. After delivery of the foal
   a. Perform an examination per vagina
      i. Uterine and vaginal lacerations and contusions
      ii. Check for twin
   b. Uterine lavage
      i. Caution if uterine rupture is suspected
      ii. If uterine rupture is deemed unlikely, lavage is typically performed
         1. Aids clearance of debris
         2. May aid in placental expulsion
   c. Oxytocin
      i. Aid uterine contraction, control hemorrhage
      ii. Aid in expulsion of fetal membranes
   d. Monitoring
      i. Daily examinations of the reproductive tract per rectum to assess involution
      ii. Lavage daily if significant fluid or debris is present

Assisted Vaginal Delivery (AVD), Controlled Vaginal Delivery (CVD), Fetotomy or Caesarean Section: How Do You Choose?

There is no one best way to manage a dystocia. The choice that is made will depend largely on the case at hand, whether or not the foal is viable, the experience of the veterinarian, and the availability of facilities and personnel for abdominal surgery. Nonetheless, there are some studies that report on the outcomes of dystocias managed by different approaches that may help with this decision.

Outcomes Assessment Following AVD and CVD

The prognosis for systemic recovery in mares following resolution of a dystocia by assisted vaginal delivery (AVD) or controlled vaginal delivery (CVD) is excellent (approximately 90%). One study suggested that CVD may be associated with more complications and a poorer outcome (only a 71% survival rate in mares undergoing CVD). This may be a result of more prolonged deliveries in CVD mares in the 1999 study, rather than a primary effect of the CVD itself.

Overall pregnancy rates are good following resolution of a dystocia using either assisted or controlled vaginal delivery. If mares were bred in the same season as the dystocia, pregnancy rates were lower than long term pregnancy rates (58% vs. 66%, respectively).

Outcomes Assessment of Cesarean Section

The prognosis for systemic recovery in mares undergoing cesarean section has improved dramatically over the last few decades and now is very good. Overall survival rates in mares
undergoing elective or emergency cesarean section without concurrent colic surgery is approximately 80% - 90% with highest survival rates in mares undergoing elective Cesarean section and in mares with dystocias of less than 90 minutes in duration.\textsuperscript{3,10-13} Lower survival rates (38% - 75%) can be expected in mares undergoing Cesarean section due to a concurrent mare disease (e.g., colic, middle uterine artery rupture, etc). In these cases, the less successful outcome is more likely due to problems associated with, e.g., the gastrointestinal tract, rather than problems with the Cesarean section itself. Death appears to be more common in mares undergoing Cesarean section following prolonged dystocia (> 90 minutes duration) or following partial fetotomy.\textsuperscript{13} The take home message is \textit{refer early}.

Fertility of mares following Cesarean section also is very good. Although pregnancy rates do appear to be reduced in mares bred back in the same year as Cesarean section was performed (50% - 60%)\textsuperscript{3,13} pregnancy rates in subsequent years approach or equal pre-Cesarean section pregnancy rates. In one report, all mares bred back in the year following elective Cesarean section became pregnant.\textsuperscript{12} In other studies involving mares presenting for largely emergency Cesarean sections, the pregnancy rate in the year following surgery ranged from 50% - 72%\textsuperscript{3,11,13} Live foaling rates (LFR) post Cesarean section (41 – 61%, depending on the year post Cesarean section that the mare is bred back) compare favorably to those in the North American Thoroughbred industry as a whole (45 - 73% depending on book size of the stallion).\textsuperscript{14} This represents a substantial improvement in fertility compared with previous reports of only an 11% live foal rate if mares were bred back in the same year as surgery and 50% LFR if bred in the subsequent year.\textsuperscript{11}

Pregnancy rates appear to be influenced by mare age (highest pregnancy rates in mares under 16 years at the time of Cesarean section) and in mares with less prolonged (< 90 minute duration) dystocias.\textsuperscript{13} Thus, mares most often are able to return to a successful breeding career following Cesarean section, and in some cases, even within the same breeding season. In general, we make decisions on future breeding management on a case-by-case basis. For example, mares undergoing Cesarean section early in the season and who experience minimal post-operative complications may be returned to breeding later that same year, while mares undergoing surgery later in the year and who experience significant complications may be best served waiting until the following year before rebreeding.

