

A Rabbit Model of Hormone-induced Early Avascular Necrosis of the Femoral Head¹

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Objective To establish an experimental model of early stage avascular necrosis of the femoral head (ANFH) caused by corticosteroid in adult rabbits and to observe the pathological changes with various imaging techniques. **Methods** ANFH was induced by a combination of hypersensitivity vasculitis caused by injection of horse serum and subsequent administration of a high dose of corticosteroid. The pathological changes were detected with digital radiography (DR), computed tomography (CT), magnetic resonance imaging (MRI), ink artery infusion angiography, hematoxylin-eosin staining, and immunohistochemistry. **Results** The imageological and pathological changes corresponded to the clinical characteristics of early stage ANFH. DR showed bilaterally increased bone density, an unclear epiphyseal line, and blurred texture of cancellous bone. CT showed spot-like low-density imaging of cancellous bone, thinner cortical bone, osteoporosis, and an unclear epiphyseal line. MRI showed bone marrow edema and spot-like high signals in T2-weighted imaging in cancellous bone. Ink artery infusion angiography showed fewer obstructed blood vessels in the femoral head. HE staining of pathological sections showed fewer trabeculae and thin bone, an increased proportion of empty osteocyte lacunae, decreased hematopoiesis, thrombosis, and fat cell hypertrophy. Immunohistochemistry showed attenuated expression of vascular endothelial growth factor in osteoblasts and chondrocytes, and on the inner membrane of blood vessels. **Conclusion** Experimental rabbit model of early stage ANFH caused by corticosteroid can be successfully established and provide the foundation for developing effective methods to treat early stage ANFH.

Key words: Avascular necrosis of the femoral head; Corticosteroid; Animal model

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