

Age-related changes in the hemodynamics of the femoral head as evaluated by early phase of bone scintigraphy

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Objective: The femoral head is reported to be in a markedly hypoemic state as compared with other tissues even under normal conditions, and it is therefore necessary to understand its hemodynamics to investigate the pathogenesis of hip disorders. It is known that aspects of intraosseous hemodynamics including blood flow and blood pool can be evaluated soon after radioisotope administration. In this study, hemodynamic changes in the femoral head according to gender and age were examined by investigating accumulation of radioisotope in the tissue during the early phase of bone scintigraphy. **Methods:** The subjects of this study consisted of 58 joints of 31 men and 75 joints of 41 women, whose ages ranged from 15 to 87 years (average age: 67.9 years). Images of bone scintigraphy were obtained for 15 to 20 minutes at 5 minutes and at 3 hours after radioisotope administration. The ratio of accumulation in the femoral head to that in the diaphysis (head-to-diaphysis ratio, HD ratio) was calculated. **Results:** HD ratios obtained 15–20 minutes later ranged from 0.01 to 7.35 (1.88 ± 0.91 , mean \pm SD). HD ratios decreased with age, and a significant inverse correlation was observed between age and HD ratio, demonstrating a correlation coefficient of -0.27 ($p = 0.001$). The HD ratio among men was 0.01–3.57 (1.66 ± 0.71), while that among women was 0.53–7.35 (2.05 ± 1.01), and a significant difference was observed in HD ratio between men and women ($p = 0.02$). There was a significant difference in HD ratios between men and women in their teens to forties ($p = 0.03$), while no significant differences was observed in the other age groups. HD ratios obtained 3 hours later ranged from 0.44 to 6.32 (1.95 ± 0.79 , mean \pm SD), and no significant correlation was observed between age and HD ratio, demonstrating a correlation coefficient of -0.14 . **Conclusion:** The present study demonstrated that blood flow and blood pool of the femoral head decrease with aging particularly in women. This hemodynamic deterioration of the femoral head caused by aging may have an effect on the onset and progression of hip disorders by influencing bone metabolism.

Key words: early phase, bone scintigraphy, blood flow, blood pool, femoral head