

COMPARISON BETWEEN ENDOMETRIAL ECHOTEXTURE AND ENDOMETRIAL HISTOPATHOLOGICAL FEATURES IN MARES

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The collection and examination of endometrial biopsy samples is used as a definitive diagnostic tool to evaluate histopathological changes of the equine endometrium, however the procedure is invasive and carries the risk of potential adverse complications. The main objectives of this study were to investigate the relationship between quantitative endometrial echotextural characteristics and features of endometrial biopsies such as the degree of fibrosis or Kenney-Doig score. Mares (n = 61, 3 to >20 years old) were examined using B mode transrectal ultrasonography (Aloka 500) and a 5 MHz linear probe. Still frame ultrasound images of the endometrium, and endometrial biopsy samples were collected from left and right uterine horns. Four sample spots (15 mm in diameter) were placed in each quadrant of the endometrial ultrasound image. The pixels within each spot were assigned a numeric value corresponding to their gray scale value. An overall mean numerical pixel value (NPV) and standard deviation were calculated by averaging the NPV of 4 spots. Jugular blood samples were collected for progesterone analysis to confirm the stage of estrus. Histopathological features of endometrial biopsy samples were independently evaluated by 2 individuals blinded to the identity of samples according to the Kenney-Doig grading system (Kenney R.M. 1986). The degree of endometrial fibrosis was rated from minimum to maximum. (minimum - none or 1 layer of fibrosis, sparsely scattered; mild – 2 to 3 layers of fibrosis, frequent scattered; moderate – 3 to 5 layers, widespread, and < 2 fibrotic nest per 5.5 mm; severe - >5 layers, >2 fibrotic nests per 5.5 mm nests). Mare age was classified as young <6 years (y), middle aged 6-12 y and old $\geq$ 13 y). A one-way analysis of variance (ANOVA), or Kruskal-Wallis analysis, if the data was not normally distributed, were used to investigate the effects of: endometrial biopsy grade, categories for degree of endometrial fibrosis, uterine horn, and age groups on the mean of NPV for endometrial ultrasound images. Post hoc differences between means were tested using a least significant difference (LSD) method. Examiners had 90.5% agreement on the biopsy grade and 96.7% degree of endometrial fibrosis in the samples. Biopsy samples from left and right uterine horns had similar biopsy grades (91.4%) and degrees of fibrosis (88.6%). There were no differences between uterine horns in the degree of fibrosis or biopsy grade within each category for age, however older mares had significantly higher biopsy grades in samples collected from both the left and right uterine horns ($p = 0.0229$ and $p = 0.0228$, respectively). Significantly higher endometrial mean NPV ($p = 0.0077$) were present in samples collected from the right ($p=0.0451$), but not left ($p = 0.245$) uterine horns. Post hoc analysis showed that there were higher mean NPV in grade III versus: grade I ($p = 0.041$), grade IIA ($p=0.008$) and grade IIB ($p=0.047$) biopsies. The difference between left and right horns may be due to small numbers, error, or gas echos from adjacent bowel in the right side. Using the present ultrasound equipment and computer assisted ultrasound image analysis technology was able to detect some associations between mean endometrial NPV and biopsy grade, but not degree of endometrial fibrosis. Further studies with larger numbers of mares are required to confirm these findings. Key Words: endometrium, biopsy, echotexture, fibrosis