Design and Analysis of Partial Replacement of Hip Prosthesis

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ABSTRACT

With the increase of age, there are many diseases caused by joint wearing and degenerative. So far, the artificial hip joints have been fully developed and become an important treatment of joint wearing and degenerative. In recent years, minimally invasive surgery is a popular surgery used in the artificial hip joint replacement. Shortening the procedure of the surgery and reducing the cutting bones is the major tendency at present. The patient needs fast recovery time and a small scar after the surgery. This research is to design three kinds of artificial hip joint replacement with above-mentioned concept of customization.

After implanting the artificial hip joint, the stress concentrates on the implants and the proximal femur may be rebuilt and shrink with less load. As the displacement of implants and bones get big, a fibrosis soft tissue is caused between the implants and the bones, which induces loosen conditions after the artificial hip joint replacement. The study is to apply the finite element analysis to analyze and imitate the stress distribution condition of the biomaterials implants and femur, to explore the stability between the implants and the femur with different human gait pressure loading and to observe the influence of Tresca on the screws. According to the simulated results, the value in all respects show that the customization design of femur shape is approved to be a better design than the standard design under the imitation analysis of stress distribution, stability and Tresca of Von Mise. The material made of CoCrMo alloy is performed better by the analyzed results.

Keywords : Partial Replacement of Hip Prothesis、finite element analysis、joint wearing and degenerative、customization.

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