

Advanced Equine Reproduction Course

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INDUCTION OF PARTURITION

Induction of parturition is becoming popular for many reasons. It enables people to witness the foaling and provide assistance as needed for mares with high risk pregnancies. Induction also tends to cut down on nightly foal watches by the owner. Although induction increases convenience, natural patterns and processes are disrupted and thus the consequences may be severe. Time of induction can be determined using several criteria in order to minimize complications. For example one should wait at least until day 330 of gestation. The birth of weak, nonviable foals occur more often if the mare is induced before day 330. Other signs a practitioner should look for are udder enlargement with milk, relaxation of the sacrosciatic ligament, cervical softening, and electrolyte changes in the milk. A good indication of fetal maturity is a milk calcium level of greater than 250 ppm which is measured by using the new Foal Watch kit. Fetal maturity can be assessed using these parameters, thereby increasing the chance of producing a viable foal.

There are various protocols for induction of parturition that vary in action and time of onset to delivery. In order to understand the action of these drugs, an explanation of the hormonal events that occur during late gestation is needed. Cortisol gradually rises in late gestation which tends to be a sign of fetal maturity. This rise causes a decrease in progesterone and an increase in maternal estradiol 17B. Cortisol acts on the fetal gonads which produce pregnenolone. The pregnenolone changes to the androgen dehydroepiandrosterone (DHA) which circulates back to the placenta and aromatizes to an estrogen. This estrogen has a positive effect on the uterus, placenta, and fetal growth. The estrogen also stimulates prostaglandin production and receptor synthesis, causes gap junction formation, and oxytocin receptor synthesis. Therefore estrogen priming must occur before prostaglandins can cause induction of parturition.

The three main methods currently used for induction of parturition are oxytocin, prostaglandins, and dexamethasone. Oxytocin is secreted normally in a pulsatile fashion secondary to a neuroendocrine reflex known as the "Ferguson reflex." Stretching of the cervix and vagina stimulates this reflex to release maternal oxytocin. Oxytocin activity depends on extracellular calcium. Oxytocin binds to sites in the sarcolemmal membrane causing an influx of calcium which in turn inhibits the sarcolemma calcium extrusion pump and produces myometrial contractions. Various dosages of oxytocin can be given to induce parturition. A dose of 20 IU given intramuscularly will cause a slow delivery; and 100 IU will initiate a rapid delivery. The best dosage for intramuscular administration is 40-60 IU which initiates a safe, quiet foaling within one hour. Oxytocin can also be

given intravenously either by a bolus dose of 2.5-10 IU every 20 minutes or 120 IU in 1 liter of saline at 1 liter per hour until delivery. Pluriparous mares tend to progress to stage two of labor more rapidly than primiparous mares. One disadvantage of oxytocin use is that it can override the physiologic events responsible for normal parturition without considering fetal maturity. Also high doses of oxytocin can increase the incidence of perineal tears, cause uterine rupture, elicit a fetal cerebral vascular accident, and cause premature placental separation. Even though oxytocin for the most part is reliable and speedy, if within 30 minutes you still do not see fetal membranes a vaginal exam must be performed to confirm the fetal presentation.

Prostaglandin metabolism increases during the last two weeks of gestation and peaks before delivery. The fetoplacental unit is the primary site of prostaglandin synthesis and this rise in prostaglandin concentration relates to fetal maturity. This hormone has a direct ionotropic effect on myometrial contractions. It increases the intracellular calcium mobilization from sarcolemmal stores just like oxytocin. Some sources say that prostaglandins mediate oxytocin release and others say that it is vice versa. No matter which is released first, both work hand in hand and are important in the mediation of parturition. Three different analogues of prostaglandins have been used for induction. Prostanoid dinoprost trometnamine can be given at a dose of 7.5-10 mg intramuscularly. Fluprostenol (Equimate) can be given at a dose of 250 mg intramuscularly which will cause delivery within one half to three hours. The safety and efficacy of this drug has been questioned since it can cause induction of nonviable or premature foals. Equimate has also been shown to initiate parturition even if there is a closed cervix and no mammary development. Fenprostalene (Bovilene) is the third analogue that can be used. Two doses of 0.5-1 mg each can be given subcutaneously two hours apart. Delivery normally occurs within four hours after the first dose. Normally no adverse local or systemic reactions occur, but Bovilene contains a vehicle that has a history of causing clostridial infections at the injection site. Therefore it is probably good practice to add one milliliter of procaine penicillin G to the injection. Oxytocin has been used in conjunction with fenprostalene to shorten the time to delivery. The dose given is normally 2.5 IU intravenously every 20 minutes. By giving this protocol we are mimicking the physiologic peak seen in the prostaglandin concentration prior to stage one of labor. As stated earlier, prostaglandins need estrogen priming of the receptors and initiation of increased synthesis in order for it to work. Therefore fenprostalene tends to be the method of choice since it will not induce parturition unless the fetus is ready.

Dexamethasone is the last protocol that has been used. The dosage given is 100 mg qd for four days. Delivery is normally seen within four days of the last dose. As you can see this is not a preferred method to use due to the high dose that must be given and the duration of the treatment. Also it is too unreliable as to when foaling will begin, which means many nights up doing foal watch. Dexamethasone does however stimulate fetal lung development which is about the only plus to this protocol. Other disadvantages are that this drug may cause an increase in disease susceptibility to the foal, a decrease in resistance, transient fetlock laxity, and possible dystocias.

As one can see, there are a number of protocols one can choose for induction of parturition; which one to use all depends on the practitioner's experience and comfort with certain protocols. As long as you follow the guidelines to determine fetal readiness almost all of these will be safe to use. Personal preference amongst practitioners is leaning toward a combination of fenprostalene and oxytocin. It is quicker with fewer possible complications. None of these are one hundred percent accurate so be aware. More complications tend to be seen as you increase the number of mares you are inducing, no matter how careful you are.

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