Ultrasonographic study of gestation in dogs and cats
Estudo ultrassonográfico da gestação em cães e gatos

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Abstract

Ultrasonographic examination provides useful information for monitoring fetal growth and for assessing gestational age. Among a wide variety of ultrasonographic fetal measurements, the diameter of the inner chorionic cavity (ICC) during early pregnancy and the biparietal (BP) diameter during late pregnancy are highly correlated with the gestational age and both highly reliable for the prediction of parturition term when specific formulae for different size bitches and for queens are applied. In clinical practice the prediction of parturition term is particularly valuable for planning clinical assistance of whelping or elective caesarean sections.

Keywords: cat, dog, pregnancy, ultrasound.

Resumo

O exame ultrassonográfico fornece informação útil para o monitoramento do crescimento fetal e avaliação da idade gestacional. Entre uma grande variedade de medidas fetais ultrassonográficas, o diâmetro da cavidade coriônica interna (ICC) durante o início da gestação e o diâmetro biparietal (BP) durante o final da gestação estão altamente correlacionados com a idade gestacional e ambos são confiáveis para a previsão do termo de gestação quando fórmulas específicas para cadelas e gatos de diferentes tamanhos são aplicadas. Na prática clínica, a predileção por termo de gestação é particularmente valioso para o planejamento da assistência clínica para parto ou cesárea eletiva.

Palavras-chave: gato, cão, gestação, ultrassom.

Ultrasonography is applied in veterinary medicine for the study of gestational development.

Canine and feline pregnancy lasts about 9 weeks from the ovulation day and the pregnancy diagnosis can be performed starting from week 2 o 3 of pregnancy in queens and bitches, respectively.

Soon after pregnancy diagnosis, embryos can be examined and in the following weeks the foetal growth can be carefully evaluated. During the examination, the accurate measurement of extrafoetal and foetal structures allows the determination of gestational age and the prediction of parturition term.

Among several extrafoetal and foetal ultrasonographic measurements (for review Luvoni and Beccaglia, 2006; Zambelli and Prati, 2006; Lopate, 2008), the inner chorionic cavity (ICC) in the early pregnancy, and the distance between parietal bones (biparietal diameter - BP) in the late pregnancy are highly correlated with the gestational age and provide a very accurate estimation of the day of parturition.

The measurement of the spherical ICC is determined by taking the mean of two ICC diameters made at 90° angles from one side of the trophoblastic decidual reaction to the other. Accurate measurements can be performed until embryonic vesicles appear regularly spherical with clearly defined margins. Then, the vesicle become elongate, and the measurement might be less precise.

The BP is visualized on a longitudinal scan of a foetal head. The distance is recorded when the parietal bones are parallel in order to standardize the measurement.

During the examination, the ICC or the BP should be measured on a minimum of two different fetuses. The mean value (in mm) of the data obtained from the measurement of each structure on different fetuses is calculated and the predicted day of parturition is obtained by the application of specific formulae.

Different formulae derived from foetal growth curves for bitches of different size and for queens have been developed (Luvoni and Grioni, 2000; Beccaglia et al., 2008).

The formulae we currently use are the followings:
- ICC in small size bitches: days before parturition = (mm – 68.68)/1.53;
- ICC in medium size bitches: days before parturition = (mm - 82.13)/1.8;
- ICC in queens: days before parturition = (mm – 62.03)/1.1;
- BP in small size bitches: days before parturition= (mm - 25.11)/0.61;
- BP in medium size bitches: days before parturition=(mm - 29.18)/0.7;
- BP in queens: days before parturition = (mm – 23.39)/0.47.

The prediction is considered accurate when the difference between actual and predicted parturition dates is within ±1 day or ±2 days.

We previously reported an overall accuracy of ICC and BP of 70 and 77% at ±1 day and of 86 and 85% at ±2 days, respectively (Beccaglia and Luvoni, 2006).

In queens overall accuracy of the prediction of parturition day based on ICC measurements was 65% at ±1 day and 85% and at ±2 days; while with BP was 73.9 and 91.3%, respectively (Beccaglia et al., 2008).

We also demonstrated that the accuracy of ICC and BP measurements is not affected by the prevalence of one gender in the litter. Thus, individual variability due to the male or female growth is negligible.

Litter size does not affect the overall accuracy of parturition date prediction in bitches (Kutzler et al., 2003). However, considering single ultrasonographic parameters we found that, whereas the parturition date prediction based on ICC is not affected by litter size, a higher accuracy is obtained with BP in normal litter size when compared with small and large litters (Beccaglia and Luvoni, 2006). Biparietal measurement, which is taken during late gestation, is likely affected by individual variability of growth when few fetuses are present or it may be less accurate when the overlapping of multiple fetuses in the same ultrasonographic image field occurs.

Furthermore, our recent results demonstrated that the accuracy of the prediction in bitches and queens is influenced by the gestational period when ultrasonographic measurements are performed, particularly for BP (Beccaglia and Luvoni, 2012).

Measurement of BP is highly accurate (±1 day) within the first 6 weeks of pregnancy; afterwards a gradual decrease of the accuracy is observed, thus maintaining a good accuracy at ±2 days until week 8. On the other hand, ICC measurement leads to a similar accuracy of the prediction at week 4 and 5.

In conclusion, the ultrasonographic examination provides useful information for studying the foetal growth and for assessing the gestational age. Among foetal parameters, ICC and BP are easily identifiable and allow an accurate prediction of parturition term.

In clinical practice predicting the day of parturition is particularly valuable in cases of uncertain mating times or when other information for determining gestation age (that is, day of luteinizing hormone surge, day of initial rise in progesterone or day of ovulation in the bitch, day of coitus-induced ovulation in the queen) are unavailable. An estimated due term allows the planning of clinical assistance of whelping and the schedule of elective caesarean sections with the certainty that the complete foetal maturation has occurred.

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