\textit{Caesarean Section vs. CVD vs. AVD}

Freeman et al. reported fewer complications and better survival in mares following Cesarean section than in mares following CVD.\textsuperscript{10} Based on their results, they recommended Cesarean section over CVD if dystocia is protracted and great difficulty or trauma has already been sustained, even if CVD might permit delivery of the foal.

Byron et al. reported no difference in outcome between the two techniques.\textsuperscript{3} This group recommended choosing whichever option was likely to result in the fastest delivery of the foal. Pregnancy rates in mares following CVD were 58% for mares bred back in the same year and 66% over the course of the study.
Better mare survival was reported following AVD compared to CVD, but this is likely because mares undergoing CVD probably had more severe and more protracted dystocias.

**Fetotomy**

Mare survival following fetotomy was reported to range from 56% to 96%. In mares that underwent Cesarean section following partial fetotomy, survival rate (40%) was reduced compared to mares that underwent only Cesarean section (84%). Survival is likely related to experience of the obstetrician and the condition of the mare and the mare’s reproductive tract at the time the procedure is performed. Lower survival rates in the Byron study may have been attributable to the economic necessity of performing fetotomy in some mares that would have been better served by Cesarean section. Alternatively, poorer outcomes in mares undergoing fetotomy may occur when fetotomy is used only as a ‘last resort’ after prolonged attempts at manipulations of the foal (Perkins and Frazer, 1994). These mares, therefore, will be at increased risk for damage to the reproductive tract not as a result of the fetotomy itself, but rather because of the prolonged duration of the entire process. In the Carluccio study, fetotomy was performed as a first option for dystocia resolution when the foal was dead and mare survival rates were excellent.

Pregnancy rates in mares bred back the same year as fetotomy were very high in one study (80%). However, in a second study that looked only at mares that underwent Cesarean section following partial fetotomy, subsequent pregnancy rates tended to be lower when compared to mares undergoing only Cesarean section. This difference may have been an effect of the prolonged dystocia in the mares that underwent partial fetotomy followed by Cesarean section, rather than an effect of the fetotomy itself.

**Foal Survival Following Vaginal Delivery**

The length of stage II is the single most important determinant of the outcome of the foal. It has been reported that for every 10 minute increase in stage II labor beyond 30 minutes, there is a 10% increased risk of the foal being dead at delivery and a 16% increased risk of the fetus not surviving to discharge. In foals surviving to discharge, the length of stage II was 44 – 71 minutes. For non-surviving foals, the length was 85 – 249 minutes.

The length of time spent attempting vaginal correction of a dystocia on the farm is only one component of the length of 2nd stage labor. In mares referred to secondary care facilities for dystocia resolution, travel distance, travel time, time spent arranging for transport, loading the mare, etc. all will play a role. The best outcome for the foal was reported in those mares that spent minimal time on the farm in 2nd stage labor before being referred to a local (10 minutes average travel time) referral institution for rapid delivery of the foal.

**Foal Survival Following Caesarean Section**

As for vaginal deliveries, the prognosis for survival of foals delivered by Caesarean section depends very largely on the duration of 2nd stage labor. Unfortunately, in most cases the decision to proceed to a Caesarean section is made only after many hours of attempting a vaginal
delivery, thus greatly reducing the chances of delivering a live foal with minimal complications. Delivery of a live foal following Caesarean section varies from 11% - 42% and survival of the foal to discharge from the hospital is lower (5% - 35%). As might be expected, survival of foals delivered by appropriately timed elective Caesarean section was much higher (7 of 8 foals survived to discharge in one study and 4 of 4 in a second study). The wide range in foal survival consistently depends on the duration of second stage labor. Thus, whether or not a mare has a Caesarean section is not what determines the outcome for the foal. Rather, it is how long it takes for a foal to be delivered -- regardless of delivery method -- that is the critical factor. Take home point: refer early.

Sample Flow Chart for Management of Referral Dystocias

References and Footnotes


5. LeBlanc M. Sedation and anesthesia of the parturient mare, Periparturient Mare and Neonate Symposium, San Antonio, Texas, 2000;59-64.


a. Buscopan®, Boehringer Ingelheim, Ridgefield, CT.


d. Ventipulmin solution, Boehringer-Ingelheim, Burlington, ON.