

Finite element analysis of proximal femur under static loading during sideway fall

Abstract

A femoral fracture happens when the femur gains a very high stress concentration during fall and may results in femur fracture. In fact, most of fall-related cases occur in sideways fall. Bone fracture leads to life quality impairment and even life threatening. In this study, the effect of quasi-static loading on the femur bone during sideway fall is investigated by employing Finite Element (FE) software, ANSYS. The FE model is developed and simulated in the different fall conditions; inclination angle of 10° and rotation angle from -20° to 30° . The capacity of the bone is evaluated in terms of von Mises stress and deformation. The highest stress concentration is found at femoral neck region. 30° rotation angle with 10° inclination angle is observed as the critical loading direction at which the femoral neck may results in fracture. The understanding of the effect of loading magnitude and direction on the femoral bone capacity obtained herewith is useful in assisting the medical practitioner to provide better treatment and reduce repeated treatment cases.