When sooner is better than later
Frances O. Smith
Smith Veterinary Hospital, Inc., Burnsville, MN

Abstract
Clinicians are commonly consulted regarding parturition in the bitch and are questioned regarding the length of gestation, labor and delivery. The client of today wants and expects a positive outcome for the health of the bitch and her puppies with minimal impact on the lifestyle of the breeder. In human obstetrics, induction of labor is commonly performed oftentimes for the preference of the mother and sometimes for the convenience of the medical team involved. This paper explores human labor induction versus parturition induction in the bitch and outlines rationale, technique and outcomes.

Keywords: Induction, parturition, bitch, aglepristone, misoprostol, cervix

A recent study on the risk of cesarean section and any maternal and/or perinatal effects of induction of labor was published in the American Journal of Obstetrics and Gynecology. Each of these pregnancies was a singleton in an uncomplicated full-term gestation where full-term was defined as a mother who was 39 weeks to 40 weeks gestation with intact membranes. Five randomized controlled studies including 844 women were analyzed. Primary outcome was the incidence of cesarean delivery. The incidence of cesarean delivery was similar between the groups with labor induction versus the control group (routine expectant management) 9.7% vs 7.5%, respectively. Induction of labor and the control group had similar rates of chorioretinitis but statistically less blood loss occurred in the induction group. In this study induction of labor at full term in uncomplicated singleton gestation did not result in increased risk of cesarean delivery.

An additional study involving induction of labor in twin pregnancies in Sweden yielded much different results. In this study of 462 twin pregnancies 220(48%) women had induction of labor and 242 (52%) experienced spontaneous onset of labor. Labor inductions were performed by amniotomy in 149(68%), oxytocin administration 11(5%) and cervical ripening in 60(27%). The rate of cesarean sections was 21% for induced labor and 12% in spontaneous labor. Absolute risk of cesarean section following induction was 15% with amniotomy, 36% with oxytocin and 37% with cervical ripening. Thus induction increased the risk of cesarean section by 90% versus spontaneous labor in this group. Women with a previous cesarean section have in increased risk of uterine rupture when labor is induced. There is insufficient information available from randomized controlled trials to assess the optimal method of induction of labor in women with a previous cesarean delivery. In 2006, The American College of Obstetrics and Gynecology issued a bulletin stating that misoprostol never be used for this purpose as a significant increase in the incidence of uterine rupture could occur.

The American Congress of Obstetricians and Gynecologists have recommendations regarding the selection of cases that are appropriate for induction of labor. The rate of labor induction in the United States is 22% and has more than doubled since 1990. The rate of cesarean section in the US and Canada is 32% and has increased 50% in the US from 1996 to 2006. Prior to induction the maternal-fetal status should be assessed, the status of the cervix evaluated, and a full term pregnancy (at least 39 weeks) of gestation should be confirmed. The following conditions can be an indication for induction of labor when present: abruptio placentae, chorioamnionitis, fetal compromise, fetal death, gestational hypertension, maternal gestational diabetes of chronic kidney disease, pre eclampsia or eclampsia, premature rupture of membranes and postterm pregnancy. Logistical reasons such as distance from health care facilities or psychosocial conditions are also considered. Contraindications are prematurity, vasa previa, complete placenta previa, umbilical cord prolapse and active genital herpes.

Induction of parturition is relatively common in multiple livestock species. In swine, induction of parturition is used to ensure that there will be attendants present to assist during the farrowing time in case problems occur and to allow scheduling in farrowing facilities. Most sows will farrow within two days of
a mean gestation period of 115 days (from day 1 of estrus). Sows induced prior to 110 days of gestation may be subject to decreased piglet viability therefore accurate breeding records are essential.

