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Early Magnetic Resonance Imaging of Experimentally Induced Legg-Calve-Perthes Disease in Dogs

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Introduction: To evaluate the different characteristics of MR signal intensity in the early Legg-Calve-Perthes disease(LCPD), the sensitivity contrast-enhanced T1-weighted images was compared with T1-weighted pre-contrast images.

Materials and methods: Avascular necrosis of the femoral head was produced in fifteen premature dogs by surgically placing a 1-0 nonabsorbable ligature around the femoral neck. Physical examination, radiography, and MRI were performed during 7 days after surgery and at the 14th, 21st, and 28th postoperative day, respectively. On radiographs, we staged LCPD using the Steinberg modification classification. MRI involved T2-weighted images, T1-weighted images, and gadodiamide (Omniscan®) contrast-enhanced images.

Results: MRI for LCPD was positive, though osseous changes were not shown on radiographs throughout the study. The early MR signal intensity patterns during the study were as follows: (1) homogeneous low signal was gradually increased on T2- and T1-weighted images and decreased on contrast enhanced images; (2) homogeneous high signal was gradually decreased on T2WI and increased on contrast-enhanced images; (3) crescent sign, one of the LCPD characteristic findings, was gradually decreased on T2WI and increased on contrast-enhanced images; (4) focal high signal was gradually increased on T2- and T1-weighted images (5) double line sign, also one of the LCPD characteristic findings, was peaked between 4 days and 7 days after surgery; (6) low band sign was gradually increased all images. The ROI on T2WI was peaked at P2 and the ROI on contrast-enhanced images had the lowest at P1.

Clinical relevance: Combination of T2WI and pre- and post-contrast T1-weighted images were enough to evaluate LCPD.

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