Introduction
Rapidly destructive coxopathy (RDC) is characterized by rapid destruction of the femoral head and/or acetabulum within 6-12 months, and causes severe hip pain and disability in mostly middle-aged and elderly women.1 Mechanical factors and immunological factors have been suggested as a primary cause of RDC. Mechanical factors include a subchondral insufficiency fracture of femoral head and increasing pelvic posterior inclination.2,3 Immunological factors include MMP-3,9 in blood and IL-6 in T cells.4,5 Histological features are severe destruction of cartilage and bone along with invasion of nonspecific granulation tissue composed of macrophages and fibroblastic cells. To determine the detailed histological characteristics of RDC, we analyzed whole femoral head and synovial membrane of RDC compared with rheumatoid arthritis (RA), common hip osteoarthritis (OA), and femoral neck fracture (Fx).

Methods
200 whole femoral heads were investigated. There were 44 hips with RDC, and for comparison, 10 hips with RA, 65 hips with OA, 81 hips with Fx. The mean age was 73 years in RDC, and the age and gender were matched in each group. The diagnosis of RDC was done on plain radiographs and MRI of the hip, which showed diffuse low signal intensity area in the femoral head and neck on T1WI, and high signal intensity area on T2WI with or without rapidly destructive findings (Figure1). All femoral heads and synovial membranes were retrieved at the coronal sections, fixed in formalin, and decalcified by EDTA before being embedded in paraffin. To investigate the relationship with osteoclastogenesis, all femoral head specimens were stained for HE and TRAP. In addition, these specimens were immunohistochemically stained by anti-RANKL, anti-RANK, anti-Cd68, and anti-MMP9 antibodies. We performed real-time quantitative reverse transcription-polymerase chain reaction (RT-PCR). We measured the mRNA levels of RANKL, the major mediator of osteoclastogenesis, synovial membranes expressed. Chi-square test and Kruskal-Wallis test were used for the statistical analysis. The level of significance was set at P<0.05.

Results
TRAP positive cells accumulated in the fibrous tissues of the subchondral area within the femoral head in RDC (32/44, 73%), RA (3/10, 30%), OA (1/65, 2%) and Fx (0/81, 0%) (p<0.001). Even before the femoral heads represent severe destructive changes in RDC, TRAP positive cells accumulated and RANKL positive cells were detected (Figure2). The mean relative mRNA level of RANKL was 9.1 in RDC, 6.3 in RA, 6.0 in OA, and 1 in Fx (p<0.001), while the mean relative mRNA level of OPG was 1.2 in RDC, 0.5 in RA, 0.6 in OA, and 1 in Fx (Figure4).

Discussion and Conclusion
TRAP positive cells accumulated and RANKL positive cells were detected in the fibrous tissues at subchondral area within the femoral head in RDC, compared with RA, OA, and Fx, even before the femoral heads show severe destructive changes. These findings may be specific histological findings of RDC. In TRAP positive cells, MMP9 were also detected. These differences may be the cause of more rapidly destruction of hip joint than RA, OA and Fx. The mRNA level of RANKL is higher than RA, OA and Fx in synovial membrane. In RDC, RANKL positive cells that activate the TRAP positive cells, may be related with destruction of the articular cartilage and subchondral bone.

REFERENCES