Prostaglandin F2alpha (PGF) is approved in the United States for induction of parturition in swine within three days of expected farrowing. Synchrony of farrowing is improved if sows are given oxytocin 20-24 hours after administration of PGF. Sows are typically given 10mg dinoprost followed by 5-30 IU oxytocin 20 hours later. A high percentage of sows will farrow six hours later. In does, parturition is rarely induced except in cases of pregnancy toxemia/ketosis. Parturition can be induced by the use of prostaglandin if the doe is within two weeks of her expected kidding date. Induction of parturition in ewes can be done if the breeding date is known within an accuracy of three days. Ewes may be induced with either dexamethasone IM or betamethasone IM after day 137 of pregnancy. Induction after day 142 results in improved fetal viability. Lambing usually occurs within 36 to 60 hours after induction. In cattle, dinoprost has been used for induction of parturition on or after 270 days of pregnancy. Indications for induction are convenience and suspected fetal oversize.

In the mare, the indications for induction of parturition are medical reasons such as rupture of the prepubic tendon, prolonged gestation, previous pelvic fracture with known compromise of the pelvic canal and convenience which can result in significant labor savings plus the opportunity for early intervention in the case of a dystocia. Parturition induction has been utilized in research projects and as a teaching tool. As with other species gestation length is a vital factor in a successful outcome for parturition induction. The mare must be at least 320 days of gestation with greater that 330 being preferred. Milk calcium levels of at least 220 ppm aid in selection of appropriate candidates for induction. Mares foaling in January, February and March have longer gestations than mares foaling in April, May or June. The most common agent used to induce parturition in the mare is oxytocin administered by either bolus or IV infusion. The dose and route vary by clinician and by the degree of cervical relaxation. Fluprostenol has been used successfully to induce parturition in mares and causes less myometrial stimulation than PGF. Fenprostalene both with and without oxytocin has been used to induce parturition in the presence of appropriate mammary secretions. Prostaglandin F2 alpha has failed to induce parturition in the mare. It can cause very strong myometrial contractions and increase the risk of fetal death due to premature placental separation. Glucocorticoids have failed to induce parturition in the mare.

The bitch depends on progesterone secreted from the corpus luteum for the maintenance of pregnancy. The ovary appears to be the only source of progesterone in the bitch. Parturition appears to be influenced by the fetus through secretions of the fetal adrenal cortex. The fetal pituitary secretes adrenocorticotropic hormone which causes glucocorticoid secretions by the fetal adrenal cortex. The fetal glucocorticoids boost the production of estrogens in the placenta through induction of aromatizing enzymes which increase the production of prostaglandin. It has been hypothesized that crowding in the uterus causes stress and subsequent cortisol release resulting in the initiation of the parturition events. Clinicians are occasionally asked about induction of parturition in the bitch. Induction of parturition in the bitch should not be attempted only for convenience. Puppies from induced parturition are at risk of fetal prematurity with accompanying respiratory distress and poor survivability. Any of the drug protocols currently published for use in pregnancy termination in the bitch can be potentially used for induction of parturition. The key factor for a successful outcome is exquisite timing which requires a very accurate history and ideally confirmed ovulation data versus simply insemination data. Historically, it has been established that glucocorticoid administration to bitches may cause premature labor hence could be used to induce parturition. In marked contrast to the species in which parturition induction is more routine, the bitch is the only one who presents with large fetal numbers. In a study published in Theriogenology in 2000 a group of six Greyhound bitches were treated with cloprostenol using miniosmotic pump on day 57 of pregnancy. Parturition was associated with a decrease in plasma progesterone, a reduction in body temperature and an increase in plasma concentration of 13,14-dihydro-15keto-prostaglandin F2alpha. The first puppy was born 37.7+/12.9 hours after the start of treatment (range 28-46h). Duration of whelping was 15.7+/- 2.2 hours (range 10-24 hours). The litter size was 9.2±0.8 pups(range 6 to 12 pups) and the puppy survival rate was 6.0±0.8 per litter (range 4-9
pups). While the author of that paper concluded that this protocol resulted in the birth of healthy pups, with minimal or no side effects to the bitch, neither this author nor this author’s clients would have considered this protocol successful due to the time lag between induction and whelping, the length of whelping and, most importantly, puppy survival.