ABSTRACTS
ISCFR 2012
July 26-29, Whistler, Canada

7th International Symposium on
Canine and Feline Reproduction

In a joint meeting with
EVSSAR 2012
15th Congress of the
European Veterinary Society for Small Animal Reproduction

Editors: Gary England, Michelle Kutzler, Pierre Comizzoli, Wojciech Nizanski, Tom Rijsselaere and Patrick Concannon

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Uterine doppler velocimetry in bitches with cystic endometrial hyperplasia-pyometra

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OBJECTIVES AND METHODS: The presumptive diagnosis of Cystic Endometrial Hyperplasia (CEH)-Pyometra Complex is generally determined through two-dimensional ultrasound examination. However, differential diagnosis between CEH-mucometra, endometritis and pyometra is achieved by the combined analysis of ultrasonographic findings, clinical signs, as well as uterine macroscopic and histological evaluation. In order to establish an accurate, precocious and noninvasive method of diagnosis, the aim of this study was to characterize uterine blood flow in bitches with distinct uterine pathological conditions. For this purpose, we allocated 14 bitches into 4 groups, according to clinical signs, ultrasound analysis and uterine histological examination: Diestrus Group (n = 1), CEH-mucometra Group (n = 5); Endometritis Group (n = 3) and Pyometra Group (n = 5). Scanning of the uterine horns by colour Doppler was performed for quantitative assessment of the overall uterine vascularization. An arbitrary score from 1 to 4 was adopted, being score 1 the minimum degree of uterine vascularization and score 4, maximum vascularization. Doppler velocimetry of right and left uterine arteries was performed at the level of the uterine body in longitudinal section. With the use of colour Doppler, the gate was positioned when a vessel with good colour signals could be identified. Subsequently, flow velocity waveforms were obtained with the pulsed-wave Doppler. Parameters of blood flow velocity such as systolic peak velocity (SPV), end-diastolic peak (EDV) and time-average maximum velocity (TAMAX), as well as hemodynamic parameters such as resistance index (RI), pulsatility index (PI) and systolic-diastolic ratio (S/D) were calculated electronically. We used similar consecutive waveforms for at least nine waveforms of good quality to obtain the final Doppler index. Sample volume was positioned in the middle of the vessel and the insonation angle did not exceed 60° after correction. This study was approved by the Bioethics Committee of the College of Veterinary Medicine - USP.

RESULTS: Groups showed quantitative variations of uterine vascularization: Diestrus Group - minimum and maximum of score 1, CEH Group - minimum of score 1 and maximum of score 2; Endometritis Group - minimum of score 1 and maximum of score 3; Pyometra Group - minimum of score 3 and maximum of score 4. No differences were observed between right and left uterine arteries in Doppler velocimetry. However, Diestrus and CEH Groups (SPV: 41.88±4.32; EDV: 0.55±0.02; TAMAX: 7.16±0.25 and SPV: 58.67±2.67; EDV: 8.47±0.48; TAMAX: 18.42±1.13, respectively) showed lower blood flow velocities when compared to Endometritis and Pyometra Groups (SPV: 93.54±9.76; EDV: 37.60±3.84; TAMAX: 53.88±5.38 and SPV: 71.09±21.26; EDV: 29.56±10.48; TAMAX: 40.37±13.91, respectively). Conversely, Diestrus and CEH Groups (RI: 0.99±0.0; PI: 6.06±1.05; S/D: 76.39±10.76 and RI: 0.85±0.0; PI: 2.82±0.14; S/D: 7.46±0.48, respectively) presented higher hemodynamic indices in comparison to Endometritis and Pyometra Groups (RI: 0.61±0.01; PI: 1.11±0.05; S/D: 2.68±0.10 and RI: 0.62±0.01; PI: 1.34±0.07; S/D: 2.57±0.24). In the latest Groups, uterine perfusion was characterized as continuous blood flow.

CONCLUSIONS: This study demonstrated that the changes in uterine diameter and, especially, the presence of inflammatory process culminate with the rise in uterine blood flow, marked by low resistance and pulsatility. In addition, the severity of the uterine disease is associated with low blood flow, thus contributing to further dissemination of the infectious agent. Doppler velocimetric evaluation may be a promising adjuvant diagnostic tool for uterine disorders, mainly because of its noninvasive feature. It may allow for the differential diagnosis between CEH-mucometra and endometritis-pyometra, whenever clinical symptoms and ultrasonographic findings are inconclusive. Hence, erroneous and/or unnecessary treatment can be avoided.