The clinical significance of orthopedic examination, diagnostic imagings and cartilage metabolic markers in experimental canine osteoarthritis at its early stage

Asako Omachi

Laboratory of Veterinary Surgery
Department of Veterinary Clinical Sciences
School of Veterinary Medicine
Hokkaido University, Sapporo 060-0818, Japan

The objective of this study is to evaluate the clinical significance of cartilage metabolic markers, findings of orthopedic examination and diagnostic imagings to recognize the pathophysiology of canine osteoarthritis (OA) at its early stage.

The experimental canine OA of the left stifle joint was established by arthroscopic transection of anterior cruciate ligament (ACL) in 5 healthy beagle dogs. Gait and pain examinations were performed in day 0 (before surgery), immediately after surgery, 3, 7, 14, 28, 42, 56, 70 and 84 after surgery. Conventional radiographs and computed tomographs (CT) were investigated in day 0, 7, 14, 28, 42, 56, 70 and 84. The concentration of sulfated glycosaminoglycans (s-GAG) in synovial fluid, which was collected in day 0, 3, 7, 14, 28, 42, 56, 70 and 84, was measured by dimethylmethylene blue dye-binding method. The concentrations of promatrix metalloproteinase (proMMP-3) and chondrocalcin in synovial fluid, which was collected in day 0, 7, 14, 28, 56 and 84, were measured by sandwich-ELISA. The dogs were euthanized 84 days after surgery, then gross and histologic exami-nations were performed.

Gross and histological findings revealed that the experimental transection of ACL induced early stage of OA in all left stifles. The concentration of s-GAG in synovial fluid collected from the affected joints significantly decreased from day 3 to day 14. The concentration of proMMP-3 in all samples was below detectable value. The concentration of chondrocalcin in synovial fluid of the affected joint was significantly increased in day 7. Osteophyte formation in conventional radiography was found 42 days after surgery, while new bone formation in CT images was done 14 days after surgery.

These results indicate that CT images are superior for the detection of bonny lesion in OA at its early stage to conventional radiography. Before these morphological changes in the joint were found in CT images, the significant changes of the concentrations of s-GAG and chondrocalcin were found. It is therefore suggested that the cartilage metabolic markers are of further value to detect the pathology of cartilage in canine OA before the morpho-logic changes were found in diagnostic imaging.