Prediction of Parturition in the Bitch: A Clinical Study of Near-term Progesterone Concentrations in Normal Parturition and Elective Caesarean Section

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Introduction
Due to the high variability in apparent gestational length in the bitch as determined from the day of mating (58-72 days), accurate prediction of parturition date becomes a veterinary service usually required by dog’s owners and breeders to prevent reproductive losses by timely intervention and to better manage peri-natal care. To date, knowing a litter whelping date has gained increased emphasis in small animal reproduction. A review by Kim et al. (1) suggested that the most accurate methods to predict to day of parturition are measurement of the initial rise in preovulatory serum progesterone concentrations (2) and fetal biometry, i.e. biparietal diameter, performed by transabdominal ultrasound scan (3). However, in many cases, ovulation timing is not performed and many multi-breed models to calculate parturition date using fetal measurement have been reported mainly in small and medium sized dogs. In addition, according to a great variation in size (from toy to giant) and in morphology of the head and the body which are more evident among canine breeds, reported formulas for parturition prediction in the dog based solely on maternal size are unlikely to be highly accurate in some cases.

In the bitch, progesterone is secreted chiefly by the corpus luteum and has an important physiological role in the maintenance of pregnancy. High progesterone concentration is pivotal almost throughout the gestation period. Near to parturition, the progesterone concentration declines gradually and an abrupt fall occurs 1-2 days before parturition. Determination of plasma progesterone can be practically useful in small animal obstetrics for the assessment pregnant bitches that are thought to be overdue (4) and for a highly accurate prediction parturition date. The present study was undertaken to investigate the concentrations of plasma progesterone in prepartum period in the normal parturition and elective caesarean section.

Materials and Methods
Healthy bitches presented at the Small animal teaching hospital for pregnancy diagnosis and prediction parturition were included in the study. Fetal biparietal measurements were performed to predict the day of parturition and to schedule blood collection for progesterone assay. Blood samples were taken from the cephalic or saphenous vein in heparinized tubes. Progesterone concentrations were determined by competitive FEIA method (ALPACK®, TOSOH Corp, Tokyo, Japan). Study I (normal parturition): During 5 days before parturition, a total of 29 blood samples were collected from 24 prepartal pregnant bitches that whelped normally. The day of parturition was recorded. Study II (caesarean section; CS): Elective CS was requested by dog’s owners to maximize puppy survivability in a particularly precious breeding. Planned caesarean section was carried out within 2 days before predicted normal whelping. A total of 26 blood samples submitted for progesterone assay commencing 2 days before operations and on the day of CS (day 0) in 17 bitches.

Results and Discussion
Mean progesterone concentrations 5, 3, 2 and 1 days before parturition were 5.76±1.68 (n = 3), 5.48±1.09 (n = 5), 4.64±0.36 (n = 3) and 2.75±1.75 ng/ml (n = 6), respectively. Mean plasma progesterone concentration was 1.42±0.69 ng/ml (n = 12) on the day of parturition. Results observed in the present study suggested that measurement of serum progesterone concentration is clinically useful for predicting impending parturition; the concentration was < 5 ng/ml from 2 days before whelping onwards.

Prior to the second stage of parturition, planned CS done in this study resulted in a favorable outcome for the bitches and near-term litters. Mean progesterone concentrations 2 and 1 days before CS were 4.88±1.90 (n = 4) and 3.52±2.30 ng/ml (n = 4), and 3.70±2.53 ng/ml (n = 13) on the day of surgery. It was suggested that planned CS can be safely performed after Day 63 post LH surge (5) which is 2 days before normal whelping. In addition to ovulation timing and/or fetal biometry for accurately predicting parturition date, progesterone concentration may help in timing elective CS. Our findings suggested that progesterone concentration of < 4 ng/ml is indicative for near-term elective CS. The present study provided information of near-term plasma progesterone concentrations obtained from clinical cases of different breeds that could be practically applied in the detection of impending parturition and to schedule a planned CS before normal whelping begins. However, near-term...
progesterone assay must be done in conjunction with other methods to estimate gestational age because it has been reported in a pregnant Beagle bitch that plasma progesterone concentrations are less than 2 ng/ml for 6 days before parturition (4).

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**References**